ON

THE FUNCTIONS OF THE BRAIN

AND

OF EACH OF ITS PARTS:

WITH

OBSERVATIONS ON THE POSSIBILITY OF DETERMINING THE INSTINCTS, PROPENSITIES, AND TALENTS, OR THE MORAL AND INTELLECTUAL DISPOSITIONS OF MEN AND ANIMALS, BY THE CONFIGURATION OF THE BRAIN AND HEAD.

ON THE

ORIGIN OF THE MORAL QUALITIES

AND

INTELLECTUAL FACULTIES

OF

MAN,

AND THE CONDITIONS OF THEIR MANIFESTATION.

By FRANCOIS JOSEPH GALL, M. D.

TRANSLATED FROM THE FRENCH,

By WINSLOW LEWIS, Jr., M. D., M. M. S. S.

IN SIX VOLUMES.

VOLUME I.

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DEDICATION.

TO

PROFESSOR ELLIOTSON,

OF THE LONDON UNIVERSITY:

DISTINGUISHED ALIKE

AS THE

SCIENTIFIC PHYSICIAN AND THE ABLE ADVOCATE

OF THE SCIENCE OF THE MIND,

THIS TRANSLATION

IS MOST RESPECTFULLY INSCRIBED, BY

THE TRANSLATOR

TRANSLATOR'S PREFACE.

THE discoveries of Gall have hitherto been promulgated in Great Britain, and in this country, by means of the works of his disciples; and the greatest and last labor of the 'créateur de la physiologie du cerveau,' has, until now, been suffered to remain as 'sealed volumes,' to those ignorant of the language in which they originally appeared. It is now, at least conceded, that the labors of Gall, and his no less illustrious associate, have been the foundation of all the additions made to the knowledge of the nervous system, additions which have been followed by important practical results. The basis of the great superstructure is now given to the public in these volumes, the first five of which contain the physiological exposition of the brain, and the sixth, Gall's defence of his views of the anatomy of that organ, in critical analyses of the opinions of Tiedemann, Jourdan, &c. &c. It will be found a work of great interest, on a great subject. 'If Phrenology be the exposition of the true functions of the brain, and of the real philosophy of mind, it obviously carries consequences of the greatest magnitude in its train. It will not remove the mystery which hangs over the connection be-

tween mind and matter, betwixt that which thinks, and that which does not think; but it has opened new and most important views of *the manner* in which corporeal and mental constitutions of man influence, or act and react on each other; and Dr. Gall's name will, in consequence, stand second to none that has hitherto graced the annals of scientific discovery.' He, who has thus led the way to anatomical and physiological accuracy, in investigations of the brain, should be known by his own writings, and this translation has been, therefore, prepared, to introduce to the English reader, the productions of one of the greatest modern philosophers. As MARSH, CAPEN & LYON have it in view to publish the plates, illustrative of this work, at some future time, we have retained the references to them, as they stand in the original.

W. L., JR.

Boston, September, 1835.

CONTENTS.

SECTION III.

SECTION IV.

SECTION V.

BIOGRAPHY OF DR. GALL.*

FRANÇOIS JOSEPH GALL was born in a village of the Grand Duchy of Baden, on the 9th of March, 1758. His father was a merchant and mayor of Tiefenbrun, a village two leagues distant from Pforzheim, in Swabia. His parents, professing the Roman Catholic religion, had intended him for the church; but his natural dispositions were opposed to it. His studies were pursued at Baden, afterwards at Brucksal, and then were continued at Strasburg. Having selected the healing art for his profession, he went, in 1781, to Vienna, the Medical School of which had obtained great reputation, particularly since the times of Van Swieten and Stahl.

Dr. Gall gives an account, of which the following is an abstract, of the manner in which he was led to the study of the natural talents and dispositions of men, his views of which terminated in the formation of the Phrenological System.

From an early age he was given to observation, and was struck with the fact, that each of his brothers and sisters, companions in play, and schoolfellows, possessed some peculiarity of talent or disposition, which distinguished him from others. Some of his schoolmates were distinguished by the beauty of their penmanship, some by their success in arithmetic, and others by their talent for acquir-

* This Biography is compiled chiefly from "The Transactions of the Edinburgh Phrenological Society," "The Edinburgh Phrenological Journal," and the "*Journal de la Société Phrénologique de Paris.*" ED.

ing a knowledge of natural history, or of languages. The compositions of one were remarkable for elegance, while the style of another was stiff and dry; and a third connected his reasonings in the closest manner, and clothed his argument in the most forcible language. Their dispositions were equally different, and this diversity appeared also to determine the direction of their partialities and aversions. Not a few of them manifested a capacity for employments which they were not taught: they cut figures in wood, or delineated them on paper: some devoted their leisure to painting, or the culture of a garden, while their comrades abandoned themselves to noisy games, or traversed the woods to gather flowers, seek for birds' nests, or catch butterflies. In this manner each individual presented a character peculiar to himself; and Gall never observed, that the individual, who, in one year, had displayed selfish or knavish dispositions, became in the next a good and faithful friend.

The scholars with whom young Gall had the greatest difficulty in competing, were those who learned by heart with great facility; and such individuals frequently gained from him by their repetitions the places which he had obtained by the merit of his original compositions.

Some years afterwards, having changed his place of residence, he still met individuals endowed with an equally great talent of learning to repeat. He then observed, that his schoolfellows, so gifted, possessed prominent eyes; and he recollected, that his rivals in the first school had been distinguished by the same peculiarity. When he entered the University, he directed his attention, from the first, to the students whose eyes were of this description, and he soon found that they all excelled in getting rapidly by heart, and giving correct recitations, although many of them were by no means distinguished in point of general talent. This observation was recognized also by the other students in the classes; and, although the connection betwixt the talent and the external sign was not at this time established upon such complete evidence as is requisite for a philosophical conclusion, yet Dr. Gall could not believe that the coincidence of the two circumstances thus observed was entirely accidental. He sus-

pected, therefore, from this period, that they stood in an important relation to each other. After much reflection, he conceived, that if Memory for words was indicated by an external sign, the same might be the case with the other intellectual powers; and, from that moment, all individuals distinguished by any remarkable faculty became the objects of his attention. By degrees, he conceived himself to have found external characteristics, which indicated a decided disposition for Painting, Music, and the Mechanical Arts. He became acquainted, also, with some individuals remarkable for the determination of their character, and he observed, a particular part of their heads to be very largely developed. This fact first suggested to him the idea of looking to the head for signs of the Moral Sentiments. But in making these observations, he never conceived, for a moment, that the *skull* was the cause of the different talents, as has been erroneously represented;—he referred the influence, whatever it was, to the Brain.

In following out, by observations, the principle which accident had thus suggested, he for some time encountered difficulties of the greatest magnitude. Hitherto he had been altogether ignorant of the opinions of Physiologists, touching the brain, and of Metaphysicians respecting the mental faculties, and had simply observed nature. When, however, he began to enlarge his knowledge of books, he found the most extraordinary conflict of opinions every where prevailing, and this, for the moment, made him hesitate about the correctness of his own observations. He found that the moral sentiments had, by an almost general consent, been consigned to the thoracic and abdominal viscera; and, that while Pythagoras, Plato, Galen, Haller, and some other Physiologists, placed the sentient soul or intellectual faculties in the brain, Aristotle placed it in the heart, Van Helmont in the stomach, Des Cartes and his followers in the pineal gland, and Drelincourt and others in the cerebellum.

He observed also that a greater number of Philosophers and Physiologists asserted, that all men are born with equal mental faculties; and that the differences observable among them are owing either to education, or to the accidental circumstances in which they are placed.

If all differences are accidental, he inferred that there could be no natural signs of predominating faculties, and consequently, that the project of learning, by observation, to distinguish the functions of the different portions of the brain, must be hopeless. This difficulty he combated, by the reflection that his brothers, sisters, and schoolfellows had all received very nearly the same education, but that he had still observed each of them unfolding a distinct character, over which circumstances appeared to exert only a limited control. He observed also, that not unfrequently they, whose education had been conducted with the greatest care, and on whom the labors of teachers had been most freely lavished, remained far behind their companions in attainments. "Often," says Dr. Gall, "we were accused of want of will, or deficiency in zeal; but many of us could not, even with the most ardent desire, followed out by the most obstinate efforts, attain in some pursuits even to mediocrity; while in some other points, some of us surpassed our schoolfellows without an effort, and almost, it might be said, without perceiving it ourselves. But, in point of fact, our masters did not appear to attach much faith to the system which taught the equality of mental faculties; for they thought themselves entitled to exact more from one scholar, and less from another. They spoke frequently of natural gifts, or of the gifts of God, and consoled their pupils in the words of the gospel, by assuring them that each would be required to render an account, only in proportion to the gifts which he had received." *

Being convinced, by these facts, that there is a natural and constitutional diversity of talents and dispositions, he encountered, in books, still another obstacle to his success in determining the external signs of the mental powers. He found that, instead of faculties for languages, drawing, distinguishing places, music, and mechanical arts, corresponding to the different talents which he had observed in his schoolfellows, the metaphysicians spoke only of general powers, such as perception, conception, memory, im-

* Preface by Dr. Gall to the "Anatomie, &c. du Cerveau."

agination, and judgment; and when he endeavored to discover external signs in the head, corresponding to these general faculties, or to determine the correctness of the physiological doctrines regarding the seat of the mind, as taught by the authors already mentioned, he found perplexities without end, and difficulties insurmountable.

Dr. Gall, therefore, abandoning every theory and preconceived opinion, gave himself up entirely to the observation of nature. Being Physician to a Lunatic Asylum in Vienna, he had opportunities, of which he availed himself, of making observations on the insane. He visited prisons, and resorted to schools: he was introduced to the courts of Princes, to colleges and the seats of Justice; and wherever he heard of an individual distinguished in any particular way, either by remarkable endowment or deficiency, he observed and studied the development of his head. In this manner, by an almost imperceptible induction, he conceived himself warranted in believing that particular mental powers are indicated by particular configurations of the head.

Hitherto he had resorted only to Physiognomical indications, as a means of discovering the functions of the brain. On reflection, however, he was convinced that Physiology was imperfect when separated from Anatomy. Having observed a woman of fifty-four years of age, who had been afflicted with hydrocephalus from her youth, and who, with a body a little shrunk, possessed a mind as active and intelligent as that of other individuals of her class, Dr. Gall declared his conviction, that the structure of the brain must be different from what was generally conceived,—a remark which Tulpius also had made, on observing a hydrocephalic patient, who manifested the mental faculties. He, therefore, felt the necessity of making anatomical researches into the structure of the brain.

In every instance, when an individual, whose head he had observed while alive, happened to die, he used every means to be permitted to examine the brain, and frequently did so; and he found, as a general fact, that on removal of the skull, the brain, covered by the dura mater pre-

sented a form corresponding to that which the skull had exhibited in life.

The successive steps by which Dr. Gall proceeded in his discoveries, are particularly deserving of attention. He did not, as many have imagined, first dissect the brain, and pretend by that means to have discovered the seats of the mental powers; neither did he, as others have conceived, first map out the skull into various compartments, and assign a faculty to each, according as his imagination led him to conceive the place appropriate to the power. On the contrary, he first observed a concomitance betwixt particular talents and dispositions, and particular forms of the head: he next ascertained, by removal of the skull, that the figure and size of the brain are indicated by these external forms; and it was only after these facts were determined, that the brain was minutely dissected, and light thrown upon its structure.

Dr. Gall was first known as an author by the publication of two chapters of an extensive work, entitled, "Philosophisch-medicinische Untersuchungen über Natur und Kunst im gesunden und kranken Zustande des Menschen, Wien, 1791." The continuation of this work has never appeared; but, in the first of the two chapters printed, he has evinced the spirit with which his researches into the moral and intellectual nature of man were subsequently conducted. The first written notice of his inquiries concerning the head appeared in a familiar letter to Baron Retzer, which was inserted in the German periodical journal "Deutschen, Mercur," in December, 1798. In this letter he announces the publication of a work upon his views concerning the brain; but circumstances induced him to alter his intention.

In reading it, one will be surprised to find contained in so few pages, written so long ago, all the principles of the physiology of the brain. It will be observed, that Gall clearly defined the object of his researches; to wit, a knowledge of the brain, in relation to the fundamental qualities of man, illustrated by that of the instincts and propensities of animals in connection with their cerebral organization. The reader will perceive in it all the useful applications which he proposed to make of his new doctrines to medi-

cine, to morals, to legislation, to every thing, in a word, which relates to the physical, moral, and intellectual nature of man.

This paper is a valuable document for the history of the science, and should convince every one that to Gall alone, belongs the glory of having discovered the true physiology of the brain.*

Letter from Dr. F. J. Gall, to Joseph Fr. De Retzer, upon the Functions of the Brain, in Man and Animals.†

I have at last the pleasure, my dear Retzer, of presenting you a sketch of my Treatise upon the Functions of the Brain; and upon the possibility of distinguishing some of the dispositions and propensities, by the shape of the head and the skull. I have observed, that many men of talent and learning, awaited with confidence the result of my labors, while others set me down as a visionary, or a dangerous innovator.

But, to the subject: my purpose is to ascertain the functions of the brain in general, and those of its different parts in particular; to show that it is possible to ascertain different dispositions and inclinations by the elevations and depressions upon the head; and to present in a clear light the most important consequences which result therefrom to medicine, morality, education, and legislation—in a word, to the science of human nature.

To do this effectually, it is necessary to have a large collection of drawings and plans. Therefore, with regard to particular qualities and their indications only, I shall now submit to my readers so much as is necessary for the establishment and illustration of the fundamental principles.

The particular design of my work is to mark the historical outline of my researches; to lay down the principles, and to show their application. You will readily conceive, that the study of the real springs of thought and action in man, is an arduous undertaking. Whether I succeed or not, I shall count upon your indulgence and support, if only on account of the hardihood of the enterprise.

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* Fossati.

† Journal de la Société Phrénologique de Paris.

Be so good as to recollect, that I mean by the head or cranium, the bony box which contains the brain; and of this, only those parts which are immediately in contact with it. And do not blame me for not making use of the language of Kant. I have not made progress enough in my researches to discover the particular organ for sagacity, for depth, for imagination, for the different kinds of judgment, &c. I have even been sometimes wanting precision in the definition of my ideas, my object being to make known to a large number of readers the importance of my subject.

The whole of the work is divided into two parts, which together makes about ten sheets.

Part I.

contains the principles. I start with my readers from that point to which nature had conducted me.* After having collected the result of my *tedious experiments*, I have built up a theory of their laws of relation. I hasten to lay before you the fundamental principles.

I. The faculties and the propensities innate in man and animals.

You surely are not the man to dispute this ground with me; but, follower of Minerva, you should be armed to defend her cause. Should it appear from my system, that we are rather slaves, than masters of our actions, consequently dependent upon our natural impulses, and should it be asked what becomes of liberty? and how can the good or evil we do, be attributed to us?—I shall be permitted to give you the answer, by extracting it literally from my preface. You can strengthen the argument by your metaphysical and theological knowledge.

Those who would persuade themselves, that our dispositions (or qualities) are not innate, would attribute them to education. But have we not alike acted passively, whether we have been formed by our innate dispositions, or by edu-

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* The original is obscure: the author means, probably, that nature, or the natural process of induction, having led him to certain principles, he starts from them with his readers. Tr.

cation ? By this objection, they confound the ideas of faculties, inclinations, and simple disposition, with the mode of action itself. The animals themselves are not altogether subject to their dispositions and propensities. Strong as may be the instinct of the dog to hunt, of the cat to catch mice, repeated punishments will, nevertheless, prevent the action of their instincts ! Birds repair their nests when injured; and bees cover with wax any carrion which they cannot remove. But man possesses, besides the animal qualities, the faculty of speech, and unlimited *educability*,—two inexhaustible sources of knowledge and action. He has the sentiment of truth and error, of right and wrong: he has the consciousness of free-will; the past and the future may influence his action; he is endowed with moral feeling, with conscience, &c. Thus armed, man may combat his inclinations: these indeed have always attractions, which lead to temptation; but they are not so strong, that they cannot be subdued and kept under by other and stronger inclinations which are opposed to them. You have a voluptuous disposition, but, having good morals, conjugal affection, health, regard for society and for religion, as your preservatives, you resist it. It is only this struggle against the propensities which gives rise to virtue, to vice, and moral responsibility. What would that self denial, so much recommended, amount to, if it did not suppose a combat with ourselves? and then, the more we multiply and fortify the preservatives, the more man gains in free agency and moral liberty. The stronger are the internal propensities, the stronger should be the preservatives; from them result the necessities and the utility of the most intimate knowledge of man, of the theory of the origin of his faculties and inclinations, of education, laws, rewards, punishments, and religion. But the responsibility ceases, even according to the doctrine of the most rigid theologians, if man is either not excited at all, if he is absolutely incapable of resistance when violently excited. Can it be, that there is any merit in the continence of those who are born eunuchs? Rush mentions the case of a woman, who, though adorned by every other moral virtue, could not resist her inclination to steal. I know many similar examples among others, of an irresistible inclination to

kill. Although we reserve to ourselves the right to prevent these unhappy beings from injuring us, all punishment exercised on them is not less unjust than useless: they merit indeed only our compassion. I hope some day to render the proof of this rare, but sad fact, more familiar to judges and physicians. Now that our opponents are tranquilized, let us take up these questions—in what manner are the faculties and the propensities of man connected with his organization? are they the expression of a principle of mind purely spiritual, and acting purely by itself? or is the mind connected with some particular organization? if so, by what organization?—From the solution of these questions, we shall derive the second principle.

II. The faculties and propensities of man have their seat in the brain.

I adduce the following proofs:—1. The functions of the mind are deranged by the lesion of the brain: they are not immediately deranged by the lesion of other parts of the body.

2. The brain is not necessary to life; but as nature creates nothing in vain, it must be that the brain has another distinction; that is to say,—

3. The qualities of the mind, or the faculties and propensities of men and animals, are multiplied and elevated in direct ratio to the increase of the mass of brain, proportionally to that of the body; and especially in proportion to the nervous mass. Here we find ourselves associated with the boar, the bear, the horse, the ox—with the camel, dolphin, elephant, and the stupid sloth. A man like you, possesses more than double the quantity of brain in a stupid bigot; and at least one-sixth more than the wisest or the most sagacious elephant. By this, we are led to admit the second principle here laid down.

III. and IV. The faculties are not only distinct and independent of the propensities, but also the faculties among themselves, and the propensities among themselves, are essentially distinct and independent: they ought, consequently, to have their seat in parts of the brain distinct and independent of each other.

Proof 1. We can make the qualities of the mind alternately act and repose; so that one, after being fatigued,

rests and refreshes itself, while another acts and becomes fatigued in turn.

2. The dispositions and propensities exist among themselves, in variable proportions in man, as also in animals of the same kind.

3. Different faculties and propensities exist separately in different animals.

4. The faculties and propensities develop themselves at different epochs; some cease, without the other diminishing, and even while the other increases.

5. In diseases and wounds of certain parts of the brain, certain qualities are deranged, irritated, or suspended; they return by degrees to their natural state, during the curative process.

I do not imagine myself a man sufficiently great enough to establish any thing by bare assertion: I must endeavor, therefore, to establish each one of these facts by proof. Nevertheless, some timid minds will object thus: If you allow that the functions of the mind are produced by corporeal means, or by certain organs, will you not assail the spiritual nature and the immortality of the soul? Condescend to hear my answer. The naturalist endeavors to penetrate the laws of the material world only, and supposes that no natural truth can be in contradiction with an established truth; he now finds, that neither the mind or body can be destroyed without the immediate order of the Creator; but he can draw no conclusion as to spiritual life. He contents himself with perceiving and teaching, that the mind is chained in this life to a corporeal organization.

Thus much in general: but for details, I answer in the following manner. In the preceding objection, the being acting, is confounded by the instrument by which he acts. That which I laid down respecting the lower faculties, that is to say, of the inferior organs of the functions of the mind, in numbers 1, 2, 3, 4, 5, takes place also with it in regard to the external senses. For example, while the fatigued eye reposes, we can listen attentively; the hearing may be destroyed, without the vision being impaired; some of the senses may be imperfect, while others are in full force; worms are entirely destitute of hearing and sight, but they possess a perfect touch; the new-born

puppy is for several days both blind and deaf, while his taste is perfectly developed; in old age, the hearing generally diminishes before the sight; while the taste almost always remains unimpaired. Hence results the proof of the existence of the senses by themselves, and of their independence, which no one doubts. Has any one ever drawn the conclusion, that the mind ought to be material or mortal, from the essential difference of the senses? Is the mind which sees, different from the mind that hears? I extend the comparison a little farther: he is mistaken, who thinks that the eye sees, that the ear hears, &c;—each external organ of sense is in communication by nerves with the brain; and at the commencement of the nerves is a proportionable mass of brain which constitutes the true internal organ of each sensitive function. Consequently, the eye may be ever so sound, the optic nerve may be ever so perfect, and yet, if the internal organ is impaired or destroyed, the eye and the optic nerves are of no avail. The external instruments of sense have, consequently, their organs also in the brain, and these external instruments are only the means by which the internal organs are put in relation with external objects: it is for these reasons, that it never entered the head of Boerhaave, nor of Haller, nor of Mayer, nor even of the pious Lavater, who seeks for the qualities of mind in the head, and of character in the body, that any thing could be inferred against the doctrine of the immateriality and immortality of the soul, from the difference and independence of the faculties and propensities, and of their internal organs. The same mind which sees through the organ of sight, and which smells through the olfactory organ, *learns by heart* through the organ of memory, and does good through the organ of benevolence. It is the same spring which puts in motion fewer wheels for you and more for me. In this way the general functions of the brain are established.

I now proceed to prove, that we can establish the assistance and the relation of many faculties and propensities, by the formation of the cerebral development. By which means will be demonstrated, at once, the functions of the different cerebral parts.

V. Of the distribution of the different organs and their various development, arising from different forms of the brain.

Among the proofs in support of this principle, I point out the differences of conformation between carnivorous, frugivorous, and omnivorous animals. Then I show the cause of the difference between different species of animals, also the cause of accidental differences of species and individuals.

VI. From the totality and the development of determinate organs, results a determinate form, either of the whole brain, or of its parts as separate regions.

Here I take the opportunity to show, that an organ is the more active, the more it is developed, without denying other exciting causes of its activity. But how is all this to lead us to a knowledge of the different faculties and the different propensities, by the formation of the skull? Is, then, the form of the skull moulded upon that of the brain?

VII. From the formation of the bones of the head, until the most advanced period of life, the form of the internal surface of the skull is determined by the external form of the brain: we can then be certain of the existence of some faculties and propensities, while the external surface of the skull agrees with its internal surface, or so long as the variation is confined to certain known limits.

Here I explain the formation of the bones of the head, and I prove that, from the moment of birth, they receive their form from the brain. I speak afterwards of the influence of other causes upon the conformation of the head; among which causes we may rank continual or repeated violence. I show that the organs develop themselves, from the earliest infancy, until their final completion, in the same proportion, and the same order, as the manifestation of the faculties and natural propensities. I show, besides, that the bones of the head take on their different forms in the same proportion, and in the same order. I show, finally, the gradual diminution of our fac-

ulties, by the diminution of the corresponding organs, and how nature deposits in the vacant spaces new portions of bony matter. All these things were heretofore unknown in the doctrine of the bones of the head. By these, is the first step taken for the determination of the particular functions of the different parts of the brain.

Part II.

Application of general principles.

Establishment and determination of the faculties and propensities existing of themselves.

As I suppose a particular organ for each one of our independent qualities, we have only to establish what are the independent qualities, in order to know what are the organs which we may hope to discover. For many years I met great difficulties in this research, and at last I am convinced, that, as in every thing else, we take the nearest and surest road if we lay aside our artificial logic, and allow ourselves to be guided by facts. I make known to my readers some of the difficulties which it was necessary to surmount. They may solve them, if they have more penetration than I have. I come at last to the means, which have served me most in the determination of the independence of the natural qualities, and I begin by pointing out more clearly the seat of the organs. It is necessary, first, to show and to examine the means by which we discover the seat of the organs. Among these means I cite,

1. The discovery of certain elevations or certain depressions, when there are determined qualities. I mark here the course which it is necessary to follow in like researches.

2. The existence of certain qualities together with the existence of certain protuberances.

3. A collection of models in plaster.

4. A collection of skulls.

We shall find many difficulties with regard to human skulls: you know how every one fears for his own head: how many stories were told about me, when I undertook

such researches. Men, unhappily, have such an opinion of themselves, that each one believes, that I am watching for his head, as one of the most important objects of my collection. Nevertheless, I have not been able to collect more than twenty in the space of three years, if I except those that I have taken in the hospitals, or in the asylum for idiots. If I had not been supported by a man, who knows how to protect science, and to consult prejudices, by a man justly and universally esteemed for his qualities of mind, and for his character, I should not have been able, in spite of all my labors, to collect even a few miserable specimens.

There are those, indeed, who do not wish that even their dogs and monkeys should be placed in my collection after their death. It would be very agreeable to me, however, if persons would send me the heads of animals, of which they have observed well the characters; for example, of a dog, who would eat only what he had stolen; one who could find his master at a great distance; heads of monkeys, parrots, or other rare animals, with the histories of their lives, which ought to be written after their death, lest they should contain too much flattery. I wish you could establish the fashion, for every kind of genius should make me the heir of his head. Then, indeed, [I will answer for it with mine own,] we should see in ten years a splendid edifice, for which at present I only collect materials; it would be assuredly dangerous for a Castner, a Kant, a Wieland, and other like celebrated men, if the exterminating angel of David were placed under my order; but, with Christian patience, I shall wait the tardy will of Providence.

However, in the mean time, my dear Retzer, look a little with me into futurity, and see assembled the choice spirits of men of past ages;—how they will mutually congratulate each other, for each minute portion of utility and pleasure, which each one of them has contributed for the happiness of men. Why has no one preserved, for us, the skulls of Homer, Ovid, Virgil, Cicero, Hippocrates, Boerhaave, Alexander, Frederic, Joseph II., Catharine, Voltaire, Rosseau, Locke, Bacon, and of others?—what ornaments for the beautiful temples of the muses!

I come now to the fifth means: 5. Phenomena of the diseases and lesions of the brain. I have also much to say on this subject. The most important, is the entirely new doctrine of the different kinds of insanity, and the means of cure, all supported by facts. If all my researches should only conduct me to this result, I should deem myself sufficiently rewarded for my labors. If men of sense will not thank me, I ought, at least, to be sure of the thanks of fools.

6. The sixth means for discovering the seat of the organs, consists in examining the integral parts of different brains and their relations, always comparatively with the different faculties and the different propensities.

7. I come at last to one of my favorite subjects, the gradual scale of perfections.

Here I imagine that I am a Jupiter, who beholds from the heavens his animal kingdom crowding upon the earth. Think a little of the immense space which I am going to pass through:—from the zoophyte, to the simple polypus, up to the philosopher and the theosophist? I shall hazard, like you, gentlemen poets, some perilous leaps. In setting out I shall create only irritable vessels; then I add nerves and the hermaphrodite nature; then beings who merit something better, who can unite, and look around upon the world by the organs of sense. I make an arrangement of powers and instruments, and divide them according to my pleasure; I create insects, birds, fishes, mammalia. I make lap-dogs for your ladies, and horses for your beaux; and for myself, men, that is to say, fools and philosophers, poets and historians, theologians and naturalists. I end, then, with man, as Moses told you long before; but it has cost me more than one reflection before I could elevate him to the rank of the king of the earth. I give you the language of signs, or natural language, that you may amuse yourselves, and that if any mute should be found, there may be for him one other language besides that of speech. I assure you, that, although no one has thought of acknowledging it, I have not been able to effect this, but by putting in communication, in a strange manner, your body, and your muscles with your cerebral organs.

Strictly speaking, you only play the part of puppets in a show: when certain cerebral organs are put in action, you are led, according to their seat, to take certain positions, as though you were drawn by a wire, so that one can discover the seat of the acting organs by the motions. I know that you are blind enough to laugh at this; but if you will take the trouble to examine it, you will be persuaded, that by my discovery I have revealed to you more things than you observe. You will find the explanation of many enigmas: for example, why you defend so valiantly your women; why you become churls at your advanced age; why there is no one so tenacious of his opinion as a theologian,—*pourquoi plus d'un taureau doit éterneur lorsqu' une Europe le chatouille entre les cornes, etc.* I return at last to you, my dear Retzer, like a poor author, to satisfy you concerning my work.

The first section of the 2d part being here finished, I ought to beg my readers to examine all that I have said, so that they may be more convinced of the truth of my first principles, which I have explained in a superficial manner; but I think that he who is so blind as not to see by the light of the sun, will not do better by the additional light of a candle.

The second section contains various subjects.

1. *Of National Heads.*

Here I agree in some measure with Helvetius, whom I have heretofore contradicted. I shall, perhaps, fall out with Blumenbach, Camper, and Sœmmering, although I gladly confess that I am not certain respecting it. You may nevertheless perceive, why some of our brethren cannot count more than three,—why others cannot conceive the difference between *meum* and *tuum*,—why lasting peace among men will be always but a dream.

2. *Of the difference between the Heads of Men and Women.*

That which I could say on this subject must remain *entre nous*. We know very well that the heads of the women are difficult to unravel.

3. *On Physiognomy.*

I shall show here that I am nothing less than a physiog-

nomist. I rather think, that the wise men have baptized the child before it was born; they call me craniologist, and the science, which I discovered, craniology; but, in the first place, all learned words displease me; next, this is not one applicable to my profession, nor one which really designates it.

The object of my researches is the brain. The cranium is only a faithful cast of the external surface of the brain, and is consequently but a minor part of the principal object. This title then is as inapplicable as would be that of maker of rhymes to a poet.

Lastly, I cite several examples to give to my readers something to examine, so that they may judge, not by principles alone, but also by facts, how much they can hope from the effect of these discoveries. You know, without doubt, my dear friend, how much strictness I observe in my comparisons.

If, for example, I do not find in *good* horse, the same signification as in *good* dog, and if I do not find in this the same as in *good* cook, or *good* philosopher, and if it is not in the same relation to each of these individuals,—the sign or word is of no value to me; for I admit no exceptions in the works of nature.

Finally, I would warn my disciples against a rash use of my doctrine, by pointing out many of its difficulties. On the other hand, I shall get rid of many doubters.

Allow me, at present, to touch upon two important defects in my work. First, it would have been my duty and my interest to conform more to the spirit of the age; I ought to have maintained, that we could absolutely ascertain by the form of the skull and the head, all the faculties and all the propensities, without exception; I ought to have given more isolated experiments, as being a hundred times repeated; I ought to have made of the whole, one speculative study, and not to submit my doctrine, as I have done, to so many investigations and comparisons; I should not ask of the world so much preparatory knowledge and perseverance; I ought to have mounted Parnassus upon Pegasus, and not upon a tortoise. Where is the charm or the interest of a science, so hard to acquire? The premature sentences which

have been pronounced, the jokes and squibs which have been let off at my expense, even before my intention or my object was known, prove that men do not wait for research, in order to draw their conclusions.

I remark, in the second place, I have not sufficiently appreciated the *a priori*, that is to say, the philosophy which is to be founded upon the *a priori*. I have had the weakness in this, to judge others by myself; for that which I have considered as well established by my logic, I have invariably found incomplete or erroneous. It was always difficult for me to reason soundly upon the experiments which I make, as well as upon those made by others, although I am persuaded, that I can collect truths only on the highway of experience. It is possible, nevertheless, very possible, that others have a more favorable organization than I have, to arrive at knowedge *a priori*; but you will do me the justice not to insist upon my entering the lists with other arms than my own."

In 1796, Dr. Gall commenced giving courses of lectures at Vienna. Several of his hearers, as well as others, who had never heard him lecture, published notices of his doctrines, and have represented them with greater or less exactness. Among the better class, the following deserve to be noticed:

Froriep.—Who has printed an Exposition of the Doctrine of Dr. Gall.—*3d Edition*, 1802.

Martens.—"Quelque chose sur la physiognomie."—*Leipzic*, 1802.

Walther.—"Exposition critique de la Doctrine de Gall, avec quelques particularités concernant son auteur."—*Zurich*, 1802.

Having continued his lectures for five years, on the 9th of January, 1802, the Austrian Government issued an order that they should cease; his doctrines being considered dangerous to religion. A General Regulation was made upon the occasion, prohibiting all private lectures, unless a special permission was obtained from the Public Authorities. Dr. Gall understood the object of this "General Regulation," and never solicited permission, but rather stopped his courses. The doctrines, however, continued to

be studied with greater zeal than before;—the prohibition strongly stimulated curiosity, and all publications on the subject continued to be permitted, provided they abstained from reflecting on the Government for issuing the "general order."

In 1800, Dr. Spurzheim commenced his labors along with Dr. Gall, and in that year assisted, for the first time, at one of his courses of lectures. He entered with great zeal into the consideration of the new doctrine; and, to use his own words, "he was simply a hearer of Dr. Gall, till 1804, at which period he was associated with him in his labors, and his character of hearer ceased."

"Dr. Spurzheim," says Dr. Gall, "who for a long time had been familiar with the physiological part of my doctrine, and who was particularly expert in anatomical researches, and in the dissection of the brain, formed the design of accompanying and of pursuing in common with me the investigations which had for their end the anatomy and physiology of the nervous system."

Gall and Spurzheim quitted Vienna in 1805, to travel together, and to pursue in common their researches.

In the period which elapsed betwixt the interdiction of Dr. Gall's lectures in 1802, and the time when he and Dr. Spurzheim left Vienna, the doctrine had made a rapid progress, not only in general diffusion, but in solid and important additions; a fact of which any one may be satisfied, by comparing the publications by Dr. Gall's auditors already mentioned, with those by his hearers in the different towns in Germany, visited in the course of his and Dr. Spurzheim's travels. The following works, in particular, afford evidence of the state of the science in 1805:

Bischoff.—Exposition de la Doctrine de Gall sur le Cerveau et le Crâne, suivie de remarques de Mr. Hufeland sur cette doctrine.—*Berlin, 2de. Edit.* 1805.

Blœde.—Le Doctrine du Gall sur les fonctions de Cerveau.—*Dresde, 2de. Edit.* 1805.

From 1804 to 1813, Dr. Gall and Dr. Spurzheim were constantly together, and their researches were conducted in common. They left Vienna on March 6, 1805, to go direct to Berlin, and thereafter visited the following

places: Berlin, Potsdam, Leipzic, Dresden, Halle, Jena, Weimar, Goettingen, Brauerschweig, Copenhagen, Kiel, Hamburgh, Bremen, Münster, Amsterdam, Leyden, Dusseldorf, Frankfort, Würtzbourg, Marbourg, Stuttgard, Carlsruhe, Lastall, Freybourg en Brisgaw, Doneschingue, Heidelberg, Manheim, Munich, Augsbourg, Ulm, Zurich, Bern, Bâle, Muhlhause, Paris.

In these travels "I experienced every where," says Gall, "the most flattering reception. Sovereigns, ministers, philosophers, legislators, artists, seconded my design on all occasions, augmenting my collection, and furnishing me every where with new observations. The circumstances were too favorable to permit me to resist the invitations which came to me from most of the Universities."

"This journey afforded me the opportunity of studying the organization of a great number of men of eminent talents, and of others extremely limited, and I had the advantage of observing the difference between them. I gathered innumerable facts in the schools, and in the great establishments of education, in the asylums for orphans and foundlings, in the insane hospitals, in the houses of correction, in prisons, in judicial courts, and even in places of execution; the multiplied researches on suicides, idiots, and madmen, have contributed greatly to correct and confirm my opinions." *

From November, 1807, Dr. Gall made Paris his permanent home.

In November, 1807, Dr. Gall, assisted by Dr. Spurzheim, delivered his first course of public lectures in Paris. "His assertions," says Chenevix, "were supported by a numerous collection of skulls, heads, casts; by a multiplicity of anatomical and physiological facts. Great indeed was the ardor excited among the Parisians, by the presence of the men, who, as they supposed, could tell their fortunes by their heads. Every one wanted to get a peep at them; every one was anxious to give them a dinner, or supper; and the writer of this article actually saw a list on which an eager candidate was delighted to

* An account of their visit to the prisons in Berlin and Spandau, may be found in the 6th volume of this work.

inscribe himself for a breakfast, distant only three months and a half; at which breakfast, he sat a wondering guest."*

In 1808, they presented a joint memoir, on the anatomy of the brain, to the French Institute. We present you, said they, in their memoir, "*Une déscription du Systeme Nerveux, moins d'après sa structure physique, et ses formes mécaniques que d'après des Vues Philosophiques et Physiologiques que des hommes habitués a des considérations superieures ne refuseront point d'accueillir.*" The Institute was then in all its glory. In proportion as Buonaparte had cannonaded, it had grown enlightened. As the hero was the referendary of military justice, so was it the areopagus of scientific truth. The chief of the anatomical department was M. Cuvier; and he was the first member of this learned body to whom Drs. Gall and Spurzheim addressed themselves.

M. Cuvier was a man of known talent and acquirements, and his mind was applicable to many branches of science. But what equally distinguished him with the versatility of his understanding, was the suppleness of his opinions. He received the German Doctors with much politeness. He requested them to dissect a brain privately for him and a few of his learned friends; and he attended a course of lectures, given purposely for him and a party of his selection. He listened with much attention, and appeared well disposed toward the new doctrine; and the writer of this article heard him express his approbation of its general features, in a circle which was not particularly private.

About this time, the Institute had committed an act of extraordinary courage, in venturing to ask permission of Buonaparte to award a prize medal to Sir H. Davy, for his admirable galvanic experiments, and was still in amaze at its own heroism. Consent was obtained; but the soreness of national defeat rankled deeply within. When the First Consul was apprised that the greatest of his comparative anatomists had attended a course of lectures by Dr. Gall, he broke out as furiously as he had done against

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* Article published in the Foreign Quarterly.

Lord Whitworth; and at his levee berated the wise men of his land for allowing themselves to be taught chemistry by an Englishman, and anatomy by a German; *sat verbum.* The wary citizen altered his language. A commission was named by the Institute to report upon the labors of Drs. Gall and Spurzheim: M. Cuvier drew up the report. In this he used his efforts, not to proclaim the truth, but to diminish the merits of the learned Germans. Whenever he could find the most distant similarity between the slightest point of their mode of operating, and any thing ever done before, he dwelt upon it with peculiar pleasure; and lightly touched upon what was really new. He even affected to excuse the Institute for taking the subject into consideration at all, saying that the anatomical researches were entirely distinct from the physiology of the brain, and the doctrines of mental manifestations. Of this part of the subject, Buonaparte, and not without cause, had declared his reprobation; and M. Cuvier was too great a lover of liberty not to submit his opinion to that of his Consul. His assertion, too, that the anatomy of the brain has nothing to say to its mental influence, he knew to be in direct opposition to fact; but even the meagre credit which he did dare to allow to the new mode of dissection, he wished to dilute with as much bitterness as he could. So unjust and unsatisfactory, so lame and mutilated did the whole report appear, that the authors of the new method published an answer, in which they accused the committee of not having repeated their experiments. Such was the reception which the science of Phrenology met with from the Academy of the great nation.*

Napoleon was unquestionably a good judge of character, and had his favorite rules in deciding upon the motives and designs of men. It was not in his nature to be either ignorant of, or indifferent to, the doctrines of Gall. Conscious of his own superiority, and eminently proud and selfish, it is not to be supposed that he would favor a system which opened to all the origin and na-

* Chenevix.

ture of human actions. In admitting such a theory as that of Gall, he would himself become a subject of remark and investigation by his own consent; and, however well he might have liked the principles of organology, for his own exclusive use, his spirit could never have sanctioned the practice of them in others.

That this position may be made more apparent, we will quote the following conversation from the *Mémoires du Docteur F. Antommarchi, ou les derniers Momens de Napoléon.* He does not hesitate to express his aversion to all those philosophers who pretend to interpret the internal man by the external organization.

Lady Holland had sent a box of books, in which was also contained a bust in plaster, the head of which was covered with divisions and figures according to the craniological system of Dr. Gall. "There, doctor," said Napoleon, "that lies in your province; take and study it, and you shall then give me an account of it. I should be glad to know what Gall would say of me if he felt my head." I immediately set to work; but the divisions were inexact, and the figures misplaced, and I had not been able to put them to rights when Napoleon sent for me. I went, and found him in the midst of a mass of scattered volumes, reading Polybius. He said nothing to me at first, and continued to run over the pages of the work he held in his hand; he then threw it down, came to me, and taking me by the ears, and looking me steadily in the face, "Well! *dottoraccio di capo Corso*, you have seen the bust?—Yes, sire.—Meditated the system of Gall?—Very nearly.—Comprehended it?—I think so.—You are able to give an account of it?—Your majesty shall judge.*—To know my tastes and to appreciate my faculties, by examining my head?—Even without touching it (he began to laugh.)—You are quite up to it?—Yes, sire.—Very well, we shall talk about it when we have nothing better to do. It is a

* Verily the *Dottoracio's* modesty was very great, and his understanding very gigantic in its dimensions. Few men, except himself, could have studied, comprehended and mastered, in as many months as he required hours, a science which, in its application and details, is perhaps the most extensive that is known. Ed. Jour.

pis-aller, which is just as good as any other; and it is sometimes amusing to notice to what extent folly can be carried." He now walked up and down, and then asked, "What did Mascagni think of these German reveries? Come, tell me frankly, as if you were talking to one of your brethren.—Mascagni liked very much the manner in which Gall and Spurzheim develop and point out the different parts of the brain; he himself adopted their method, and regarded it as eminently fitted for discovering the structure of this interesting viscus. As to the pretended power of judging from protuberances, of the vices, tastes, and virtues of men, he regarded it as an ingenious fable, which might seduce the *gens du monde*, but could not withstand the scrutiny of the anatomist.—That was like a wise man; a man who knows how to appreciate the merit of a conception, and to isolate it from the falsehood with which charlatanism would overcharge it: I regret not having known him. Corvisart was a great partisan of Gall; he praised him, protected him, and left no stone unturned (*fit l'impossible*) to push him on to me, but there was no sympathy between us. Lavater, Cagliostro, Mesmer, have never been to my mind; I felt, I cannot tell, how much aversion for them, and I took care not to admit any one who kept them among us. All these gentlemen are adroit, speak well, excite that fondness for the marvellous which the vulgar experience, and give an appearance of truth to theories the most false and unfounded. Nature does not reveal herself by external forms. She hides and does not expose her secrets. To pretend to seize and to penetrate human character by so slight an index, is the part of a dupe or of an impostor; and what else is that crowd with marvellous inspirations, which pullulates in the bosom of all great capitals? The only way of knowing our fellow-creatures is to see them, to haunt them, and to submit them to proof. We must study them long if we wish not to be mistaken; we must judge them by their actions; and even this rule is not infallible, and must be restricted to the moment when they act; for we almost never obey our own character; we yield to transports—we are carried away by passion; such are our vices and virtues, our perversity and heroism. This is my

opinion, and this has long been my guide. It is not, that I pretend to exclude the influence of natural dispositions and of education; I think, on the contrary, that it is immense; but beyond that, all is system, all is nonsense."

Sovereigns, remarks Dr. Gall, are always deceived, when they ask advice from the ignorant, the jealous, the envious, the timid, or from those, who, from age, are no longer accessible to new opinions. Napoleon acquired his first notions of the value of my discoveries during his first journey to Germany. A certain metaphysical jurisconsult, E——, at Leipzig, told him, that the workings of the soul were too mysterious to leave any external mark. And, accordingly, in an answer to the report of the Institute, I had this fact in view when I terminated a passage by these words:—"And the metaphysician can no longer say, in order to preserve his right of losing himself in a sea of speculation, that the operations of the mind are too carefully concealed to admit of any possibility of discovering their material conditions or organs." At his return to Paris he scolded sharply (*tança vertement*) those members of the Institute who had shown themselves enthusiastic about my new demonstrations. This was the thunder of Jupiter overthrowing the pigmies. On the instant, my discoveries were nothing but reveries, charlatanism, and absurdities; and the journals were used as instruments for throwing ridicule—an all-powerful weapon in France—on the self-constituted bumps.

We should here remark, that although Gall, merely from seeing the bust of Napoleon placed along side of those of the generals of the Austrian armies, predicted the immortal victories of Italy, yet he never received from the Emperor the smallest mark of attention.*

Keeping in view the strong and adverse feelings of Napoleon, in relation to Phrenology, we may account for the imperfect Report of Cuvier. The Report, it should be observed, related only to the anatomical discoveries of Gall and Spurzheim;—not to their peculiar doctrines of the functions of the brain. Cuvier, however, admitted,

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* Phren. Jour.

in the Annual Report, that their "Memoir was by far the most important which had occupied the attention of the class."

That Cuvier was a phrenologist, there can be but little doubt; neither his Report, or any of his works, warrant us in supposing the contrary. Although political causes had a tendency to influence Cuvier against the doctrines of Gall,—nevertheless, these two celebrated men were made to understand and esteem each other, and, towards the end of their career, they did each other justice. Gall had already one foot in the grave when Cuvier sent him a cranium, "which," he said, "appeared to him to confirm his doctrine of the physiology of the brain." But the dying Gall replied to him who brought it, "Carry it back, and tell Cuvier, that my collection only wants one head more, my own, which will soon be placed there as a complete proof of my doctrine."*

In 1809, Gall and Spurzheim commenced publishing their magnificent work, entitled "*The Anatomy and Physiology of the Nervous System in general, and of the Brain in particular; with Observations upon the possibility of ascertaining several intellectual and moral Dispositions of Man and Animals, by the configuration of their Heads. 4 volumes, folio, with an Atlas of* 100 *plates.*" [Price 1000 francs.]

This great work was continued by the joint exertions of Gall and Spurzheim, to the completion of two and a half volumes, and was ultimately finished by Gall in 1819. They continued their researches in common till 1813, when Spurzheim left Paris to visit Vienna and Great Britain.† During Dr. Spurzheim's absence, Dr. Gall discontinued his lectures. After his return, (1817,) he delivered one private course in his own house, and two public courses gratis, one "*à l'Ecole de Medecine*," and the other in a hall "*de l'institution pour les Aveugles.*"

In 1819, Dr. Gall, at the request of the Minister of the Interior, commenced lecturing for the benefit of the medical students in Paris. The lectures were, like others, de-

* Jour. de la Soc. Phrénol. de Paris.
† Edin. Phren. Transactions, vol. I.

livered gratis; but he was provided with the use of the operation and lecture room in the *Hospice de Perfectionnement*, for his first course, and afterwards, on account of that being too small, with the large examination room of the Institution *des Jeune Aveugles*, which is well fitted for the purpose. His audience amounted to betwixt 200 and 300; and so eagerly was he attended, that many more tickets were applied for at each course, than could be given, and the apartment was regularly crowded half an hour before the lecture began. The physiognomical expression of some of the English students, who were present at Blainville's Lecture, and who probably knew nothing of Phrenology but through the English Reviews, was truly ludicrous. They appeared to relax their features for a laugh when the name of Dr. Gall first escaped the lips of the Professor; but when they heard him spoken of with respect, and his doctrines declared to be true, the expression changed into wonder in some, and in others to absolute contempt.

The French savans * listened to him with the same interest as those of Germany had done, and the celebrated Corvisart was, among others, one of his most enthusiastic admirers. But, alas! an absolute ruler governed France at that epoch, and he held philosophy in horror. Nothing more was required to induce the courtiers, and some literary men, to declare themselves the enemies of the doctrines broached by the German doctor. Hence the ridicule and the ignoble pleasantry which degraded the *Journal de l'Empire* and most of the secondary journals of Paris,—most unworthy means, certainly, of discussing a science so important as that which treats of the powers of the mind and functions of the brain,—means which never reached the elevated mind of the philosopher against whom they were employed, but which contributed greatly to prevent the study and propagation of the truths which Gall had announced. At last, however, his works appeared, and several of his eminent cotemporaries hastened to do him justice, and still follow the line of investigation so successfully marked out by him.

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* Dr. Fossati's Funeral Oration on Dr. Gall.

From 1822 to 1826, Dr. Gall published an edition of his work, "*Sur les Fonctions du Cerveau*," &c., in 6 volumes, 8vo.

In March, 1828, at the conclusion of one of his lectures, Dr. Gall was seized with a paralytic attack, from which he never perfectly recovered, and which ultimately carried him off the 22d of August, 1828, in the seventy-second year of his age.* His remains were followed to the grave by an immense concourse of friends and admirers, five of whom pronounced discourses over his grave, as is the custom in France on such occasions. His death gave rise to a succession of eulogiums and attacks in the French newspapers that had scarcely ever been paralleled, and public sentiment was warmly and loudly expressed in his favor. In proof of this, I may be allowed to quote a few lines of a letter lately received from a French friend, with whom I was intimate in Paris, but who is no phrenologist, and whose testimony is therefore impartial. After speaking of the political relations of France, he adds, "You will, I am sure, be more affected by the death of Dr. Gall, than by any political events. In truth, it is an immense loss to science. Whatever opinion we may form of the system of that illustrious man, it must be acknowledged that he has made an immense stride in the sciences of medicine and of man. You must have been satisfied with the homage paid to his memory by the side of his grave, by whatever distinguished men Paris possesses. Nothing was wanting to his glory; not even the abuse and calumnies of our *devots de gazette*."

The person of Dr. Gall was well developed; he was five feet two inches in height, with a large chest and strong muscles; his step was firm, and his look vivid and penetrating.† His features, though not handsome, possessed a mild and pleasing expression. Every part of his head was strikingly developed, measuring, above the eyebrows and at the top of the ears, twenty-two inches, and two lines in circumference, and fourteen inches and nine lines, from the root of the nose to the occiput.

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* Dr. Combe, Phren. Jour. vol. v. † Dr. Fossati, Paris Phren. Jour.

Dr. Gall acquired an honorable reputation as a physician, writer, and philosopher, and, independent of the respect shown him by all parties, he realized the additional reward of a handsome fortune.* His skill as a physician may be inferred from the fact, that, in 1820, a medal was presented to him, executed by M. Barre, an eminent artist in Paris, by order of count Potosky, a rich Polish nobleman, who took this method of expressing his deep gratitude to Dr. Gall, who had cured him of an old and dangerous malady, for which he had in vain consulted the best medical men in Paris. On one side of the medal is the head of Dr. Gall, an admirable likeness; and on the other is Esculapius standing at the bed-side of the patient, chasing away with one hand the birds of darkness, and crushing a frog, the symbol of ignorance, under his right foot. Behind Esculapius is an altar, with a skull placed upon it, to denote the particular kind of study to which Dr. Gall was addicted. Near the couch are the arms of the count himself.

Taking Gall as a model of a phrenological portrait, it is proper that we should speak of all the cerebral organs, belonging to our nature.†

The organs of Amativeness, Philoprogenitiveness, Adhesiveness, Combativeness, and Destructiveness were all very well developed in Gall. His Secretiveness was also rather large, but he never made a bad use of it. He was too conscious of his intellectual powers to obtain his ends by cunning or fraud. He was frank and honest, but acute and penetrating.

The Marquis de Moscati gives the following account of an attempt to deceive Gall, with regard to himself, and of some interesting trials of his skill, as a phrenologist.

"Dr. Gottfried of Heidelberg, with whom I was acquainted, informed me that Dr. Gall wished to have an interview with me, in order to demonstrate to me, on the skulls, *the truth* of what he advanced, and I disbelieved; but I declined, and did every thing in my power to ridicule his system in society, with all my military friends, and through

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* Phren. Trans. † Fossati.

the German, French, and Italian periodicals. But when I saw that, notwithstanding my repeated diatribes, and the opposition of the medical faculty, Dr. Gall went on in making converts to his doctrine, I determined to see him, and endeavored to deceive him by presenting myself under the dress of a servant. Colonel Bucher, of the fifth dragoons, took me with him to the house of Dr. Gall, who was in Paris, and told him that he wished to know his opinion about my head; that I was an Italian, had lived with him as a servant for seven years, and during that interval had been much attached and very faithful to him; that it was for those good qualities that he had endeavored to have me instructed, but that although he had given me several masters, *for nearly three years*, I had scarcely learned to read and write *Italian*, but had not yet acquired the French language.

"I remember as it were now, Dr. Gall opened his large eyes, fixed them on my countenance with a look of surprise and doubt, and then began to feel my head. While he was making his observations, he now and then murmured, "*Ce n'est pas vrai! Ce n'est pas possible!!*" Shortly after having examined my cranium, he said to Bucher, that an individual with a head so well formed could not be of *the character* he had just mentioned; that on the contrary, unless I was blind and deaf, by the conformation of my cranium, he thought I was able to acquire *general knowledge, particularly the languages*, and geographical and astronomical sciences. Moreover, that if I had applied according to the development of my organs, I must be a distinguished person and a *mad poet*. When I heard this last remark, I told Bucher, *Ce n'est pas bien! tu as trahi mon secret*. I do not wonder at the Doctor's accuracy. Bucher swore that he had not betrayed me. Gall remonstrated against my suspicion, and assured me of his being totally unacquainted with my trick; but I remained doubtful about the sincerity of both of them, and continued to be an adversary to Gall and his system.

"However, from that day I began to study craniology, and made use of the skulls of the killed in battle; but I studied as one of those who *oculos habent, et non vident, aures habent et non audiunt*, and my obstinacy rendered me

inaccessible to persuasion. Often when I knew well the character of some of my soldiers who died, I sent the skulls to Dr. Gall, and requested his opinion; and I must say that more than *once* his remarks were truly astonishing; but I persisted in my incredulity. In 1810, one of my lieutenants was killed at the battle of Lintz; he was a Pole of a very violent temper, a bloody duellist, and much addicted to sensuality. I forwarded his skull to Dr. Gall, and in answer to my question, he replied, that it belonged to an individual *very violent, ferocious*, and a *sensualist*. This time I was the only depository of my secret."

We come now to another quality, on which we should like to dwell, were we not obliged to confine ourselves within prescribed limits—we mean the sentiment of property.*

Many people in Paris have reproached Gall with being selfish. It cannot be denied that he was amply paid for his public lectures; that he was unfortunate in soliciting the sale of his work; and that he prosecuted some of his patients who refused to pay their bills. But we should know his own remarks on this point. "Do you see, my friend, how these wealthy people treat us and other physicians? They spend a hundred times more for their pleasures than the health we give them, and expend enormous sums on balls and dinners, while they leave their physicians unpaid. Indeed, while they largely remunerate the lawyer who gains their cause, they give nothing to the physician who saves their lives." Gall was not generous, in the common understanding of the term; but it must be considered that in his domestic economy he failed in method, and consequently was always pressed by unforeseen and urgent wants. If he was selfish, let me ask what kind of selfishness it was? He educated and supported his nephews, and young people of talents, and his table was free to every body. It is true, he was not generous to all who surrounded him, but he was so towards his domestics, and people of low condition, whose services he had received. We may

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* Fossati.

say he had a love of property, but that his intellectual powers placed him above its control.

Another faculty which Gall possessed in a remarkable degree, as his organization shows, was that of Elevation, Pride, or a high opinion of one's self. We will here quote a remarkable passage, where, in speaking of that organ, he has delineated himself. "There are certain men," says he, "with minds sufficiently strong, who are so deeply impressed with a sense of their own value, and so independent withal, that they know how to repel every external influence which tends to subject them. As far as practicable, they choose the freest countries to live in, and devote themselves to an employment that renders them independent, and exempts them from the caprices and favor of the great. That domination over their inferiors, which becomes slavery under an absolute master, would be insupportable to them. The honors and distinctions that are withheld from merit, while they are lavished on insignificant men, are but humiliations in their eyes. If they prosper, it is only by their own efforts; like the oak, they are sustained by their own strength, and it is to their own resources that they would be indebted for all they possess." He was, in fact, proud and independent. He never was anxious for titles, and cheerfully practised the profession of medicine. As a political man, he loved liberty and good laws.

There is another innate sentiment, Vanity, Ambition, Love of Glory, approaching the preceding in its nature, but still quite distinct from it, which was feeble in Gall. We always observed him to be indifferent to the praise and approbation of the multitude, as he was also to their blame and ridicule. He labored for the love of science, and under the conviction that his ideas would triumph in the end. We could recall a thousand anecdotes to prove that his vanity was not very susceptible. How many times have we seen him laugh at the squibs of the little journals, and unaffectedly despise the gross abuse which they heaped upon him. Let us cite one fact which will answer for many others. Gall had lived for some time at Berlin, with the celebrated poet Kotzebue, who profited by the occasion to learn of him the technical

terms of his science, and such ideas and principles as he could best turn to ridicule. He composed his play, Craniomania, which was immediately performed at the theatre in Berlin, and Gall attended the first representation, and laughed as heartily as any of them.

Caution, by means of which the effects of our actions are referred to the future, which sometimes renders us distrustful of the world and indecisive in forming our resolutions, was very strong in Gall. Observe what a fulness the head presents in its superior posterior lateral region. Gall proceeded with extreme prudence in every step; he was distrustful, and much disposed to give credit to bad insinuations against his friends and acquaintances, and would rather break with any one than live in the disquietude of doubt. He often said, that it is more difficult to sustain a reputation than to create one, and that we must always act as if making the first efforts to render ourselves known.

Let us now pass to the faculties whose organs are situated in the anterior part of the head, beginning with the sense of the memory of things, (Individuality.) This sense is the source of educability in man and other animals. Gall possessed it in a moderate degree, but it was not one of his most remarkable faculties.

He easily forgot whatever had no connection with his doctrines, or with any of his predominant faculties.

It was the same with the faculty of local memory, (Locality.) We will once more leave him to speak for himself. "My taste for natural history," said he, "often led me into the woods, for the purpose of ensnaring birds or taking them in their nests. In the latter object I was very fortunate, because I had often observed, towards which of the cardinal points, each species were accustomed to build their nests. I should have succeeded equally well by disposing my nets properly, because I was in the habit of ascertaining the district the bird frequented, by his song, and his movements; but when, after a week or fortnight, I went to find what birds had been taken, or to carry off a nest, it was often impossible for me to find the tree I had marked, or the nets I had placed." He also forgot the residence of his patients whom he had frequent-

ly visited in his carriage, and had considerable difficulty in remembering in what story of the building they lived. He was ignorant of geography, and whenever he looked upon a map he found something new, though he had observed it a thousand times before. So we may be sure, that if he traveled, it was not from taste, but with the sole object of propagating his doctrines.

If it be true, as we believe it is, that there is an organ of Order, Gall was absolutely destitute of it. The arrangement of his house was a curiosity. He said it was order to him. Let one imagine to himself, huddled together in his bureau-drawers, for instance, old journals, quittances, quack advertisements, letters from distinguished men, pamphlets, nuts, pieces of gold, silver, and copper, and packets of seeds. We have seen him take up a bundle of these papers, and shake out from them the money he happened to need. In this manner he kept his records and his desk.

Weaker still was his *memory of persons*. "This faculty," said he, "is too feeble in me, and the defect of it has, all my life-time, caused me a thousand troubles. When I rise from the table, I cannot distinguish either man or woman who sat by my side during the meal." In *verbal memory*, Gall was also deficient. At school he never could learn his lessons, and when the task was one that exercised the memory, he was always surpassed by his school-fellows, whom he excelled in original composition.

The organ of *the sense of language*, which gives the talent of philology, was a little better developed. He knew, besides his own, the Latin, and French language, which he wrote and spoke with facility, though defective in pronunciation, and had some knowledge of English and Italian. He had a strong dislike, however, for questions about mere words, grammatical discussions, compilations, and works of that kind. *(Pour les compilations, et autres travaux du même genre.)*

The sense of the relations of colors, which is one of the fundamental qualities indispensable to the painter, was absolutely wanting in Gall. He was obliged to depend upon the opinions of his friends, whenever he treated of painters or painting, and by that means was sometimes

led to pronounce an erroneous judgment which the critics never failed to remind him of. As for his taste, he was fond of those brilliant porcelain-like pictures of modern times; and when in a gallery, he bestowed his attention on portraits, and especially on those of women when painted in a classical style.

As he was a poor judge of painting, so was he as poor an amateur in music. He generally got wearied at the Opera or Concert; but a woman's voice in conversation, he said, was very agreeable.

He was no more apt in the science of numbers; every kind of numerical calculation fatigued him, and we believe we never saw him go through a process in simple multiplication or division that was at all complicated. He knew nothing of geometry, nor the problems of mathematics. What a contrast to those philosophers who make this same science the basis of all positive knowledge!

In mechanics, architecture, and the arts, he was no happier than in calculation, music, and painting. We will only remark, that the execution of the plates of his great work, after Spurzheim ceased to overlook them, was detestable, which would not have been the case if Gall had possessed the slightest knowledge of design, or of the arts in general.

Having thus finished our notice of the organs situated in the lower part of the forehead, it remains for us to examine those higher faculties whose organs are placed in the upper part of that region. It is these that gave Gall his eminence over the generality of men.

That *comparative* sagacity, by means of which we promptly discern the relations of agreement and disagreement between the objects of our examination, and are led to search for affinities, comparisons, and similes, was very strong in Gall. Accordingly, you will observe that not only were all his researches but a continual comparison of organization with faculties, and of the faculties of man with those of other animals, but that he also employed this method in his familiar conversations and public lectures, whenever he was particularly anxious to impress his ideas on the minds of others.

The following interesting account of an interview with

Gall was published in the Birmingham Gazette, and may serve to give the reader some idea of the habits of the philosopher at home.

"Most of us find some satisfaction in tracing on Fancy's tablet the portrait of a person of whom we have heard much, and particularly after we have read many of the works of an author, but with whom we have had no personal acquaintance. It generally happens, however, that our portrait is not correct, when we compare it with the original. Thus it was with myself. I found Dr. Gall (in 1826) to be a man of middle stature, of an outline well proportioned; he was thin and rather pallid, and possessed a capacious head and chest. The peculiar brilliancy of his penetrating eye left an indelible impression. His countenance was remarkable,—his features strongly marked and rather large, yet devoid of coarseness. The general impression that a first glance was calculated to convey would be, that Dr. Gall was a man of originality and depth of mind, possessing much urbanity, with some self-esteem and inflexibility of design.

"After presenting my letters of introduction to him at seven o'clock, A. M., he showed me into a room, the walls of which were covered with bird-cages, and the floor with dogs, cats, &c. Observing that I was surprised at the number of his companions, he observed, 'All you Englishmen take me for a bird-catcher; I am sure you feel surprised that I am not somewhat differently made to any of you, and that I should employ my time in talking to birds. Birds, Sir, differ in their dispositions like men; and if they were but of more consequence, the peculiarity of their characters would have been as well delineated. Do you think,' said he, turning his eyes to two beautiful dogs at his feet, that were endeavoring to gain his attention, 'do you think that these little pets possess pride and vanity like man?' 'Yes,' said I, 'I have remarked their vanity frequently.' 'We will call both feelings into action,' said he. He then caressed the whelp, and took it into his arms; 'mark his mother's offended pride,' said he, as she was walking quietly across the chamber to her mat: 'do you think she will come if I call her?' 'Oh yes,' I answered. 'No, not at all.'

He made the attempt; but she heeded not the hand she had so earnestly endeavored to lick but an instant before. 'She will not speak to me to-day,' said the doctor. He then described to me the peculiarity of many of his birds; and I was astonished to find, that he seemed familiar also with their dispositions, (if I may be allowed the word.) 'Do you think a man's time would be wasted thus in England? You are a wealthy and a powerful nation, and as long as the equilibrium exists between the two, so shall you remain; but this never has, nor cannot exist beyond a certain period. Such is your industry, stimulated by the love of gain, that your whole life is spun out before you are aware the wheel is turning; and so highly do you value commerce, that it stands in the place of self-knowledge, and an acquaintance with nature and her immense laboratory.'

"I was delighted with this conversation: he seemed to me to take a wider view in the contemplation of man, than any other person with whom I had ever conversed. During breakfast, he frequently fed the little suitors, who approached as near as their iron bars would admit. 'You see they all know me,' said he, 'and will feed from my hand, except this black-bird, who must gain his morsel by stealth before he eats it; we will retire an instant, and in our absence he will take the bread.' On our return, we found he had secreted it in a corner of his cage. I mention these, otherwise, uninteresting anecdotes, to show how much Dr. Gall had studied the peculiarities of the smaller animals. After our breakfast, he showed me his extensive collection; and thus ended my first visit to the greatest moral philosopher that Europe has produced; to a man, than whom few were ever more ridiculed, and few ever pursued their bent more determinately, despite its effects; to a man, who alone effected more change in mental philosophy than perhaps any predecessor; to a man, who suffered more persecution, and yet possessed more philanthropy than most philosophers."

To that other form of human intelligence, viz. the *metaphysical*, Gall was strongly opposed, when it soars into the spiritual world, and pushes its inquiries into general principles and general truths, slighting, however, the ma-

terial world and the relations of cause and effect. This way of thinking, and directing one's efforts in the search after truth, was none of his; he was for the positive, not the abstract.

Another remarkable manifestation of mind, *wit*, which gives a kind of relief to its possessor, Gall was endowed with in no small degree. Although he never engaged in the polemics of the Journals, yet in his works, he replied to his opponents with a keenness of satire truly astonishing. To be convinced of this, one has only to read the sixth volume of his work. Observe his piquant observations on the Editors of the *Dictionary of Medical Sciences*, in answer to the wish expressed by them, that somebody would, at last, devote himself to the physiology of the brain. He exclaims,—"Behold, an instance of lethargy, in M M. Fournier and Begin, which has lasted from the time of my arrival in Paris, 1807, to the year 1819!" While deriding the principles of the transcendentalists, and at the same time answering his opponents, he observes, "It may be certainly said, with truth, that the dead kill the living. Some time or other, when I shall take it into my head to be admired, cried up, and to have even my follies sanctioned, I mean to drown, hang and burn myself, till I am well dead; and if, notwithstanding these means of getting a reputation, my *moi* is still doomed to be concerned with the *non moi*, with the vanities of the world in *space*, I hope at least to have some titles and places to spare in *time*. *Moi*, *space* and *time*, you know, are the pivots on which the metaphysicians turn much of their reasoning."

While pointing out the piracies many *savans* had made upon his works, he reasons with them in the following style: "When nations are at war, pillage becomes a right. Now, savans who are engaged in making discoveries, are constantly at war with one another; therefore, they are allowed to pillage; therefore, the little malice of M. Boisseau is eminently rational."

The result of another manifestation of the intellect, is the *poetical talent*. This is not enough to make one a poet, (in the ordinary acceptation of the word;) for versification depends upon another faculty. Gall could never make verses. He even detested poetry, because he

had no ear for harmony; but he possessed, in a high degree, the poetical power of invention.

A fundamental quality inherent in our nature, and which constitutes the strongest bond of our species, is the sentiment of *benevolence*, *compassion*, *moral sense*. Gall was exceedingly benevolent; he succored the unfortunate, and procured them the assistance of his rich patients; he encouraged talents, and rendered them all the aid in his power. If a kind of abruptness, or, more properly speaking, nonchalance, was sometimes observed in his manners, all thought of it was effaced by his benevolence. In his conversation, he was not too careful to observe those conventional forms and verbal disguises, which civilization has introduced to cover, as with a fine mantle, the bad dispositions of the soul; but the more intimately he was known, the more he was loved.

The faculty of *Imitation*, that which makes the actor and mimic, and is also of great use to the orator, inasmuch as it excites him to express by external signs what is passing within, existed in a very high degree in Gall. We had but imperfect means of judging of him as an orator, in his public lectures, where, however, notwithstanding the disadvantage of speaking in a foreign tongue, he left a deep impression on the minds of his hearers.

Let us now see what were Gall's opinions respecting God and religion. "Every where," he says, "and in all times, man, pressed by the feeling of dependence, by which he is completely surrounded, is forced to recognize at every instant, the limits of his power, and avow to himself that his fate is in the hands of a superior power. Hence, the unanimous consent of all people to adore a Supreme Being; hence, the ever-felt necessity of recurring to him, of honoring him, and rendering homage to his superiority." Thus Gall recognized God like a philosopher. He was indignant only against the abuses that men practised upon the credulity of the people; against those who make of religion a refinement of power, of ignorance, of slavery and corruption. He was indignant against the persecutions which sectarians, of different faiths, carry on against their fellow-men in the name of God and religion. He was indignant against all these

abuses, because he loved the human race, and desired its happiness.

It was to his *firmness*, that Gall owes the success of his researches. Without this constancy, or rather obstinacy with which he pursued the same ideas, the same observations, and the same researches, it would have been impossible for him to carry his new science to the point where he left it.

We present a diagram of the system such as Dr. Gall made, and another comprising Dr. Spurzheim's latest modifications.

No. 1, *Zeugungstrieb*, the instinct of generation.
No. 2, *Jungenliebe*, *Kinderliebe*, the love of offspring.
No. 3, *Anhänglichkeit*, friendship, attachment.
No. 4, *Muth*, *Raufsinn*, courage, self-defence.
No. 5, *Würgsinn*, murder, the wish to destroy.
No. 6, *List*, *Schlauheit*, *Klugheit*, cunning.
No. 7, *Eigenthümsinn*, the sentiment of property.
No. 8, *Stolz*, *Hochmuth*, *Herschsucht*, pride, self-esteem, haughtiness.
No. 9, *Eitelkeit*, *Rhumsucht*, *Ehrgeitz*, vanity, ambition.
No. 10, *Behuthsamkeit*, *Vorsicht*, *Vorsichtigkeit*, cautiousness, foresight, prudence.
No. 11, *Sachgedächtniss*, *Erziehungs-fahigkeit*, the memory of things, educability.
No. 12, *Ortsinn*, *Raumsinn*, local memory.
No. 13, *Personensinn*, the memory of persons.
No. 14, *Wortgedächtniss*, verbal memory.
No. 15, *Sprachforschungssinn*, memory for languages.
No. 16, *Farbensinn*, colors.
No. 17, *Tonsinn*, music.
No. 18, *Zahlensinn*, number.
No. 19, *Kunstsinn*, *Bausinn*, aptitude for the mechanical arts.
No. 20, *Vergleichender-Scharfsinn*, comparative sagacity, aptitude for drawing comparisons.
No. 21, *Metaphysischer Tiefsinn*, metaphysical depth of thought, aptitude for drawing conclusions.
No. 22, *Witz*, wit.
No. 23, *Dichtergeist*, poetry.
No. 24, *Gutmüthigkeit*, *Mitleiden*, good-nature.

No. 25, *Darstellungsinn*, mimicry.
No. 26, *Theosophy*, theosophie, religion.
No. 27, *Festigkeit*, firmness of character.

"Philosophers," said Spurzheim, in one of his lectures, "have merely spoken of the general manifestations of the mind, and have given names to them; but we must be more particular, we must specify the powers, and hence we are obliged either to speak in circumlocution, or to give new names. Some people say they do not like new names; but if I have an idea, must I not give it a sign? If the first man gives names to all things known to him, and if in future ages things are discovered not known before, must we not name them? I will not, however, dispute about names, only let us have the powers kept distinct: I am ready to change the names at any time, if any person will suggest better."

Dr. Spurzheim's arrangement of the faculties is comprised in orders, genera, species, &c.

Special Faculties of the Mind. ORDER I.—Feelings, or Affective Faculties. GENUS I.—Propensities.

† Desire to live. * Alimentiveness. 1. Destructiveness. 2. Amativeness. 3. Philoprogenitiveness. 4. Adhesiveness. 5. Inhabitiveness. 6. Combativeness. 7., Secretiveness. 8. Acquisitiveness. 9. Constructiveness.

GENUS II.—Sentiments.

10. Cautiousness. 11. Approbativeness. 12. Self-esteem. 13. Benevolence. 14. Reverence. 15. Firmness. 16. Conscientiousness. 17. Hope. 18. Marvellousness. 19. Ideality. 20. Mirthfulness. 21. Imitation.

ORDER II.—Intellectual Faculties. GENUS I.—External Senses.

Voluntary motion. Feeling. Taste. Smell. Hearing. Sight.

GENUS II.—Perceptive Faculties.

22. Individuality. 23. Configuration. 24. Size. 25. Weight and resistance. 26. Coloring. 27. Locality. 28. Order. 29. Calculation. 30. Eventuality. 31. Time. 32. Tune. 33. Artificial language.

GENUS III.—Reflective Faculties.

34. Comparison. 35. Causality.

In 1831, a Phrenological Society was formed in Paris. "Actuated by the wish," as stated in its Constitution, "to perform worthily the task bequeathed by Gall to his adopted country, the Phrenological Society calls upon all the friends of science and humanity to communicate the results of their observations, and lend their aid by all the means in their power." It is only astonishing that France so long delayed to profit by the labors of Gall, and to advance the impulse, which he first communicated, while already, and for a long time past, in England, in Scotland, in Ireland, in the United States, in India, and even in Italy,—that land of despotism, religious and political, Phrenology has been cultivated with the greatest ardor and the most encouraging success."*

The object of this society, as stated in its own prospectus, is to propagate and improve the doctrines of Phrenology. The society publishes a journal, "offers prizes, and bestows medals of encouragement.

"The society has a council of management, composed as follows: a cabinet council; a committee for editing the journal; a committee of funds.

"The cabinet council consists of a president, two vice-presidents, a general secretary, two secretaries for the minutes (proces verbeaux,) a treasurer, and a keeper of the museum (materiel) of the society.

"On the 22d of August, every year, the anniversary of the death of Gall, the society holds a general public meeting, in which the general secretary gives an account of the labors of the society, reads notices of the members which it has lost, and proclaims the names of those whom it has honored, announcing the prizes which it proposes to bestow.

"The society has tickets *(jetons)* of presence, bearing the portrait of Gall; and on the reverse, the title and year of the foundation of the society, with this motto—*Aux Progrès Des Lumieres.*

"The journal is published monthly. Its contents are to be, 1. An analysis of the proceedings of the meetings; 2. Memoirs and other papers which the society shall re-

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* Edin. Journal.

solve to publish; 3. Articles sent for the journal; 4. A bibliographical bulletin. *M. Dannecy* was elected president, and *Casimir Broussais*, general secretary."

The Paris society, within the first year of its existence, consisted of one hundred and ten members, sixty of whom were physicians. Its members are of the highest respectability in Medicine, Philosophy, and Law, with some of both Chambers of the Legislature. We make reference to this Society, because its members have particularly honored Gall, in their constitution and proceedings.

It would be interesting to notice in this place the various societies and the progress of phrenology, throughout the civilized world; but we should exceed our present limits and design. That Phrenological Societies exist in most of the civilized nations, and are actively engaged in promoting the science originated by Gall, is an interesting fact—and it should lead those, who speak lightly of Phrenology, to reconsider their assertions, and to adopt a course of conduct more in accordance with modesty and justice.

The history of science, like the political history of nations, exhibits to us, at longer or shorter intervals of time, men of a superior order, who conceive a great idea, develop it largely, apply it boldly, and who leave behind them an indelible impression.* Such a man was Gall. That great discoverer is no more; but his genius survives in the science which he has created. We owe it to him, that henceforward we shall study the intellect and passions of man, the intelligence and instincts of animals, not entramelled in our views by blind superstitions, and metaphysical subtleties and prepossessions, but guided by the light of reason, and bound by no rule but the induction of pure philosophy. In the system of Dr. Gall, we find organic and physiological facts, which, for the first time, enable the naturalist to draw the line of distinction, between man and the lower animals, and by which man is demonstrated to be immeasurably the superior of the whole animated creation. Let us for a moment look back on the previous state of our knowledge of human nature.

The abstract study of man, as pursued by the ancients,

* Prospectus of the Paris Phrenological Society. See Edin. Jour. No. xxx.

has been the source of the most inexplicable contradictions, and pernicious consequences to the human race. That abstract philosophy, which, originating in the East, obtained so great a reputation in Greece, and was supported by so much zeal in the new capital of Egypt, abounded with lofty conceptions, and with the sublime creations of a poetical fancy. But to what did it lead? The unhappy fruits of its popularity were the most intolerant dogmatism, and desolating scepticism; while the system was rendered imposing, only by a cloak of mysterious importance thrown over it by the mad enthusiasm of its professors.

It is difficult now to conceive, how, during the lapse of so many ages, so many attempts should have been made to arrive at a correct theory of the human mind, without the idea having ever occurred to any one of the celebrated philosophers of past times, to take *the brain* as the groundwork of their labors; that organ whose functions they were engaged in studying, but whose connection with those functions they never recognized. It is indeed true, that some of them took notice of the wonderful structure of the cerebral mass, and even undertook the dissection of the brain, to which they professed to attach a high degree of importance; but their labors were nearly fruitless, for to them the brain appeared but a single homogeneous mass, undivided into separate organs. "What is the use of observation," said Bichat, "if we know not the seat of the disease?" What, in the same way, could be the value of observations made by men, who not only were ignorant of the seat of the different faculties, but to whom the idea had not even occurred as possible, that each of those faculties might depend for its manifestation on a particular portion of the cerebral substance? Thus did these great anatomists make no real progress in the study of the human intellect and passions. Succeeding ages were not more successful in founding a system which should substitute close observation of facts for mere arbitrary hypothesis.

Down to the days of Gall, the inquirer into the nature of the human mind, began his investigations by a forced abstraction of his own faculties from the whole external world, and then turning his intellectual powers inwards

upon his own mind;—in profound reflection, and in the total inaction of by far the larger portion of his faculties, he fixed in his memory a picture of what he fancied to be the various phenomena of cerebral activity. It was, with a crowd of ideas acquired in this manner, added to his previously received prejudices, that each philosopher, taking himself and his own individual constitution as the standard, formed his theory of the human understanding. Other philosophers, again, holding different views, sought for the origin of the human faculties in the impressions made on the senses, and these brought out ideas more distinct and positive; but, instead of regarding external sensations as merely necessary excitements to action of the internal organs of the different faculties, they considered the latter to result from the sensations themselves, and the brain was as yet vaguely believed to be, as a whole, the general seat of intelligence. As for physiologists, they were content to ascribe, in a general way, the origin of the passions to the influence of temperament, or to various viscera or organs of the body.

On the appearance of Gall, the science of mind assumed an entirely new aspect. Instead of studying the character and intellect of man in general, through the medium of himself, he began a series of observations upon individual men, and the lower animals. Instead of inventing an arbitrary system of faculties, Gall noted the relation between each organ, and the manifestations which he observed in the different individuals whom he examined; he distinguished between the general attributes of all or a variety of the faculties, and particular faculties themselves. Instead of inquiring whether an individual was well endowed with memory, imagination, judgment, or attention, (which are attributes common to a variety of intellectual powers,) he observed his capacity for any, and what employment of those faculties; whether he most easily remembered places, or words, or persons, and so on. In a word, instead of an abstract and *à priori*, Gall introduced an experimental or *à posteriori*, method of philosophising.

He studied what are called morals, in the same way that we study physics; and he gave to the physiological science of mind that happy direction, to which the other natural sciences owe those splendid results which so hon-

orably distinguish the latter part of the last century, and, still more, the beginning of the present. The course which he has pointed out, is that which must be followed by all future philosophers, or they will infallibly continue to wander blindfold amidst error and absurdity.

But the system of Dr. Gall cannot be properly understood, until the inquirer shall know how to apply it with certainty. To attain this knowledge, a long and enlightened experience is absolutely necessary, and the results thence obtained are truly astonishing. Suppose that we wished to judge of the capacity of any individual, the general development of his head must first be considered, next the proportion which the anterior bears to the posterior regions, then the prominent parts in each region must be ascertained, and if a sufficient degree of experience has been acquired, the limits of the different organs should be specified. Thus, if it be known beforehand what allowance should be made for the influence of the viscera, the faculties and dispositions of the individual may be accurately determined. Such is the process that must be gone through before arriving at any thing positive, and Gall will be found to be a sure guide throughout. By this means, it will be understood why one individual is distinguished for his success in poetry, music, mathematics, logic, eloquence, or metaphysics; why another is impelled by the noblest of human passions, that of desiring to sacrifice even his life for the sake of doing good; why another is insensible to the existence of danger; why this man sacrifices every thing to the desire of being thought eminent in some accomplishment which, in reality, he does not possess, while that man would give up all besides to gratify his thirst of rule; and, finally, why some individuals can never attain to excellence, notwithstanding the greatest efforts, but remain forever condemned to a humiliating mediocrity. But this is not all. When we are thoroughly convinced, that those differences of disposition are the results of organization, we will congratulate the man whom nature has constituted favorably in that respect; and we will, on the other hand, regard with compassion him who has been less felicitously endowed. The same considerations will strengthen our feelings of indulgence towards the failings of our fellow-creatures,

at the same time that they will show the importance of an enlightened education, which shall aim at counterbalancing the depraved dispositions of a child, by exercising those organs and faculties which may tend to destroy their effects, and which may even frequently turn them to the advantage of the individual who would otherwise have been their victim.

Such is the importance of Phrenology; but, at the same time, can it be said that the man whose genius has given it birth has succeeded in bringing it to perfection? Little attention, indeed, would, in these days, be paid to the man who should pretend to prescribe limits to any one of the sciences. No! Phrenology, like all the branches of medicine, is still imperfect; but, like them, it lays claim to stand on certain positive *data*, on fixed principles, and fundamental doctrines, which cannot be called in question, as being the results of testimony a thousand times repeated, of the whole united senses, elucidated by the simplest reasoning, and proved by the severest induction. So fully is this admitted to be the case, that now-a-days the study of Phrenology is no longer considered to belong exclusively to the physician, but begins to be looked upon as common to all the world.

Artists were perhaps the first to perceive the importance of our science; for it is a striking fact, that, in the models of antiquity, the forms of the head are very often found in the most exact relation to the faculties of the gods and men whom the chisel of the artist has handed down in sculpture to posterity. What sculptor will not comprehend, that, by means of Phrenology, he may be able at a single glance to obtain a key to individual character? and that, in creating an ideal subject, he must be guided by the same principles? Will it ever occur to him to give to the figure of a Hercules the forehead of an Apollo? or would he place the head of a demon of cruelty on a statue intended to represent a character of pure benevolence? Were an artist to commit such an error, he would be considered a man of superficial mind; and though, as a mere workman, he might be more or less rewarded for his skill, he would be treated as one who had not an idea of the true nature of his art, and of accomplishing it. The same remarks are equally applicable to the kindred art of

painting. The painter cannot too strenuously pursue the study of Phrenology: for he has only an even surface on which to delineate his objects, and he may fail in giving them the necessary expression, by neglecting those traits, which, however slight, are characteristic and necessary to bring out the distinguishing peculiarities of his subject. Moreover, Phrenology recognises a uniform relation, an intimate connection between the habitual attitude of individuals and their predominant dispositions; and the painter who knows how to appreciate this influence of the cerebral organization upon the movements of the body, will be distinguished for the naturalness of the deportment and action of all his personages; while he who is a stranger to Phrenology runs a continual risk of falling into the grossest inconsistencies. What would be thought of a medallion, in which the predominating organs of its subject were not more strikingly developed than the rest? In this way, to all those arts which profess to present the exact image of man to the eyes of his survivors, Phrenology is most useful, and will in future be considered indispensable.*

It is now beginning to be perceived also, that, without physiology, the philosophy of mind cannot advance a single step; that a thorough knowledge of organization in general, and of that of the brain in particular, must be the foundation of all inquiries of that nature; that every attempt to explain intellectual and moral phenomena, which shall not take the principles of Phrenology for its basis, will inevitably be fruitless. On this subject all are agreed, spiritualist as well as physiologist, for, even according to the views of the former, the brain is a condi-

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* From ignorance of these principles, the ancients have, in some of their master-pieces, fallen into errors which are now considered monstrous, such as the extreme smallness of the head of the Venus de Medicis. From the same cause, and from fear of failing in certain arbitrary proportions, the head of Napoleon has been reduced in size, without regard to the existence of an extraordinary cerebral development, of which Phrenology alone is capable of comprehending the importance, and appreciating the beauty. The ancients, when they concealed the enormous size of the head of Pericles, had the same end in view as the moderns, but were more faithful imitators of nature.

tion necessary to the manifestation of both intellect and sentiment, while, according to the latter, it is the vital organ of the intellectual and moral powers. It were out of place here to attempt to decide upon the superiority of either of those methods of reasoning; suffice it to say, that both are deeply interested in advancing the progress of Phrenology. Besides, this science explains the cause of this very difference of opinion on matters which, ever since man began to think and reflect, have divided the world. We cannot at the same time help noticing here, the sure consistency of the ideas furnished by Phrenology on this subject. How unerring and elevated are the views of the philosophical observer, who, contemplating man in the midst of his fellow-creatures, recognises and traces the reciprocal actions and reactions of different organizations! Should such a philosopher ever be called upon to give laws to his country, he will, far from setting at nought the uniform cravings inherent in certain organizations, be careful to avoid all excitements to infraction of municipal law arising from demanding of man more than his organization is capable of, and from sacrificing some of the faculties to the interests of some others: he will frame laws which shall be adapted to the real wants of the community, according to the variety of their nature, and not founded on false views of the equality and uniformity of the intellectual and moral faculties; for he will be familiar with those varieties of organization, from which the differences of intelligence and resource arise.

Phrenology will be consulted, also, in the preparation of a penal code; for the nature of the punishments to be inflicted ought to bear a relation to the possibility, more or less admitted, of correcting and ameliorating the guilty. A great latitude will thus be allowed, in order that he whose organization does not indicate his propensities to be incurably strong, may one day, when their influence shall have been abated by well-directed training, be restored to his place in that society, of which he shall be no longer unworthy; whilst the unfortunate being, in whom the excessive and fatal preponderance of certain organs over those of the intellect, or the almost total absence of the latter, shall leave no hope of improvement, will be

kept separate from the former class of moral patients, and will be prevented forever from returning into that society of which he can only be the pest.

But the department in which Phrenology is most necessary, and is destined to produce the happiest results, is that of Education. Here the extent of its application will be prodigious. How should that science fail to be of primary importance to a teacher, which should enable him to turn the studies of his pupils into the proper channel, and to have a thorough knowledge of their characters; which should inform him with certainty that such a one has a decided talent for drawing, such another for languages, a third for calculation, and a fourth for poetry; and which should warn him, that it would be a loss of time to urge the progress of a fifth in a particular direction! How many tears would not be spared to childhood! How many vexations would not the teacher himself escape! And who will presume to foretel the results of a system of education, in which, by proper direction, those dispositions shall be turned to the advantage of an individual, which would otherwise have been the cause of his inevitable destruction? When a child is born with a particular development of brain, if he be left altogether to himself, he will become cruel and ferocious, and perhaps commit murder. What does an able instructor do in such a case? He endeavors to place beyond the reach of his pupil all objects calculated to call into action the organs of his most dangerous propensities, and to present to him only those of an opposite tendency. He strongly calls his attention to the charms of an amiable disposition, to the affection which it generates towards itself, to the praises which it calls forth, and, above all, to the internal complacency, with which it never fails to bless its possessor. Such representations, exhibited to the infant's mind incessantly, and in a thousand different ways, incline him to make an effort at amiability. He is praised for his first virtuous acts; he is skilfully encouraged to persevere in the same line of conduct. Even accidentally, and as opportunity offers, he is made to feel, by some striking example, the melancholy and deplorable effects of indulging criminal passions; and, by assiduous and

long continued care, the result, after years of perseverance, is, that he becomes a man of courage and coolness, who is not to be diverted from a useful enterprise by feelings of too great sensibility, but who, actuated by those principles of virtue which have gradually become his constant guide, will refrain from indulging in any act of cruelty.

Such is the happy influence which Phrenology will exercise over the development of childhood; but is not education also useful at all ages and at every stage of life? Youth and mature age are not necessarily incorrigible. The attempt is then, without doubt, more difficult, but still success is not impossible. Let us suppose a man to be of a passionate temperament: Phrenology informs him that there exists within him a disposition, the result of organization, hurrying him blindly on to all the violence of passion. If, besides, he be endowed with reason, that is to say, if he be not deficient in the intellectual organs, will he not keep himself on his guard against the causes which inflame his passion? Knowing that the chief cause exists in his own constitution, will he not strive to yield less and less to the influence of causes which are external? And will he not, consequently, succeed at last in weakening his own tendency to paroxysms?

It would require much more than our present limits, to enter fully here into the services which Phrenology will be the means of rendering to human society, as soon as it shall be universally known and appreciated as it ought; all that we aim at, is, to call attention to the nature and importance of its assistance, in order that all those who are actuated by a desire of doing good, and who consider it a duty to contribute to the amelioration of our social condition, and of the human race in general, may concentrate their exertions in maintaining, spreading, and bringing it to perfection. EDITOR.

ADVERTISEMENT.

It is three years since I published my large work on the anatomy and physiology of the brain. This magnificent work soon found its way into the principal libraries of Europe. The public were sure of finding in it, the real ideas of the founder of the physiology of the brain, and it contributed its potent influence to destroy the prejudices which still reigned respecting the nature and tendency of my researches.

I had come to the conclusion, that it was necessary, in the first instance, to publish a work worthy of the importance of the subject, which would make known to the learned world the whole extent of my discoveries, and at the same time would afford the means of putting them to the ordeal, and of multiplying and perfecting them.

This purpose not only required many discussions on subjects altogether new, but, likewise, a great number of portraits, and designs of brains and skulls, both of men and animals.

The execution of this vast plan, raised the price of my work above the means of most persons, to whom my labors ought to prove of the most utility; and I was therefore urged from all quarters to publish an edition,

which in its price might come within the reach of the public in general.

In the fulness of my conviction, that my labors may have the happiest influence on moral institutions, in the treatment of cerebral diseases, particularly mental alienation, &c., I feel it my duty to neglect no means of extending the knowledge of them. Notwithstanding the great number of general views, small works, articles in journals, analyses and criticisms by many of my most distinguished pupils, I still meet, in almost all the works of our modern authors, either erroneous and defective notions, a total ignorance, real or affected, or a singular reserve and apprehension in passing judgment on what is most essential in my doctrines—the incontestible value of facts. They can no longer refuse to admit the principles to which these same individual observations have led me; but they find it too laborious to resist experience itself, and they conceive that they have done enough for the progress of the science, by suspending, with an air of complaisance or modesty, its definitive decision.

It is not yet time, therefore, to abandon the research and the multiplication of observations to the reader alone; it is still necessary to conduct the observer by the hand, to show him the multiplied modifications of a large number of facts, and thus to initiate him in this new field of observation. I shall concede no excuse to those who, through prejudice or self-sufficiency, neglect what is the most useful and essential, the experimental part of the physiology of the brain.

It is for the same reason, that this edition does not offer to the reader a simple sketch of my doctrines,—an extract merely from my large work. It includes the entire text, with the exception of the descriptive anatomy of the nervous system in general, and of the brain in particular, of which I propose to make a distinct work, as soon as I shall be able to profit by what has been published on these two objects of comparative anatomy, since my first edition. I shall, in this work, explain the anatomy only so far as it is indispensable

for the understanding of the physiological propositions. For this omission, however, I shall atone by several corrections; I shall add new observations, answers to new objections, and a systematic review of the most important treatises, which have appeared since the publication of my large work. But not to leave the latter in any respect inferior to this, I shall join to it a supplement, which will be wholly devoted to these improvements.

As it has been necessary to omit the plates, I shall refer to them by the same figures and the same letters with which they are marked in my great work, in order that those of my readers, who are in the vicinity of extensive libraries, may be enabled to consult them. In this manner, I apprehend, the various and multiplied materials of this whole work will be connected in the most natural manner.

The object of all my researches is to found a doctrine on the functions of the brain. The result of this doctrine ought to be the development of a perfect knowledge of human nature.

The possibility of any doctrine, in relation to the moral and intellectual function of the brain, supposes

1. That moral and intellectual faculties are innate.
2. That their exercise or manifestation depends on organization.
3. That the brain is the organ of all the propensities, sentiments, and faculties.
4. That the brain is composed of as many particular organs as there are propensities, sentiments, and faculties, which differ essentially from each other.

And as the organs and their localities can be determined by observation only, it is also necessary that the form of the head or cranium should represent, in most cases, the form of the brain, and should suggest various means to ascertain the fundamental qualities and faculties, and the seat of their organs.

The demonstration of these principles will be followed by the exposition of the moral qualities and intellec-

tual faculties, by the history of their discovery, their natural history, the seat of these organs in the brain, the form which these organs give to the head, &c.; by a treatise on national heads; on the physiognomy, pathognomy, and philosophy of man, and on several very important questions, the solution of which naturally flows from my doctrines taken together.

When I speak in the plural number, I include with myself Dr. Spurzheim, who, having accompanied me in my travels, made a great part of the observations, referred to, in common with me.

INTRODUCTION.

When any discovery or new doctrine is announced, the question is usually asked, how the author conceived the first idea?

Although the same experiments may not lead different individuals to the same meditations, yet when these same experiments are collected and presented in order, they give rise to ideas in the mind of the reader so analogous to those of the author, and the discovery often appears to him so natural an event, that he is ready to exclaim, "Why had I not made it long since?"

This is precisely what has happened with respect to my doctrine, the origin of which rests on very ordinary facts. Most of those who have heard my lectures have said to themselves, and I doubt not but most of my readers will say likewise, "How is it possible, that these truths have been so long overlooked?"

From my earliest youth, I lived in the bosom of my family, composed of several brothers and sisters, and in the midst of a great number of companions and schoolmates. Each of these individuals had some peculiarity, talent, propensity, or faculty, which distinguished him from the others. This diversity determined our indifference, or our mutual affection and aversion, as well as our contempt, our emulation, and our connections. In childhood, we are rarely liable to be led astray by prejudice; we take things as they are. Among our number, we soon formed a judgment, who was virtuous or inclined to vice; modest or arrogant; frank or deceitful; a truth-teller or a liar; peaceable or quarrelsome;

benevolent, good or bad, &c. Some were distinguished by the beauty of their writing, some by their facility in calculation, others by their aptitude to acquire history, philosophy, or languages. One shone in composition by the elegance of his periods; another had always a dry, harsh style; another reasoned closely and expressed himself with force. A large number manifested a talent or a taste for subjects not within our assigned course. Some carved and drew well; some devoted their leisure to painting, or to the cultivation of a small garden, while their comrades were engaged in noisy sports; others enjoyed roaming the woods, hunting, seeking birds' nests, collecting flowers, insects, or shells. Thus, each of us distinguished himself by his proper characteristic; and I never knew an instance, where one who had been a cheating and faithless companion one year, became a true and faithful friend the next.

The schoolmates most formidable to me, were those who learned by heart with such facility, that, when our recitations came, they took from me the honors, which I had gained by my compositions.

Some years afterwards I changed my abode, and I had the misfortune still to meet individuals endowed with a surprising facility for learning by heart. It was then that I remarked, that all these resembled my former rivals in their large prominent eyes.

Two years afterward I went to a university; my attention first fixed itself on those of my new fellow-students who had large prominent eyes projecting from the head. Such generally boasted of their excellent memories, and though in many respects by no means the first, all of them had the advantage of me, when the object was to learn promptly by heart, and to recite long passages with correctness.

This same observation having been confirmed to me by the students of other classes, I naturally expected to find a great facility of learning by heart, in all those in whom I should remark the prominency of the eyes. I could not believe, that the union of the two circumstances

which had struck me on these different occasions, was solely the result of accident. Having still more assured myself of this, I began to suspect that there must exist a connection between this conformation of the eyes, and the facility of learning by heart.

Proceeding from reflection to reflection, and from observation to observation, it occurred to me that, if memory were made evident by external signs, it might be so likewise with other talents or intellectual faculties. From this time all the individuals who were distinguished by any quality or faculty, became the object of my special attention, and of systematic study as to the form of the head. By degrees, I thought I could flatter myself with having found other external characters, which were constantly met with in great painters, musicians, mechanics, and which consequently denoted a decided propensity to painting, music, the mechanical arts, &c.

I had in the interval commenced the study of medicine. We had much said to us about the functions of the muscles, the viscera, &c., but nothing respecting the functions of the brain and its various parts. I recalled my early observations, and immediately suspected, what I was not long in reducing to certainty, that the difference in the form of heads is occasioned by the difference in the form of the brains. But, I never went so far, as to imagine that the cause of the moral qualities or the intellectual faculties, resided in such or such a place in the bones of the cranium.

Was it not then very natural to expect, that in discovering and demonstrating, in men endowed with remarkable propensities or talents, the existence of some external signs of their qualities, this discovery would lead me to a knowledge of the functions of the brain, and of its parts? The hope of having it in my power to determine, one day, the relation of the moral and intellectual forces with the organization, the hope of founding a physiology of the brain, was so powerful an encouragement, that I could not but form the resolution to continue my researches, until I had either attained my end, or was convinced of the impossibility of reaching it.

This beautiful enterprise would not have been difficult, if, entirely at liberty, I had been abandoned wholly to myself and to nature. But, it too often happens, that the more scientific one becomes, the farther he departs from the simple truth; and this was precisely what I experienced. My imperfectly established conviction was shaken, in proportion as I gained new information, or rather, as I heaped up errors and prejudices.

Philosophers assure us, said I to myself, that all our faculties come from external sensations, or, at least, that all men are born with equal faculties, and that the differences between them, are owing either to education, or to accidental circumstances. If it be so, there can be no external signs of any faculty; and, consequently, the project of acquiring in this manner a knowledge of the functions of the brain and its parts, is a mere chimera.

But I always returned to my first observations. I knew that my brothers and sisters, my companions and school-fellows, had received nearly the same education, or rather, that in general, they had received none. All had grown up in the midst of the same circumstances and analogous impressions. I also saw that ordinarily those whose education had been carefully watched, to whom the instructors had given lessons in private, were, in fact, behind others in capacity.

We were often accused of aversion to study, and of want of zeal; but many of our number could not, with the best disposition, and the most determined efforts, raise themselves in certain points, even to mediocrity, while in others, they surpassed their school-mates without effort, and almost, it might be said, without perceiving it. In fact, our masters did not give much credit to the system of the equality of the faculties, for they thought proper to exact more of one scholar, and less of another. It often happened to them to speak to us of our natural gifts, of the gifts of God; and they exhorted us in the words of the gospel, telling us that each would render an account in proportion to the talents which he had received.

Add to this, that I observed both in tame and wild animals, of which I had always a considerable number about me, differences of faculties and of character, as in men. One dog was almost of himself skilful in the chase, while another, of the same race and the same litter, could be trained only with great difficulty; one was very cross, and quarreled with all other dogs, while another was very mild and peaceful; this one could not find his way back even from a small distance; while that, on the contrary, though very young, returned, after being lost, from very distant places. Such a bird listened with great attention to an air which was played before him, and learned it with admirable facility; another, of the same covey, and fed and treated in the same manner, paid no attention to it, and sung nothing but his own note. One pigeon was the faithful mate of his companion, and in spite of repeated trials, could not be made to couple with another female; while another pigeon, on the contrary, stole into all the dove-cotes, to gallant and carry off females that were strangers to him.

In all these cases, I could not suppose either evil inclinations, the influence of education, or different impressions on the external senses. I was consequently obliged to conclude, that the propensities and the faculties, both of men and animals, were innate.

But then arises this question: On what is this innateness founded? Does it belong to a peculiar principle, a spiritual principle, the soul? and this soul, does it exercise its faculties freely and independently of organization; or, is the exercise of its faculties subordinate to certain material conditions? or, in fine, are these faculties the result of organization itself?

If this principle, this soul, enjoys the exercise of its faculties independently of organization, it is, together with all its functions, beyond the sphere of the physiologist; the metaphysician and the theologian alone will arrogate the power of pronouncing on its nature. But I will submit the following questions to those, who pretend, that this principle is independent of organization.

Is this principle the same in both sexes? Does it change its nature in infancy, childhood, puberty, manhood, old age, decrepitude? Is it at all modified according to the quantity and quality of the aliments by which the body is nourished—according as digestion is easy or laborious? What becomes of this independence in sleep, in drunkenness, in apoplexy, in acute fevers, in effusions, excrescences, inflammations and ulcers of the brain and its envelopes, in derangements of the functions of the liver and stomach? Every one knows, that such circumstances interrupt, suppress, exalt—alter, in a thousand ways, the functions of the soul.

Ought not these facts then to lead us to the conclusion, that the exercise of our propensities and faculties, whatever the principle we adopt, is subjected to the influence of organic conditions.

Who then will deny, that the propensities and the faculties are within the domain of the physiologist? It is for him to examine these material conditions, these organs of the soul; it is for him to determine whether the greater or less perfections of these organs, induces a more or less energetic manifestation of their functions; it is for him to seek to what point and under what conditions, the most favorable development of the cerebral organs impresses visible or palpable signs on the external surface of the head. It is, in fine, the task of the observing physiologist to examine what are the parts of the brain affected by a determined propensity, sentiment, talent.

For a long period I continued my researches as I had commenced them, urged on solely by my fondness for observation and reflection. Abandoning myself to chance, I gathered for several years all that it offered me. It was not till after having accumulated a considerable mass of analogous facts, that I felt myself in a state to range them in order. I perceived successively the results, and at length had it in my power to go to meet observations and to multiply them at pleasure.

But again, the more progress I seemed to have made, the more every thing appeared to conspire against me. Here, a phenomenon supposed something utterly at war with the dogmas of physiologists; there, a consequence presented itself which refused to harmonize with the opinions of philosophers; and here, many fancies were raised respecting the dire influence, which my researches were to exert on morality and religion.

In this continual struggle of facts with received notions, what was to be done? Was I to listen to the simple voice of nature, or, to the arrogant counsels of reigning doctrines? Was I prepared to interpret rightly the language of nature? I had so often deceived myself—who could answer for me, that I should deceive myself no more? Was it not a ridiculous pretension for a young man, to hope that his efforts would reveal to him things, which for ages had escaped the researches of the greatest observers? On the other hand, supposing that my labors were not to be totally vain, was it not an imprudent and rash enterprise, to oppose opinions so long established in the various sciences; to contradict the anatomists, physiologists, philosophers, metaphysicians, lawyers, &c.?

How many times have I probed my conscience, to determine whether a vicious propensity, unknown to myself, did not guide me in these researches? But, as I could not have foreseen whither they would lead me, no prospect of reputation could have influenced me in pursuing them; and beside, was it the best mode of attaining fame, to venture to announce extraordinary propositions, destitute of probability, and which, if false, must be proved such, at no distant period?

The love of truth, and a conviction of the purity of my views, could alone have inspired me at each step with the confidence and the boldness, necessary for my task. When one has discovered by experiment a series of incontestible truths, he meets all possible doubts and objections with courage. Each doubt resolved, is a difficulty removed; each objection refuted, is an error over-

thrown. In this manner I soon succeeded in removing the obstacles, and in peaceably pursuing my course. I especially familiarized myself, at an early period, with the following observations, which ought to be deeply engraved in the mind of all observers and of all readers.

The more important a new view may be, and the more nearly the doctrine is likely to touch the affections and interests of men, the greater care should be taken by the author to avoid every kind of rash and arbitrary assertion; but, the moment he announces the truth, he ought to be assured beforehand, that he can produce only good. Let these truths concern the nature of man or the nature of brutes, let them unfold the physical or mental nature of living beings, he will be always able to appeal to the harmony and order, which reign in the universe. Is it not the same Creator who has made the moral and the physical world? Can physical truth be in opposition to moral truth? If certain men cry out at the danger, with which a real discovery threatens an established doctrine, they render this doctrine singularly suspicious; for, either it is false, or we may justly accuse the weakness and ignorance of the pretended interpreters of God's works.

Nothing can resist the power of truth. Now if the truth remains, and public writers or even governments attach to it pernicious consequences, who does the mischief? On the other hand, is it not at once impious and absurd to maintain that laws and constitutions ought to be founded on imposition, in order to insure the happiness and tranquillity of men?

"Let us respect truth," you will tell me; "but how are we to know that your doctrine of the functions of the brain, is the truth?" Truth, as well as falsehood, has its proper physiognomy. This doctrine owes its birth to incontestable facts; these facts have revealed the general laws, in virtue of which they take place; they have led to principles which prove themselves, independently of the facts from which they are deduced: each new fact, whether furnished by chance,

or called forth by a mind eager for experiment, becomes a new confirmation of it: this doctrine has introduced clearness, confidence, harmony and stability, where before there reigned only obscurity, vacillation, contradiction, versatility; it explains moral phenomena, and the modifications of these phenomena at different ages and in the two sexes, in different states of health, and disease, and in different nations: in man and in animals, it reveals to us the secret of the diversity of instincts, propensities, faculties, as well in species as in individuals: from the polypus to man, it demonstrates to us from fragment to fragment, the material causes of the gradual perfection of their intelligence, of which, descending in the opposite direction from man to the polypus, and returning piece by piece, it produces the diminution and the degradation; the numerous propositions of this doctrine, destroying the most accredited errors, naturally sustain and strengthen each other: it is eminently fruitful in application to human affairs, to education, to the arts and sciences, to the study of history, to medicine, to philosophy, morals, criminal legislation, &c.: it opens to the observing naturalist, a boundless field for meditation. If these are the characteristics of the truth and utility of a doctrine, I am certain, that we shall be more and more struck with the truth and utility of the physiology of the brain, in proportion as it is submitted to more rigorous and multiplied tests.

Strongly impressed with these ideas and supported by these motives, I turned all my attention to the finding of the means which, in the least possible time, would enable me to accumulate the greatest number of facts. I shall speak of these means, when I treat of the propensities and faculties, and their organs, particularly. I will here give a single one, which presented itself when I least thought of it, and which greatly contributed to perfect my works.

The first day of the year 1805, my father, who resided at Tiefenbrunn, in the Grand Duchy of Baden, wrote me these words: "It is late, and night cannot be far

distant: shall I see you once more." Nothing but such an invitation, joined to the ardent desire which I cherished in my bosom of again seeing my beloved parents, after an absence of twenty-five years, could have induced me to leave my friends and my patients, for a few months. I wished, too, to avail myself of this opportunity to communicate my discoveries to the learned men in the north of Germany. That my interview with them might not terminate in propositions and discussions without proof, I took with me a part of my collection. I was always convinced that, without these visible and palpable proofs, it would never be possible to fight victoriously against so many preconceptions, prejudices, and contrary opinions, as I must necessarily meet.

I experienced, every where, the most flattering reception. Sovereigns, ministers, philosophers, administrators, artists, seconded my design on all occasions, augmenting my collection, and furnishing me every where with new observations. The circumstances were too favorable, to permit me to resist the invitations, which came to me from most of the universities. By this means my journey was lengthened far beyond the term, which I had first fixed; but there likewise resulted so many discussions of my doctrine, public and private, that it arrived at a degree of maturity, which few founders of new doctrines have been able to attain during their lives.

This journey afforded me the opportunity of studying the organization of a great number of men of eminent talents, and of others of very limited capacity, and I had the advantage of observing the difference between them. I gathered innumerable facts in the schools, and in the great establishments of education, in the asylums for orphans and foundlings, in the insane hospitals, in houses of correction and prisons, in judicial interrogatories, and even in places of execution: the multiplied researches on suicides, idiots, and madmen, have contributed greatly to correct and confirm my opinions. I have laid under contribution several anatomical and

physiological cabinets; I have submitted antique statues and busts to my examinations, and have compared with them the records of history.

After having used, for more than thirty years, such diversified means, I no longer feared the danger or the reproach of having precipitated the publication of my great work. I had more reason to apprehend, that the great number of proofs I had furnished in support of each of my propositions, instead of being satisfactory, would prove to the great body of my readers actually alarming. As this volume will be particularly devoted to the exposition of the moral part of the physiology of the brain, the reader may ask, if a physician has the right to apply his knowledge to the study of morals, the improvement of education, that of houses of correction, of prisons, of the penal code, of malefactors, &c. No one disputes, that all institutions and all laws ought to have for their basis, the nature of man and the wants of society. Now, to whom does human nature reveal itself more openly, and with less reserve, than to the physician? Who has more occasion than the physician, to see men in a state of absolute unreservedness? Who is more obliged to study their physical and moral character, and the influence of one on the other? Who is better prepared for it, by accessory knowledge and by the study of natural sciences? Finally, who remarks and knows how to appreciate, as well as the physician, the influence of food and drink, of temperature, of a critical period approaching, or already present, of temperament, climate, affections, passions, diseases, &c., on the determinations of men? The physician alone by night and day is witness of the most secret events in families, and of their most intimate relations. Virtuous or vicious, the man who suffers and struggles against death, can with difficulty conceal from the physician, his real character. Who would not wish to have for a friend the man to whom he confides his wife, his children, himself? The man who, at every hour, must stand ready to devote himself absolutely to his patients, and

perhaps to meet death at their bedside? It is to such a friend, to whom all that relates to human nature is so well known, that men unfold the hidden windings of the heart; they feel obliged to discover to him the weak points and eccentricities, which may guide him more surely in his judgment. Who, like the physician, can trace that extremely delicate line of demarcation which distinguishes immorality, wickedness, and crime, from certain derangements of the mind, so often masked, from imbecility, from madness? Ought not circumstances so numerous, and so favorable, give to the physician profound and certain views of human nature?* Let this same physician be endowed with the genius of

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*The truth of these remarks must be obvious to all. The sphere of the physician is great and important, and if he would make use of his frequent opportunities to observe nature as modified by disease, the result of his observations would be a valuable contribution to philosophy. We do not mean simply those symptoms which have reference to the physical system only—but those mental manifestations which change with the different stages of disease.

The character of the mind of the patient, when in health, should be first ascertained, and his most prominent phrenological developments. His concern, or indifference for life, or friends, or wealth, or business, should be noticed and registered.

We would recommend the keeping of a phrenological journal for every patient; at least, noticing the most prominent developments.

The physician has often to encounter the prejudices of his patients, or their attendants—and a knowledge of their peculiar characteristics would enable him to provide for them. He could judge more accurately of symptoms, by being able to distinguish between the effects of physical prostration, or apparent improvement, and the mere affections of the mind.

Large or small Hope, or Mirthfulness, or Cautiousness, would change materially, many of the symptoms which physicians uniformly regard as of consequence.

When encouragement becomes necessary to excite the patient, appeals should be made to those faculties which are predominant. Irritableness of temper, however, should be met with the greatest possible kindness. We cannot express too strongly our disapprobation of those medical men who treat their patients harshly, and more like brutes than human beings. They administer to their bodies, not appearing to know that they have anything to do with their minds. A cheerful communication between the physician and patient, is followed with the happiest effects.—[Ed.]

observation; let him be familiarized with the origin and nature of the propensities and the faculties of man, with the excesses and abuses with which these same propensities and faculties continually menace him, and you will have the best qualities to furnish valuable results, in all cases where the object is to direct sagaciously, and to judge equitably the actions of men. Moses, that great legislator, fixed his principal attention on the physical character of men. Is it not to physicians that men are indebted for an infinity of excellent establishments of police, and for good laws? Since some great men have given several complete treatises on medical police and statistics, as well as on legal medicine, how many instructors and moralists are there, who borrow from medicine those means, which they employ with the happiest results.

If all which I have mentioned, is not yet accomplished, it is because, neglecting the useful example of the ancient sages of Greece, men have separated from each other too far, physiology, medicine, education, morals, legislation, instead of appreciating their mutual relations; and still more because there are few philosophic physicians, who can embrace the whole extent of their sphere of activity, and elevate themselves to the full dignity of their rank.

MORAL PART.

OF THE PHYSIOLOGY OF THE BRAIN.

SECTION I.

OF THE NATURE OF MAN, AND OF THE DIFFERENCE BETWEEN VEGETABLE AND ANIMAL LIFE.

THE phenomena which takes place in man, from the moment of his conception to that of his death, taken together, constitute the nature of man.*

All these phenomena are perhaps the result of one single and uniform principle; but they manifest themselves under forms and conditions so different, that to acquire a clear and detailed knowledge of them, we must examine them under points of view, as various as these forms and conditions themselves; we must study man in all his relations, in all his points of contact with entire nature.

The greatest obstacle which has ever been opposed to the knowledge of man's nature, is that of insulating

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* The word phenomenon means more properly the appearance of a thing or quality, than the principle which constitutes the nature of it. To retain the word phenomenon, we should modify the sentence thus: The phenomena which takes place in man, from the time of conception even to that of his death—constitute the only data from which the nature of man can be inferred.—[ED.]

him from other beings, and endeavoring to remove him from the dominion of the laws, which govern them.

We may, without inconvenience, neglect the relation of man to unorganized nature. Let us leave to the cultivator of natural history, the care of determining the laws of contractility, elasticity, weight, attraction, crystalization, the action of capillary tubes, electricity, &c. But, it is impossible to avoid an endless confusion of words and notions, and not to lose ourselves in the most absurd explanations, unless we distinguish the functions which man has in common with the vegetable kingdom, from those which are peculiar to him as an animal.

The vegetable kingdom offers us organization infinitely varied. We recognize in it the act of fecundation, assimilation, nutrition, growth, a species of circulation, secretions and excretions, irritability, and an elective force, or a faculty of placing itself in relation with objects out of itself; of choosing, for example, the most suitable nourishment; of attaching itself to surrounding objects; of avoiding or seeking the light; of closing the leaves or flowers by day or by night, &c. All these operations take place from the influence of a blind necessity, without sensation, consciousness, or will. For this reason we assign to the vegetable kingdom a life, but a life purely organic, automatic, vegetative: and as all this passes in the interior of the organism itself, and the individual takes no account of the action of external things, it has been thought proper to call it an internal life. Those who find the supposition of a soul, necessary to explain these phenomena, give it the name of a vegetative soul.

The same functions are exercised in animals and in man. Fecundation, assimilation, nutrition, growth, secretions and excretions, &c., are performed in them equally by the laws of organization, by a blind necessity, without perception, consciousness, or will. Man and animals, therefore, share the vegetative, automatic life, with the vegetable kingdom. But they likewise enjoy functions of a more elevated and essentially different order; they possess the faculty of sensibility, of per-

ceiving impressions, external and internal; they have the consciousness of their existence; they exercise voluntary movements, and the functions of the senses; they are endowed with mechanical aptitudes for industry; with instincts, propensities, sentiments, talents; with moral qualities and intellectual faculties.

As soon as one or more of these functions take place in any being, it is considered as possessing animal life. And as men have thought, that all these faculties were the product of impressions on the senses, it has been called the life of relation, or external life.

It is therefore with reason, that the parts of the body have been divided into organs of vegetable life, and organs of animal life.

Those readers who are not versed in the study of natural history, will here ask me, What is the organ, or what are the organs of animal life? By what means has nature effected all its phenomena, from simple sensation to the most complicated faculties, moral and intellectual?

These means, these organs, form a peculiar apparatus, of which vegetables and zoophytes are still deprived: it is the nervous system. The nerves alone are the instruments of sensibility, of voluntary movement, of the functions of the senses. Without a nervous system, there is no *mechanical aptitude*, no instinct, no propensity, no sentiment, talent, moral quality, or intellectual faculty; no affection, no passion.

Each particular order of the functions of animal life is effected by a peculiar nervous system, by particular nerves, distinct from the other nervous systems, and from other nerves. There is a peculiar nervous system for the viscera, and for the vessels principally destined to vegetable life; there is a nervous system, the instrument of voluntary movements; there is one which belongs to the functions of the senses: finally, the noblest in animals and in man the most considerable, the brain, has all the others under its dominion; it is the source of

all perception, the seat of every instinct, of every propensity, of all power, moral and intellectual.

In order to proceed from the simple to the compound, I shall give my readers some views of the nervous system, with which the animal character commences, but the functions of which belong even more to vegetable than to animal life.

In all animals placed in the scale of living beings above the zoophytes, that is, in all animals properly so called, there exist one or more masses of a gelatinous substance, very vascular, of different color and consistence, which give rise to white threads, called nervous filaments. These filaments unite and form nerves, nervous cords, which go to this or that viscus and there spread themselves. These masses of gelatinous substance, called ganglions or plexuses, these sources of nervous filaments and the nerves formed from them, are more or less numerous, according to the number of parts or viscera with which the animal is provided, and for which they are destined.

These nervous apparatuses exist, even in animals which have neither spinal marrow nor brain; consequently, their origin and their action in these imperfect animals are independent of all other nervous systems.

They are the type of the nervous system of the viscera, of the abdomen, of the chest, and of the vessels of animals of the most perfect organization, and of man.

As long as there exists in an animal of the lower order, a sole internal part, and a sole ganglion with its nervous filaments, this nerve acts in an insulated manner; but as soon as, in a single individual, the existence of several organs renders several ganglions and several nerves necessary, these ganglions and these nerves ordinarily enter into communication by means of filaments, passing from one to the other.

There are then as many of these ganglions and of these different nerves, as there are different viscera; and as each viscus is destined to a particular use, to digestion, to the secretion of bile or semen; as each viscus has its

specific irritability, these ganglions and these nerves must necessarily have their interior structure and their functions, differing from each other.

It is probable, that in animals, even of the lowest order, this nervous system is endowed with sensibility; but in man, and the higher animals, it is, like the spinal marrow and the nerves of the senses, entirely under the dominion of the brain. In a state of health, the viscera and the vessels execute their functions without any volition on our part, and without our having the slightest consciousness of the fact: the intestines are in fact in continual motion; they choose the nutriment which suits them, and reject heterogeneous substances; they form the secretions and the excretions.

But, we have seen that vegetables present to us similar phenomena: the capacity of being stimulated, of reacting against stimulus, a character of irritability, ought not to be confounded, as most physiologists do confound it, with the faculty of *perceiving* a stimulus, of having a consciousness of it, of feeling it. The perception, the consciousness of an irritation, of an impression, are inseparable from the nerve of sensation. Sensation, or organic sensibility without consciousness, is a contradiction in terms, but a contradiction very sagely preserved and professed in our schools. Sensibility, or the faculty of feeling, constitutes the essential character of the animal. When the changes produced by an impression take place without consciousness, they must be considered the result of irritability, and as belonging to automatic life; but when changes take place with consciousness, with perception, with sensation, this act of consciousness, of perceiving, belongs to the animal life.

"But," you will say, "admitting that, in a state of perfect health, we have no consciousness of what passes in the heart, stomach, liver, &c., still we feel hunger and thirst, and the need of certain evacuations; we experience trouble, uneasiness, and pains, in the intestines, &c., and in general it would be difficult to find a part of the body, the bones, tendons, and even hair, not except-

ed, which may not, under certain circumstances, transmit sensations, and consequently become an organ of animal life. How happens this?"

We have seen, that the ganglions and nerves of the viscera and vessels, communicate together; they send several filaments of communication to the spinal marrow, and this is immediately connected with the brain. It is thus that all the impressions on the other nervous systems are transmitted to the centre of all sensibility, and that the influence of all the nerves on the brain, and of the brain on all the nerves, is established. It is for this reason, that the nervous apparatus of the chest and abdomen has received the name of sympathetic nerve, or, because its branches of communication take their course between the ribs to the spinal marrow, the intercostal nerve. Besides these means of reciprocal action and reaction, several nerves of the spinal marrow and of the head, such as the hypoglossal nerve, the glosso-pharyngeal, the abductor, the facial nerve, unite themselves with the sympathetic.

The organs of both lives can only perform their special functions in proportion to their development, to their organic function. Before the liver, the kidneys, the stomach are formed, there can be no secretion of bile, of urine, of gastric juice; in like manner, the propensities and talents cannot unfold themselves until the brain is developed.

The divers ganglions, plexuses and nerves of the sympathetic are not developed simultaneously; and for this reason, the functions of the organs of vegetable life do not commence and terminate simultaneously. It is the same with the various ganglions and pairs of nerves of the spinal marrow and of the nerves of the senses. Their successive aud independent development and death, explain the successive and independent perfection and failure of the various organs of voluntary motion, and of the senses.

I shall hereafter prove, that the different constituent parts of the brain, each of which is destined to a peculiar

function, are equally subjected to successive development and destruction. This explains how instincts, propensities, and talents do not all either appear or fail, at the same periods of life.

As the brain will be the subject of my meditations in all the volumes of this work, I leave it now, to answer a question of high importance, viz. Does the fetus and infant, while inclosed in its mother's womb, enjoy animal life, or, a life purely automatic? How ought its destruction to be judged of before the tribunal of sound physiology? Those who maintain that animal life is nothing but a life of relation, an external life, that all our moral qualities and intellectual faculties are the result of impressions on the senses, must necessarily maintain that the fetus and the newly-born infant are still only automata, whose destruction has no relation to an animated being.

Prochaska says,* "In the fetus and the new-born infant, the muscles have the automatic movement, and not the voluntary, because the brain is not yet in a state to think."

Bichat likewise says,† "We may conclude with confidence, that in the fetus the animal life is nothing; that all the acts attached to this age, are dependent on the organization. The fetus has, so to speak, nothing in its phenomena, of what especially characterizes an animal; its existence is the same as that of vegetables. In the cruel alternative of sacrificing the child, or of exposing the mother to almost certain death, the choice cannot be doubtful. The destruction is that of a living being, not of an animated being."

Yes, doubtless, it is cruel to sacrifice an unfortunate mother to a feeble fetus, still menaced with dangers without number, and on whose life it is still so difficult to calculate. Nothing but certain religious notions, or the

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* Opera Minora, L. II. p. 190.
† Sur la vie, et la mort, p. 125.

reasons of an ambitious policy, could ever recommend the dire counsel of immolating the mother in the most touching moment of her life, to the precarious existence of the infant. Still, as the expressions of Bichat, "the act involves the destruction of a living being, and not of an animate being," might lead to unlawful abuses, I consider it my duty as a physiologist, to rectify the arguments of Bichat and Prochaska.

I have said that neither the organic, nor the animal life, developed itself fully at once, or enjoyed simultaneously all its activity. If the possession of organic life by the fetus, were contested, because several of the functions of the viscera have not yet manifested themselves, the conclusion would doubtless be severely criticised. Is it, then, more reasonable to refuse to the fetus or to the new-born infant, the possession of animal life, because his brain is not yet formed for all its propensities, all its talents, and for the faculty of thinking? If physiologists had sooner known the plurality of the cerebral organs, and of their functions; if they had distinguished the different degrees of consciousness and sensation, the desires and necessities, from thought or reflection, they would have been cautious about affirming, that there exists no animal life in the fetus or new-born child. The brain of these beings is not, indeed, sufficiently developed to possess ideas, to combine and compare them; but, if this degree of perfection were necessary in order to allow them sensation and desires, it would be very difficult to determine at what period animal life does commence, and when the destruction of an infant becomes an act committed on an animate being, and, consequently, criminal. The infant has not yet the faculties of reflection and imagination; he feels as yet no affection for those of a different sex; he is not yet ambitious, &c., but can we refuse to him the faculty of perceiving, that of memory, of inclinations, of aversions, of joy and sorrow? If the noblest functions of the brain require a certain development and a certain consistence, who shall determine the degree of development, and of con-

sistence, necessary for functions of an inferior order? The new-born child manifests by the outline of his figure, by his movements, and his cries, the states of happiness and of suffering; he equally manifests, too, the desire of nursing, and so of other sensations.

At all events, this work will become an incontrovertible proof, that there exists within us a far more fruitful source of sensations than impressions made on the senses; and consequently that it is altogether false, to assert that animal life commences only with the action of the external senses.

These considerations are sufficient to prove, that the laws of animal organization by no means support the dangerous principle, avowed by certain physiologists.

Of the Special Functions of the Brain, or those which belong to Animal Life in Man and Animals.

In the natural order of the gradation of animals, the nervous system, which presides over the voluntary movements, comes after the great sympathetic nerve. It consists of the spinal marrow inclosed in the vertebral column. And from it, to the right and left, before and behind, issue as many pairs of nerves as there are vertebræ of which the column is composed. In caterpillars, &c., the ganglions and the pairs of nerves proceeding from them, correspond in number to the segments of which the animal consists.

All these pairs of nerves go to the muscles, and give them the faculty of exercising motion.

But all these nerves, at least in the more perfect animals, must be considered rather as conductors of the cerebral influence, than as independent agents; their function ceases, as soon as their free communication with the brain is interrupted.

As, in a healthy state, these functions are exercised with consciousness, they are held to make part of animal life.

Of a higher order, but always dependent on the brain, are the functions of the external senses. I shall have occasion, even in this volume, to determine better than has yet been done, the functions proper to each sense.

I come, then, to the noblest nervous system, the brain, and its peculiar functions.

As to the structure of the brain, I refer my readers to the first volume of my large work. Suffice it to say, that the whole cavity of the cranium or head, beginning with the eyes and ending with the neck, is filled with the cerebral mass. Like the rest of the nervous system, it is composed of gelatinous substance, and of an infinity of nervous filaments, which thence derive their origin.

It is this same brain which governs both the voluntary movements and the functions of the senses. It is this same brain, of which, hitherto, neither the structure nor the functions have been understood, and which yet includes all the organs of the forces, moral and intellectual, both in men and in animals.

In order to conduct my readers by a luminous path, I shall first consider these moral and intellectual forces as all philosophers and physiologists consider them. I shall then show, how they are defined and distinguished by the vulgar, and by common sense, which certainly, in this case, is good sense. The great proportion of philosophers agree in recognizing in the soul only two faculties, the understanding and the will; the understanding, or capacity of receiving ideas; the will, or capacity of receiving different inclinations: even when they speak of a greater number of faculties, they always reduce them to these two principal ones.

According to Aristotle, the soul of man has faculties which are common to it with animals; sensibility, appetite, and the power of motion. It has, also, faculties which belong to it exclusively; the intellect passive, the intellect active, the intellect speculative, and the intellect practical.

Bacon distinguishes two souls; the soul rational,

and the soul sensitive. The faculties of the rational soul, are the understanding, reason, reasoning, imagination, memory, appetite, and will. The faculties of the sensitive soul, are voluntary motion, and sensibility.

Descartes recognized four principal faculties; will, understanding, imagination, and sensibility.

Hobbes admits only two principal faculties; knowledge and motion.

Locke admits understanding and will.

Bonnet recognizes understanding, will, liberty, and, in his introduction, sentiment, thought, will, action.

Condillac admits six faculties in the understanding, or seven, counting sensation, the common origin, according to him, of the understanding and the will; sensation, attention, comparison, judgment, reflection, imagination, reasoning; and all these faculties are only sensations transferred or modified. He maintains that all the operations of the soul, thought, intelligence, reason, liberty—all the faculties of a spiritual substance, are only sensation transformed; that all the knowledge which the human intellect can attain, all intellectual and moral ideas—all, without an exception, are so many transformations of sensation.

In the system of Kant, the primitive faculties or functions, pure conceptions, and ideas *a priori*, exist to the number of twenty-five, viz. two forms of sensibility, space and time; twelve categories, or pure notions of the understanding, viz. unity, plurality, totality, affirmation, negation, limitation, inherence and subsistence, causality and dependence; society; possibility and impossibility, existence and non-existence, necessity and contingence; eight notions which depend on these, viz. identity, diversity, agreement, contradiction, interior, exterior, matter, and form; in fine, three forms of reason, consciousness and the soul, God, the universe.

According to M. de Tracy, to think is only to feel, and to feel is, for us, the same thing as to exist; for sensations inform us of our existence. The ideas or per-

ceptions, are either sensations, properly so called, or recollections, or relations which we perceive, or, finally, desires which we experience, springing out of these relations; the faculty of thinking, therefore, divides itself into sensibility, properly so called, into memory, judgment, and will. To feel, properly speaking, is to have the consciousness of an impression; to have memory, is to feel the recurrence of an impression formerly felt; to judge, is to perceive the relations among our perceptions; finally, to wish, is to feel desire. By these four elements, sensations, recollections, judgments, desires, are formed all compounded ideas. Attention is only an act of the will; comparison cannot be separated from judgment, since we cannot compare two objects without judging; reasoning is only a repetition of the act of judging; to reflect, to imagine, is to compound ideas decomposable, into sensations, recollections, judgments, desires. That species of imagination, which is only a true and faithful memory, cannot be distinguished from it.

M. Laromiguière forms the system of the faculties of the soul of two systems—the system of the faculties of the understanding, and the system of the faculties of the will. The first comprehends three peculiar faculties—attention, comparison, and reasoning; the second equally comprehends three—desire, preference, and liberty.

"These three faculties are indispensable, and they suffice for all our knowledge, for the most simple of all systems, as well as for the vastest of all sciences. Attention, comparison, reasoning; these are all the faculties which have been assigned to the most intelligent of created beings. By attention, we discover facts; by comparison, we seize their relations; by reasoning, we reduce them to system.

"Sensibility or the capacity of perceiving, and activity or the faculty of acting, are two attributes inseparable from the soul."

M. Laromiguière admits the action of the object on the organ, of the organ on the brain, and of the brain

on the soul; the action or reaction of the soul on the brain; the communication of the movement received by the brain, to the organ which forms the object, or which directs itself towards it. He allows, that the difference in minds does not proceed from the greater or less amount of sensations; "but," says he, "it can proceed only from the activity of some causes, and the inactivity of others; for, in the human mind, every thing can be referred to three causes; to sensations, to the labor of the mind on these sensations, and to the ideas, or the knowledge resulting from this labor. In fine, M. Laromiguière proposes this question, viz.: Do the operations of the mind vary with the objects to which they are applied; or, can we circumscribe them within bounds, and even very narrow ones? By attention, comparison, and reasoning, we can raise ourselves to a knowledge of the structure of the universe, and, consequently, to that of its Author; by desire, preference, and free will, we are, in some sort, the arbiters of our destiny."

"Six faculties then suffice," concludes M. Laromiguière, "for all the wants of our nature. Three have been given us to form intelligence; we call them intellectual faculties; three to fulfil the wishes of our hearts, and we call them moral faculties." *

Such is the manner in which all these philosophers and physiologists wander in the clouds of speculation, pointing out to their pupils, plains, mountains, valleys, water, and fields, and pretending that these are the only things which exist on earth, because, from so elevated a point, they are the only ones which their view distinguishes. If they would but descend from their elevation, they would discover an infinite variety of plants and animals. and would soon find themselves forced to reject classifications, which embrace only generalities.

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* Leçon de Philosophie, T. I., Quatrième leçon, et p. 354.

Whether we admit, one, two, three, four, five, six, or seven faculties of the soul, we shall see, in the sequel, that the error is always essentially the same, since all these faculties are mere abstractions. None of the faculties mentioned, describes either an instinct, a propensity, a talent, nor any other determinate faculty, moral or intellectual. How are we to explain, by sensation in general, by attention, by comparison, by reasoning, by desire, by preference, and by freedom, the origin and exercise of the principle of propagation; that of the love of offspring, of the instinct of attachment? How explain, by all these generalities, the talents for music, for mechanics, for a sense of the relations of space, for painting, poetry, &c.?

Let us now direct our attention to the language of common society, when the question arises respecting the moral and intellectual character of individuals.

I visit a numerous family, limited as much as possible to itself, and all the members of which live under the influence of the same circumstances. I engage the parents in conversation on the qualities of their children. "Our children," they tell me, "are not alike; they seem as if they were not born of the same father and mother. Yet, they eat at the same table, their occupations are the same. Here is our eldest son, who has always the air of being ashamed of his birth. Ever since he happened to see a coxcomb richly dressed, he despises his companions, and is ever wishing to leave us and to go to some large city: he is never content with the dress of his other brothers; he even affects to speak and to walk differently from the rest of us. God knows where he got this ridiculous vanity. Our second son, on the contrary, delights only in his domestic employments; he is our turner, our joiner, our carpenter; no trade is difficult to him; without ever having been taught, he shows in every thing, an address and a spirit of invention, which astonish us. Here again, is one of our daughters, who could never learn the ordinary operations of needlework; but, would you believe it, she sings from morning till

night; she forms the delight of every body in the village; at church, it is she who leads the choir; at the sound of music she kindles up at once; she needs but to hear an air once, or at most, twice, when she knows it by heart, and sings it better than any body else; she will never be good for any thing but a musician. And here is another boy, a real little devil, the terror of the village; he quarrels with every body; always beating and always beaten; nothing can break his spirit; he tells with the greatest avidity, all the news of a combat, or a battle, and looks forward with the greatest impatience to the time, when he can be a soldier. The chase is his passion; the more animals he can kill, the happier he is. He never ceases to mock his little sister, who is troubled whenever a chicken or a pig is killed. This little girl is the child that takes charge of the poultry-yard; she bestows the tenderest cares, not only on her brothers and sisters, but on the domestic animals also. If we have to destroy a fowl or a rabbit, she has tears in her eyes. No poor man or sufferer goes from her with empty hands, or without consolation. She is exactly the antipodes of another of her sisters, who, notwithstanding her devotion, is backbiting, avaricious, obstinate, and rarely omits an opportunity of making trouble between us, and her other acquaintances."

This is the faithful picture of a family in the country, where the natural characters have not assumed the mask of a deceitful similarity. All these individuals enjoy equally, the faculty of experiencing sensation, of attention, comparison, judgment, desire, will, liberty; but I have never heard that, in speaking of the character of any one, they made use of either of these expressions, in the abstract or general acceptation, of philosophers.

Let us go into a school or house of education, where all the pupils are under the direction of a uniform system of instruction and conduct. Amidst the great majority of ordinary persons, you will find some wretches, who, though often corrected with rigor, and strictly

watched, endanger the morals and the health of others. You will find some who steal books, who are liars, perfidious, cowards, ungrateful, idle, insensible to distinction. In the number of those who carry off the prizes, one excels in the study of history, another in poetry, a third in mathematics, a fourth in geography, a fifth in drawing, &c. Some are eager for political employments, some for military glory, while others devote themselves in preference to literature, philosophy, or the natural sciences. No instructor will point out to you his pupils by any of the abstractions adopted by the metaphysicians.

Thus will it also happen when you take a review of a collection of men of genius. You will find there musicians, painters, sculptors, mechanicians, mathematicians, philologists, travellers, actors, poets, orators, generals, philanthropists, astronomers, etc. etc. Here too there is no question respecting the understanding, will, comparison, desire, liberty, &c.

What are the qualities, which the biographers of remarkable men commonly celebrate? Nero was most cruel, and abandoned himself to the most unbridled voluptuousness: Du Guesclin was a desperate warrior; he would either wound his antagonist, or be wounded himself: Baratier had an astonishing talent for the acquisition of languages; Pascal, from the simple definition of geometry found his way to the thirty-second proposition of Euclid: no science was ever carried by the labors of a single individual to the perfection that geography received from those of captain Cook: Dumenil and Clairon, those celebrated actresses, will long be the models by which our young aspirants will form themselves: Sixtus V. has rendered his name immortal by the firmness of his government and his inflexible justice: before the culture of the sciences, Homer and Dante were the greatest of poets: Catherine de Medicis gave early proofs of her acuteness and her courage: Catherine II. together with the graces of her sex, had a vast and bold mind, a taste for knowledge, and for pleasure, profound

ambition, &c.: the graces guided the chisel of Praxitetes, and his genius gave life to matter.

Thus history transmits to us the life of antiquaries, architects, astronomers, dramatists, geographers, historians, mathematicians, musicians, painters, designers, philologists, philosophers, moralists, poets, orators, sculptors, travellers, mechanicians, &c.

But we no where find, that a man or a woman has become celebrated by the understanding and the will, by attention, comparison, desire, liberty, &c.

How, in fine, do we designate the different characters of animals? We say, this dog is cross, gentle, docile, courageous, affectionate, has good local memory, is a coward, has trained himself to the chase, is incapable of being trained; this stallion is excellent for the stud; this horse is skittish; very quiet; docile; very wicked; stupid; this cow is an excellent mother; this sow is a very bad mother, because she devours her young; this ram, this buck, are very ardent; we say that is a carnivorous animal, a graminivorous; the beaver, the greater part of birds, ants, bees, &c., have the instinct of building; several birds have the instinct of migrating, of singing, of living like sheep in flocks or in society; the marten, the fox, are very cunning, and live in couples; the chamois and the diver are very circumspect; the pie is a thief; the weasel and the tiger are sanguinary; the cock is valiant and proud, and so on.

In what species, or in what individual of animals, would philosophers and physiologists class their understanding, their will, their attention, reasoning, desire, preference, liberty?

Is it right, that, in examining the nature and the origin of the moral and intellectual faculties in man, we should take no account of the same faculties in animals? Can man, so long as he is an animal, stand insulated from the rest of living nature? Can he be governed by organic laws, opposed to those which preside over the qualities and faculties of the horse, the dog, the monkey? Do animals see, hear, perceive odors, tastes, sounds,

objects, otherwise than we do? Do they propagate, do they love their young, are they courageous, mild, vindictive, cunning, otherwise than man.

Is it allowable that philosophers, while boasting to penetrate into the essence of the soul, should treat of man by piecemeal, and confine themselves to making long treatises on the soul, as an insulated being? exercising its functions by itself, making use of the body, at most, as a means of communication between itself and the world; when, from the moment of conception to the last sigh, every thing indicates that in this world, the soul is in dependence on the material organs?

With these pretended general faculties of the soul, would not the moral and intellectual character of men and animals be the ever-varied sport of chance? How, from such indeterminate operations of the soul, could there constantly result in individuals of the same species, the same instincts, the same inclinations, the same total of determinate intellectual faculties and moral qualities?

"But you will not persuade us," say my readers, "that the faculties recognized by philosophers as faculties of the soul, are chimeras. Who can contest the principle that understanding and will, sensation, attention, comparison, judgment, memory, imagination, desire, liberty, are real operations of the soul; or, if you will, of the brain?"

Yes, without doubt, these faculties are real; but they are only abstractions and generalities; they are not applicable to the detailed study of a species, or an individual. Every man, except an idiot, enjoys all these faculties. Yet all men have not the same intellectual or moral character. We need faculties, the different distribution of which shall determine the different species of animals, and their different proportions of which explain the difference in individuals. All bodies have weight, all have extension, all are impenetrable in a philosophical sense; but all bodies are not gold or copper, such a plant, or such an animal. Of what use to a naturalist the abstract and

general notions of weight, extent, impenetrability? By confining ourselves to these abstractions, we should always remain in ignorance of all branches of physics, and natural history.

This is precisely what has happened to the philosophers with their generalities. From most ancient to the most modern, they have not made a step farther, one than another, in the exact knowledge of the true nature of man, of his inclinations and talents, of the source and motive of his determinations. Hence, there are as many philosophies as pretended philosophers; hence, that vacillation, that uncertainty in our institutions, especially in education and criminal legislation.

I will not, then, busy myself with the faculties of the soul, as philosophers profess them. We shall see, when the time comes to exhibit my philosophy of man, that these faculties are only attributes common to all propensities, and all talents. The different instincts, mechanical aptitudes, inclinations, sentiments, and talents of man and animals, will form the subject of my researches and meditations. The instinct of propagation, that of the love which both man and animals bear to their young, the instinct of attachment and friendship, of self-defence and courage, the carnivorous instinct, and the propensity to destruction, the sentiment of property, and the inclination to theft, cunning and prudence, pride and boldness, vanity and ambition, circumspection and foresight, educability,* the sense of localities, or relations of space, the memory

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* According to Spurzheim, this is EVENTUALITY, a much more proper name.

"In comparing animals with men," says Spurzheim, "and one kind of animal with another, Gall found that tame animals have fuller foreheads than wild ones, and that animals are generally tameable, as the forehead is more largely developed; he therefore called it the organ of educability. But I conceive that Gall here attributes to a single faculty, manifestations which depend on intellect generally. The title educability, is evidently bad, seeing that every faculty is susceptible of cultivation; in other words, capable of exercise and direction.

of words and of persons, the sense of spoken language, or the talent for philology, the sense of the relation of colors, or the talent for painting, the sense of the relation for sounds or the talent for music, the sense of the relations of numbers, or the talent for arithmetic and mathematics, the sense of mechanics, of drawing, of sculpture, of architecture, comparative sagacity, the metaphysical spirit or tendency, the caustic spirit or that of repartee, the talent of induction, the poetic talent, the moral sense and benevolence, or mildness, the talent of imitation, of mimicry or acting; the sentiment of religion and of God, firmness of character; these are the qualities and the faculties which I call moral and intellectual dispositions. It is these dispositions, these qualities, and these faculties, which form the total of the fundamental forces of the soul, the special functions of the brain; it is these forces which I hold to be innate in man, and, in part, in animals, and the manifestation of which is subordinate to organization; it is these qualities, and these faculties, the history of whose discovery I shall exhibit, together with their natural history, their modifications in a sound state, and in the state of alienation, the seat of their organ in the brain, and its external appearance on the head or skull, &c.

All these treatises will be accompanied with an application to human institutions, to education, morals, legislation, medicine, &c.

The work will be terminated by considerations on the characteristic forms of the head in each nation, on physiognomy, pathognomony, and pantomime, on the internal sources of imitation in general, and of the imitation of each affection, each sentiment, each passion, in particular; on universal language, the philosophy of man, the motives of our actions, the origin of arts, sciences, and of the different states; on the perfectibility of the human race, the extent of the sphere of each species, and of each individual, according as they are endowed with organs, more or less numerous, and more or less active.

As this first volume will be particularly devoted to the moral part of the physiology of the brain, and as the ignorant and malicious reproach the doctrine with immoral and irreligious tendency, I have thought it my duty to refute these objections, and to give assurance to those of timid minds.

Before entering directly into the discussion of my principles, it will be useful to remove an unfavorable impression, which my manner of proceeding in the exposition of my proofs, might produce on a certain class of readers, little accustomed to the study of natural history.

I often institute comparisons between men and animals: Is this comparison appropriate; is it even necessary? I am going to answer these two questions.

Is it permitted, is it even necessary, to compare man with animals, in order to acquire a complete knowledge of his nature, moral and intellectual?

Those who make the moral and intellectual acts of men to flow from the understanding and will, independent of the body, and those who, being wholly strangers to natural science, still believe in the mechanical action, in the *automatism* of brutes, may esteem the comparison of man with animals, revolting, and absolutely futile. But this comparison will be judged indispensable by those, who are familiarized with the works of Bonnet, Condillac, Reimarus, Georges Leroy, Dupont de Nemours, Herder, Cadet Devau, Huber, Virey, and especially by those who are ever so little initiated in the progress of comparative anatomy and physiology. Man is subject, as we have seen, to the same laws which govern plants and animals.

The knowledge of man, supposes the knowledge of the elements of which he is composed, as the knowledge of the mechanism of a clock supposes that of the wheels, levers, spring, weights, balance, movement, &c.

The organ of animal life, the brain of man, is an assemblage of particular organs, many of which are found in animals. The animals of inferior classes have, by the fact of their inferiority to others on the score of intelligence, fewer cerebral organs; they have only the first rudiments of the human brain, and they are, consequently, easier to decipher than those animals which are provided with a more complex brain, and a more complicate animal life, or with more numerous instincts and talents. It naturally follows, that in order to attain the knowledge of man in all the parts which constitute his brain, all his propensities and talents, it is necessary to study the animals one after another, following the gradual march which nature has observed, in the succession of their cerebral organs, and faculties.

This study opens to the philosophical observer, a field infinitely more vast than is supposed. The brutes, the objects of all the contempt resulting from the ignorance and pride of man, share so many things with him, that the naturalist finds himself sometimes embarrassed to determine where animal life terminates, and humanity commences. Animals are produced, born, and nourished, according to the same laws as man; their muscles, vessels, viscera, and nerves, are almost the same, and exercise the same functions; they are endowed with the same senses, of which they make use in the same manner; they are subject to similar affections, to joy, sadness, fear, alarm, hope, envy, jealousy, anger; they have the most part of our propensities; they are naturally inclined, as we are, to propagation; they love and foster their young; they have attachment for each other and for man; they are courageous, and fearlessly defend themselves and theirs against their enemies; like us they feed on vegetables and on other animals; they have the sense of *property*, and while some are cruel and sanguinary, others take delight in theft; they are sensible to blame and to approbation; they are mild, docile, compassionate, and mutually assist each

other; others are wicked, indocile, wayward, obstinate; they retain the recollection of benefits and injuries, are grateful or vindictive; they are cunning and circumspect; they foresee the future by the past, and take the necessary precaution against the dangers which menace them; they correct their false judgments and their unsuccessful enterprises by experience; they have the idea of time, and foresee its periodical return; they have memory; they reflect and compare; they hesitate and are decided by the most urgent motives; they are susceptible of a certain degree of individual perfectibility; they even form abstractions; by means of articulate language, or by gestures, they communicate their ideas, their wants, their projects; they acquire more sagacity and knowledge, by virtue of the circumstances which force them to be more clear-sighted and more cautious; they balance the evil consequences of certain actions which their memory recals to them, with actually stimulating desires; they are seen to follow a deliberate plan of conduct agreed upon between several individuals; they know each other; they sing, or are sensible to the harmony of music; they have an astonishing local memory, and perform long journeys; a great number among them build; some even count; very often their actions denote a sentiment of morality, of justice, and injustice, &c.

One might almost be tempted to say, with Lactantius, that except the religious sentiment, and the knowledge of God, there is no moral quality, and no intellectual faculty of which the animal kingdom, as a whole, does not share at least the first germs. Should it be thought that this comparison degrades man, I should answer with Pascal,* that if it be dangerous to show man too much, in how many respects he resembles the brutes, without pointing out his greatness, or, to let him see his greatness too much without his baseness, it is still more

* Pensées sur la religion.

dangerous to leave him in ignorance of both. We shall not recognize the less, in this work, the distinguished place which the Author of nature has assigned to man; his real advantages are sufficiently conspicuous to establish, of themselves, his superiority, without having recourse to distinctions which experience and natural history disavow. The real detractors of the human species are those, who think they must deny the intelligence of animals, to maintain the dignity of man. St. Gregory of Nyssus,* and St. Augustine† long since remarked the necessity of comparing men with animals.

I come, then, at length upon the question, What is the origin of the instincts, mechanical aptitudes, propensities, talents; in a word, the moral qualities and intellectual faculties of man?

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* De hominis opificio. Baziliæ, 1567—ch. 18.
† Lib. de vera religione.

SECTION II.

ON THE ORIGIN OF THE MECHANICAL APTITUDES, INSTINCTS, PROPENSITIES, TALENTS; OF THE MORAL AND INTELLECTUAL FACULTIES OF MAN AND ANIMALS, IN GENERAL.

It is impossible to treat with propriety of the moral and intellectual faculties of man, without having a just idea of their origin. Philosophers have always regarded the following questions as the most important to be treated of in the philosophy of man.

Is man born without determinate faculties, a *tabula rasa*, a blank leaf, entirely indifferent? Does he bring into the world with him, the dispositions, which he manifests at a later period, or, does he acquire his faculties only by his relations with the external world? To what extent are the impressions, made on the senses, the source of his sensations and ideas? What is the origin of moral good and evil? Is man born entirely good, or entirely wicked, or, with a mixture of contrary dispositions? Are all men endowed, to the same degree, with the qualities essential to their nature, or, are the differences observed in this respect, due to the influence of accidental causes posterior to birth? Are these differences, on the contrary, determined in the womb of the mother? And if they are innate, how are we to cultivate, to perfect them, to repress or to direct them, according to the demand of individual or general good?

These questions, when they are resolved, will infallibly lead to the knowledge of the true sources of our propensities and our faculties, and, consequently, the prime motives of our actions. They therefore merit the most serious attention on the part of religious and

moral instructors, judges, legislators, philosophers, and physicians.

The importance of these questions having been generally recognized, it will be impossible to avoid, in this work, the recurrence of some ideas which are found insulated in other authors, such as Bonnet, Georges Leroy, Reimarus, Herder, Cabanis, &c. But, on this subject, so vast and so worthy of our meditations, we have, as yet, had only scanty materials; we have wanted sufficient data; those, which we seemed to have, were too contradictory, to deduce from them the sure principles, which should serve as the basis for a complete and consistent doctrine. I shall support each of my propositions with such a number of positive facts, that they will not at all present simple opinions, but will have the character of remarkable truths, which, at all times, will be able to stand the test of experience, and, consequently, will be of permanent utility.

The mechanical aptitudes, instincts, propensities, talents in general, the moral qualities and intellectual faculties of men and animals, are innate.

After having clearly indicated, in the preceding pages, the faculties which form the object of my researches, the reader cannot any longer confound what I understand by dispositions, and by innate faculties, with the expressions, *ideas, innate notions, and innate principles.* Thus it will be superfluous to fatigue him with metaphysical discussions of the hypotheses of Plato, Aristotle, Pyrrho, Zeno, Descartes, Leibnitz, Malebranche, Bacon, Locke, Condillac, Buffon, Helvetius, &c., on the origin of the faculties of the soul and mind, and on the origin of ideas.

It will be seen, also, that I am far from understanding with M. Laromiguiére, by dispositions and innate faculties, a simple passive capacity, such as that of a block of marble, which submits itself to the caprice of the sculptor, according as he wishes to make of it a Satyr

or an Apollo. I understand by innate dispositions, mechanical aptitudes, determinate instincts and propensities, determinate faculties and talents. I understand, what I shall prove in the following volumes, that each cerebral organ is impressed with a determinate tendency; that each organ enjoys an internal perception, a force, a faculty, an impulse, a propensity, a feeling, peculiar to itself. Here, there is no vague and uncertain result either of an exterior influence, or of an interior abstraction. As soon as the relative organs have acquired their perfect development and entire activity, the functions which result, are as determinate as the dispositions themselves, of which these organs are the depositaries.

"Do not believe," says M. Laromiguiére, "that it is necessary to recognize and register as many faculties or capacities, as we remark acts or modifications of the human mind. In place of enriching the science, this would be to annihilate it. What would be thought of an anatomist, who, having observed that the fibre of the eyes which produces red, is not the fibre which causes blue; or, that the fibre of the ear which gives one tone, is not that which gives a different one, should see in this observation the greatest of discoveries? You have believed, till now, he would tell us, that you are reduced to the small number of five senses. I am going to teach you that nature has been more liberal to you. How many organs of sight has she given you? I see in the first place, seven principal ones, destined for the seven primitive colors."

As M. Laromiguiére admits only three intellectual, and three moral faculties, he alludes in this place to the fundamental faculties, of which I already recognize from twenty-seven to thirty, and which he would qualify as simple modifications of his six faculties.

It is certainly not necessary, nor allowable, to admit as many particular fundamental dispositions, as we can remark acts or modifications in the human mind. Yet, it may be maintained, that the example taken from the eyes and ears, is singularly inconclusive. Bonnet be-

lieves, and it seems very probable, that each nervous fibre has its proper function; that is, that each fibre of a nervous organ modifies the action of this organ. Why, otherwise, should nature have created it? The modifications of the functions of the senses explain themselves, in this view, in a sufficient manner; and we can conceive, why certain persons are incapable of perceiving certain colors, or certain sounds, while they perceive others very distinctly; why such a man finds very agreeable, what shocks the taste of another; why the same senses in different species of animals, and even in different individuals, are susceptible of flavors, odors, &c., of a nature altogether different, and so on. A more extended development of the same conjecture, might dispose the reader to consider each nervous fibril, whether in the nerves, or in the brain, as a little peculiar organ, destined to a small part of the total function.

But the question is not respecting the modifications of the functions; it relates to functions and dispositions essentially different. All the modifications of vision are owing to the general organ of sight; in the same manner as all the modifications of digestion, and of the seminal secretion belong to their organs: but who will dare to say that sight, hearing, taste, smell, touch, the seminal secretion, and digestion, are simple modifications of the same function? Who will venture to make them depend on one single source, one single organ? In the same manner the mechanical aptitudes, instincts, propensities and talents, which I recognize as fundamental or primitive forces, manifest themselves under thousands of modifications; but every thing is opposed to our regarding the instinct of propagation, that of the love of progeny, the carnivorous instinct, the talent for music, poetry, calculation, the feeling of justice and injustice, &c., as simple modifications of a single faculty.

Thus, as it is necessary to admit five different external senses, since their functions are not simply modified or transformed sensations, but functions essentially different and belonging to distinct organic apparatuses, so

is it finally necessary to recognize the various industrial aptitudes, instincts, propensities, talents, not as modifications of desire, preference, liberty, attention, comparison, and reasoning, but as forces essentially different, belonging, as well as the five senses, to organic apparatuses, peculiar and independent of each other.

The innateness of the fundamental forces, moral and intellectual, is the basis of the physiology of the brain; for, if in place of being able to demonstrate that they are innate, we could prove that they are only the accidental product of external things, and external senses, it would be useless to seek their origin and seat in the brain.

To give an extended demonstration of this first principle, I shall first throw a rapid glance upon inanimate nature. I shall then continue to compare man with animals, when any points of analogy appear between them.

It is to Philo Iudæus that we owe the doctrine, that nothing can subsist without certain properties. It is only the metaphysical theologians, that have embraced the error, that all activity and all action is owing to a spiritual being, and that inertia is the essence of matter. The weight of earths and metals, their attractive and repulsive forces, the laws of their forms, their affinities, their antipathies for other substances, &c., are properties which result from the mixture, form, and proportion of the integrant particles of these bodies, and which are so intimately identified with them, that the extinction of these properties necessarily involves the dissolution of the bodies: take away the properties of any substance whatever, and the idea of its existence disappears.

It is the same with the nidus formativus, or the plastic soul, which the ancients admitted in the vegetable kingdom. The laws, by which the fructification of plants is produced, according to which their germ is formed, developed, and finally acquires its whole increase, their specific irritability, peculiar relations to each other, and to other beings, are properties essentially inherent in their nature.

If we thence pass to animals, and reflect on the in-

stincts, on the mechanical aptitudes, which they manifest, from the moment they see the light, it is evident that these instincts, these mechanical aptitudes, are innate. The spider, when hardly hatched, weaves his web; the youngest ant-lion digs his conical hole in the sand; the bee, before going for the first time into the fields, raises himself into the air, and turns to reconnoitre the position of his abode; the young quail and the young partridge, from the moment they quit the egg, run with admirable address in pursuit of insects and seeds; the duckling, and the tortoise, still dragging the remains of the egg from which they have just emerged, make their way to the nearest water; the new-born infant seeks its mother's breast, and presses it with its hand to force from it the nutritious fluid; it seizes and sucks the nipple, as the young dog and the calf do the udder; the calf alternately draws and repulses the teat; the puppy presses by springing the udder of its dam, &c. All these beings act thus, not because they have calculated that these processes are necessary to their preservation, but because nature meets their wants, and has united the knowledge of them intimately with their organization. In all these cases, there are no previous habits, no instruction, no experience.

When, still later we see the insects in their metamorphoses, weave themselves an envelope; when we see the bee, at his first coming out, seek the willow and the strawberry, construct hexagonal cells, as the bird builds his nest, and the beaver, his hut; when we see the bird bruise the worm with his beak; and the monkey cut with his teeth, the head of the coleoptera, (the beetle,) before devouring him; the hamster lay up provisions; the dog conceal his superfluous food; the squirrel open the nut at the pointed extremity, and detach the scales of the cone of the savin at the base; the hog devour, with avidity, the first acorn he finds; the goat throw himself on the cytisus which he meets for the first time; the hound, without any previous instruction, pursue and seize the

boar; the ferret, though brought up on milk and in a cask, becomes furious at the first sight of a rabbit; and the rabbit, who likewise at the first glance recognizes in this animal his natural enemy;—we must allow that all these actions show us the result of instincts given to these individuals, and without which, they would ere long disappear from the face of the earth. The conduct of animals in these circumstances, requires neither a previous examination by the senses, nor an innate idea of the object of their appetites, nor a comparison and choice among several objects. How should they have an idea of that, which they have never in any manner experienced? In the same way as a dish at the first impression, pleases or disgusts us; so animals and children choose or reject the objects of the external world, according to the laws of sympathy and antipathy which exist between these same objects, their nutritive organs, and their senses.

To the same cause are owing the sensations and emotions, which men term affections. Satisfaction and discontent, pleasure and pain, joy and sorrow, desire, chagrin, fear, shame, jealousy, anger, etc., are so many states of our internal organization, which the animal and the man do not determine, but which both feel before having thought of them. These sentiments spring from the natural disposition of the animal and the man, without any concurrence of their will; and they are as decided, as strong, as vivid, the first time, as after having been often repeated. All which passes on this occasion, is an arrangement produced by nature, and calculated with reference to the external world, for the preservation of the animal and the man, without any consciousness, reflection, or active participation, on the part of the individual. The animal and the man are organized for anger, hatred, grief, fear, jealousy, etc.; because there are objects and events, which, from their nature, must be detested or loved, desired or feared.

It is for this reason, that the different states of the soul and its various affections, when they have a certain

degree of intensity, are accompanied with peculiar external acts, such as gestures, movements, attitudes, which, likewise, take place involuntarily and without consciousness, but which always correspond, agreeably to the design of nature, to the preservation and the wants of the individual. The limbs are drawn backwards, when one is threatened by a dangerous object, though there has been no time to think of the danger, and of the means of escaping it. Do we see an object on the point of crushing us, and which we cannot avoid, we bend the back before thinking of the resistance we offer in taking this position. The infant who is still ignorant of the existence of its mother, and of the cares which she takes of it, cries when it is hungry, or when it experiences any necessity. Puppies, though destitute of hearing for the first fourteen days of their life, and though not knowing that their cries are heard, still cry, and thus succeed in bringing their dam to their assistance. It is the same with the affections of the adult being. The expression and the gestures which accompany these affections, have been calculated to refer themselves, either solely to external objects, or to analogous beings, which surround the animal or the man, and to produce a reaction which tends to preserve them. Neither man nor the animal takes any other part in this, than to obey the natural impulse which results from their organization.

When man begins to exercise his faculties with a distinct feeling of consciousness, of personal co-operation and will, each one is inclined to imagine that he produces these faculties himself. Yet, if we first confine ourselves to considering the qualities common to the animal and to man, the comparison established between them does not permit us to doubt, that these faculties are innate. Now we find in animals a number of propensities common to them with man; that of the mutual loves of the sexes, of the care of parents for their offspring, of attachment, of mutual assistance, of sociability and the conjugal union; the propensity to

peace and war, that to mildness and cruelty; of the pleasure found in being flattered; of the forgetfulness and the recollection of ill treatment; we cannot therefore imagine, that in man and in animals, these qualities, wholly similar, should have a different origin.

Let us admit, that these qualities are ennobled in man; that the animal desire of propagating the species, is transformed in man to moral love; that the love of the females of animals, for their offspring becomes, in women, the amiable virtue which inspires their tenderness for their children; that the attachment of animals changes in man to friendship; their sensibility to caresses, into ambition and a sentiment of honor; that, from the song of the nightingale, there results in man the art of music; from the nest of the bird and the hut of the beaver, man's temples and palaces; we shall still see, that the gradual improvement of the organization affords a measure to the elevation of these faculties, and that the employment and direction of these, acquire more dignity in proportion as more elevated faculties join themselves to the first. Man consequently presents in all this only modified phenomena, and it is doing violence to reason, to place him out of the domain of nature, and to subject him to laws essentially different from those, to which the primitive faculties, common to man and animals, are subjected.

If, in fine, man has faculties which essentially distinguish him from the animal, and which give to him the peculiar character of humanity, he also offers in his brain, especially the superior and anterior portions, parts which animals have not; and the difference of effects is thus found to be explained by the difference of causes. All anatomists and physiologists agree, that the faculties augment in animals, in proportion as their brain becomes more compounded and more perfect. Why should man alone form an exception to this general rule? If we see in man a being, who compares different ideas and notions, who searches into the causes of phenomena, who deduces consequences; who establishes

general laws and rules; if we see him measure the revolutions of worlds, their duration and their intervals, traverse the whole surface of the ocean, estimate the merit and demerit of actions, bear within him a judge to which he is subjected, dictate laws for himself and for his fellow-men, in fine, exalt himself to the knowledge and adoration of a God, let us beware of thinking that these faculties are the work of his invention, or that of the accidental action of the external world. This would be to suppose that the Creator has abandoned man to himself, in matters the most important, or, that he has made his perfectibility depend on simple accident. No; in this as in other respects, God has traced for him the circle in which he must act, and has directed his steps. It is for this reason that at all times, and among all nations, man presents the same essential qualities of which he could not have conceived the idea, without the predetermination of the Creator.

Every where this plan of nature makes itself known by signs so evident, that it is impossible to call it in question. "We see," says Herder,* "that from the stone to the crystal, from the crystal to the metal, from this to the plant, from the plant to animals, and from them to man, the forms of the organization still go on improving; that the faculties and inclinations of beings augment in number in the same proportion, and end by finding themselves united in the organization of man so far as this can include them." This analogy, however, is not sufficient; it is easy to recognize in man organs of more elevated faculties; we may indeed demonstrate their existence. Thus it is impossible not to admit, that the fundamental dispositions of the properties of animals and of man, are innate, and that the activity and the manifestation of these faculties, are predetermined by the organization.

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* L. c. Th. i. s. 265.

Exposition and refutation of the different opinions on the origin of instinctive forces, moral and intellectual, in man and animals.

The anatomical and physiological knowledge of the brain, even to our times has been so defective, that no relation could be developed between it and the ingenious aptitudes, the instincts, propensities, sentiments, talents, or, in general, the moral and intellectual faculties of man and animals. Hence it has happened, that the anatomists and physiologists, themselves have presented to the metaphysical philosophers, as so many positive facts, fictitious phenomena, which these last have employed in order to give weight to their false doctrines. Buffon advanced that the brain of the orang-outang does not differ from that of man; Bichat and Sprengel doubt whether the superior parts of the brain or the circumvolutions of the hemispheres, contribute in any respect to the moral and intellectual functions: these two authors and their followers, go so far as to maintain that we might remove large portions of these parts without the faculties being impaired. We still hear of brains ossified, and even petrified; of brains, the half of which was reduced to pus; of skulls, the whole cavity of which contained only water,—and it is added, with full confidence, that the will and intellect did not suffer. Willis having found in an idiot a brain five times smaller than that of a man of sound mind, pretended to say, and Sprengel has repeated it after him, that this brain had the same parts as a complete human brain. Even authors who pretend to have made a particular study of comparative anatomy, have yet recently advanced that the brain of mammiferous animals is composed of the same parts as that of man.

The specious hypotheses, originated and diffused by philosophers of the first order, on the influence which the senses and education exercise on the source of ideas and faculties, must, necessarily, have contributed to

facilitate the adoption of these errors, and to turn away the minds of men from the true origin of our moral and intellectual forces.

Let us first examine what the influence of the senses can be on our moral and intellectual powers, whether Aristotle was correct in saying, 'Nihil est in mente quod non olim fuerit in sensu.'

The senses and the sensations, received by external impressions, cannot give truth to any ingenious aptitude, any instinct, propensity, sentiment, or talent, any moral or intellectual faculty.

In the first volume of my large work I have considered, not only the anatomy, but also the functions of the five senses. I have assigned to each sense the sphere of activity, which nature has allotted to it. I have rectified the numerous errors which naturalists and physiologists still commit in their works, and in their lectures. I have proved, in opposition to those who make the perfection of the intellectual faculties to flow from the delicacy and the greater perfection of the senses, that these five senses are almost all more delicate, more perfect in the different species of animals, than in the human species. I have there entered into the details of each sense.

As respects taste, for example, I have proved that birds and fishes possess it, as well as the mammifera.

As to smell, I have shown that it is the first sense which gives to man and to animals the idea of distance; that it is not by the sense of smell, that animals find from a distance and after a great lapse of time the place of their abode; and that the carnivorous animals have not this sense more acute than the graminivorous.

As for hearing, I have demonstrated, that we have hitherto been mistaken in attributing to this the talent for music, and to the glottis the talent for singing; that it is not the hearing, which gives the capacity for lan-

guage; that the languages, however imperfect or perfect they may be, are not the creation of the hearing, but of the cerebral organization; that the irresistible and lawless acts of certain deaf and dumb persons should not be attributed to their want of hearing, but to the imbecility of their minds, &c.

I have rendered to the sight its just rights, of which the philosophers had deprived it. I have proved that the eye, without the aid of any other sense, and without previous exercise or instruction, can perceive, not only the impressions of light and colors, but likewise those of forms, size, direction, number, and distance of objects. I have established, that the eye is not the organ of the talent of painting, and I have seized the occasion to show the great difference, which exists between the *passive* functions of our organs and their *active* functions. I have also demonstrated that man and animals fix objects, see, and look actively, with one eye only.

What I have rendered to sight I have taken from touch. This sense is not, as most authors regard it, the only mediator, the director, the reformer, or rectifier of the other senses; and its degrees of perfection have no influence on the intelligence and perfectibility of man and animals.

Thus I may refer my readers for all these objects to my large work. Here I shall confine myself to extracting what concerns the five senses, under their physiological and philosophical relation.

We call *external senses* the nervous systems, which, besides their internal action, receive, by means of external apparatuses, the impressions of the exterior world, and produce in the brain the sensations and ideas of these impressions.

Consequently, these systems reveal to the living being the objects, which exist out of himself; with each sense the animal discovers a new world; thus the creation grows larger or smaller for him, according as he is endowed with senses, more or less numerous or perfect. Without the senses, animals and man would remain shut

up in themselves, and all their consciousness would be limited to their internal life. But, provided with senses, they enter into communication with the immensity of nature; associate with all the beings which surround them, and a continual action and reaction are established between animate and inanimate beings.

What can interest man more than his senses, to which he owes so many sensations, so many enjoyments? Thus have they always been the object of his most assiduous researches. Yet, who would believe it? Not only has he remained behind in the knowledge of their interior organic functure, as I have proved in my anatomical description, but farther, he has not been able to agree with himself in their peculiar functions, and the influence which they exercise in the development of our minds. On this point, the most extravagant, the most vague, and the most irreconcileable opinions, exist. It is true some errors have been corrected, from time to time, but no author has yet established principles, which, in a physical and physiological view, have offered a system carried out and complete.

Sometimes it is said, that we cannot, without the aid of the senses, receive any idea; all our knowledge, all the faculties of our minds and our souls are the work of the external world; and sometimes, again, we are allowed sensations and ideas, but such as cannot be excited without the mediation of the senses. In both cases, the perfection of the intellectual faculties of man, of the different species of animals, and of the individuals, is regarded as a result of the perfection and harmony of their senses. Sometimes, again, the senses are only instruments, and the mind, freely and independently of all organization, modifies the impressions which are transmitted to it; sometimes there is admitted an external and internal source of our sensations and ideas, and they are both more or less subjected to the laws of organization. We continually hear complaints repeated against the illusion of the senses. Finally, some reject absolutely, the evidence of the senses and all judgment

which is based upon it; the external world then becomes the deceitful image of our internal; the sensible world is rejected, as the least worthy object of the research of man, and it is only, when the philosopher has learned to construct from himself the external world, that he can elevate himself to general, necessary, and eternal truths.

If this last proposition be true, there is no need of our collecting such numerous facts, in order, by degrees, to deduce from them laws and principles. In a short time the spring of our own imagination will raise us to a rank higher than that, to which the longest and most active life would enable us to attain, by the path of meditation and of experience. But, if we receive our ideas and all our knowledge solely from the senses, then man and animals are the perpetual sport of external fortuitous and versatile objects; the measure of the faculties has no other basis than the perfection of the senses; and education, the end of which ought to be to render individuals and nations what it is desirable they should be, has no other secret than that of duly calculating the action of the external world on the senses.

If the material conditions of the faculties of the soul and mind are bounded to the mere organs of the senses, it is an idle project to seek in the brain and its parts, the organs of the highest faculties. If we must seek, without any reserve, the principle of all the actions of men and animals, in their internal and innate nature, and if, in consequence, we have not sufficient regard to the influence of surrounding objects and social institutions, we are in manifest contradiction with the history of all ages and all individuals. If, in fine, we admit that the senses procure numerous materials, that the mind works by means of the most noble implements, and if we can establish that the internal man himself is endowed with a number of dispositions, we must seek for our ideas and our knowledge, partly in the phenomena of the external world, and their judicious employment, and partly in the innate laws of the moral and intellectual

faculties: by pursuing these two rules we shall arrive at practical and general truths. We cannot, then, under any point of view, regard, as an idle enterprise the efforts of the physiologist, who seeks to determine with precision, how far the senses extend their influence, mediate and immediate, on the functions of a superior order. In order to be able to deduce surer principles and more general consequences, I have laid down in my treatise on the functions of the senses, (vol. i. 4to ed. p. 149, etc.) what belongs, and what does not belong, to each sense in particular. In treating of the organs of the relations of space, colors, and sounds, I shall again prove, that those have been wrong, who have attributed the faculty of finding one's way home from a distance to the sense of smell; that of the talent for painting to the eyes; that of music and language, to the hearing. Accordingly I shall say no more on this subject in this place.

But almost all philosophers and naturalists have so very greatly exaggerated the merit of the sense of touch, that I deem it necessary to repeat here, what I have said on this point in my treatise on the senses.

Of Sensation and Touch.

In treating this subject, I regret to have more to refute and correct, than to establish; but the surest means of approaching the truth, is to remove errors and prejudices.

Before speaking of the touch, properly so called, I must say something of sensation in general. It is certain that a great number of erroneous opinions on the touch have arisen and are maintained, solely because the difference has never been accurately established between the idea of perception, sensation, and that of touch, tact.

The faculty of awakening perceptions or sensation is common to the whole nervous system. To perceive

and to feel are phenomena which we observe first and most generally in all beings endowed with the faculty of consciousness. Whatever alteration may have taken place in their interior or exterior, becomes necessarily a sensation, as soon as the animal has any consciousness of it. To taste, feel, see, hear, and touch, are sensations; but we likewise feel pain and pleasure, itching, tickling, weariness, &c., produced by internal causes; we feel hunger, thirst, the calls of nature; we feel joy and sadness, hatred and love, humility and pride, hope and despair, desire, anguish, fear, terror, &c.: the acts of our intellectual faculties, thinking, desiring, and wishing, are *likewise* sensations.

It follows, that to feel or perceive, is a function common to all the particular functions of the nervous system; it is properly and solely the general sense, without which no being can be conscious of his own existence, or the existence of external objects. It is only in this acceptation that it is said, with truth, that the origin of all our knowledge is in sensation. But when, by sensation, we understand only the impression of the external world on the senses, as most authors do, we neglect wholly the interior man and animals, and forget that the exterior world is known only so far as our interior has the faculty of perceiving it: and that, furthermore, this faculty is an abundant source of numerous sensations and ideas, by which each being preserves his individuality, consciousness and peculiar nature, though all are equally surrounded by the same objects. Prochaska had already called the attention of modern physiologists to the interior sensations. Tracy more recently has done the same. Cabanis has made one step farther, by adopting *instinctive tendencies*. Still, most of these authors have remained behind, on these subjects, as the following remarks on the sense of touch will prove.

I have shown, in my treatise on the functions of the senses, (large work, vol. i.) to what extent the senses must produce the ideas of external things: I have shown to what extent the ear and the eye give an exact idea of

space, form, number, figure, and the position of a body: I have demonstrated that the education or cultivation of the touch answers no purpose; that the eye sees according to its proper laws, the relations of objects which have just been enunciated, and that it would be ridiculous to accuse nature of having created senses, the functions of which would be possible, only by the aid of another sense entirely different. In this manner, I have already greatly diminished the prerogatives, which were formerly attributed to the sense of touch.

But I have not yet spoken of the opinions which particularly concern this sense. Most authors regard it as the sole mediator, director, and reformer of the other senses. Without it, say they, there would be no external world; for, "as our perceptions," says Condillac,* "are not the qualities of objects themselves, but, on the contrary, are only modifications of our soul; it is consequently easy to conclude, that a man limited to the sense of smell would have had nothing but odor; to that of taste, flavor; to that of hearing, only noise or sound; to sight, only light and color. Then the greatest difficulty would be, to imagine how we contract the habit of referring to external nature, the sensations which exist only in ourselves. In fact, it seems very astonishing that with senses, which experience nothing except in themselves, and which have no means of realizing external space, men can refer their sensations to the objects which occasion them. How can sensations be extended beyond the organ, which experiences and limits it?

"But, in considering the properties of touch, it might have been perceived, that it is capable of discovering this space, and of teaching the other senses to refer their sensations to the bodies which occupy it."

"The sensation of touch," says Degerando,† "merit, from the philosopher, peculiar attention. They are the first which affect the individual; and if, before having

* Traitè des som sensation. Lond. 1754. Vol. I. p. 119.
† Degerando des signes ou de l' art de penser. Vol. I. p. 12.

received the instruction of touch, the individual should hear a sound, or find himself affected by an odor, he would perceive nothing but the impression resulting from it; he would neither think of referring it to a foreign cause, nor regarding it as a modification of one, whatever philosophers may say. For, in the first place, there is nothing in these sensations fitted to inform him of an objeet foreign to himself; and so long as a man knows nothing foreign to himself, how should he be led to notice self?" (son moi.) *

"A man deprived of touch," says Dumas, with Lecat, "would have no sensation, but what he would consider as confined to his own person, and would be absolutely incapable of distinguishing whatever was concerned in producing it. But, with the faculty of touch, he can put objects in their places, determine the extent of space which he occupies, and ascertain the distance which separates him from each."

If touch makes us know the external world better than the other senses, for the sole reason that it finds bounds and resistance to its action, I will inquire whether the eye does not also meet with limits and resistance. If we must deal with metaphysical subtilties on the existence and non-existence of external things, then touch, resistance, repulsion, will not instruct us better than any other sensation; for, just as all other sensations have their seat solely in the brain, so the sense of touch, resistance, repulsion, has its seat only in the brain. No one has yet placed these sensations in external objects; and, consequently, the pretended illusion may as well take place in the touch as in any other sense. We must, then, admit with Locke,† that the ideas "which enter the mind by more than one sense, are those of extent or space, figure, motion, and rest;" and I conclude with Tracy,‡ that "the sensations pertaining to touch,

* Principe de physiologie, vol. iii. p. 434.
† Hum. Under. vol. i. p. 194.
‡ Idéologie, Partie I. p. 114.

have not, in themselves, any essential prerogative by nature which distinguishes them from all others. Whether a body affects the nerves concealed under the skin of my hand, or, whether it produces certain agitations of those spread over the membranes of my palate, nose, eye or ear, it is a pure impression which I receive, a simple affection which I experience; and there seems no reason to believe, that one is more instinctive than the other; that one is more fitted than the other to lead me to the conclusion, that it comes from a being foreign to myself. Why should the simple sensation of a puncture, of a burn, of tickling, of pressure, give me more knowledge of the cause which produces it, than that of a color, of a sound, or of internal pain? There is no reason for thinking so."

If philosophers, who, with Condillac, have reduced man to the state of a statue, had had the prudence to form this statue after the model of man, and to make it out like him, they would have presented principles wholly different with regard to the functions and the influence of the senses. I might, for example, remind them, that man and animals are accustomed to transfer to the external world, every thing extraordinary which passes within them, and to regard it as an accident of the world without them. A blur on the eye produces the impression of surrounding flames; the flow of blood to the ear, make us imagine that we hear the sound of bells; the sick man wishes removed from him the imaginary fly which he has before his eyes, the odor which offends his nose, and the ice-cold corpse, which lies at his side; in our dreams, we eat the most delicious viands; we walk in delicious gardens, bathe in tepid waters, fly in the air; the coward is in the hands of robbers; the gamester draws his prize from the wheel of fortune; the tender mother throws herself into the flames to save her child. Has not the illusion of the senses invented apparitions, visions, spirits, and wizards? The madman hears the celestial choirs; he fears the devil who follows him with eager step; he attacks whole legions;

dies an hundred times on the wheel for imaginary crimes, finds his head on the neck of another, and carefully repulses every thing which approaches him, in order not to endanger his nose of many yards in length, which he is forced to drag along the ground. Ought we not infer, from all these phenomena, that the nature of man is rather inclined to expand into a world, exterior to its own creation, than to transport to, and concentrate, in itself, the real external world, and in this manner to excuse, in some sort, the reveries of the idealists.

Philosophers have not stopped at the period of attributing exclusively to the touch, the knowledge of the external world.

Condillac derives from touch, as from every other sense, attention, memory, judgment, imagination. He makes of it the corrector of all the other senses, the source of curiosity, of abstract ideas, and of all desires and passions. But he has invented so romantic a fable in relation to pain and pleasure, which he presents as the only motives of all the actions of man, that I cannot undertake the tedious task of correcting him.

Ackerman* thinks, that the touch represents impressions in more distinct series; he regards it as the corrector of the other senses. According to him, the imperfect hand of animals is concealed in the nails or in the hoofs of the fore feet, so that they want this sense, the slowest in truth, but likewise the most sure.

Buffon† says,—It is by the touch alone, that we can gain complete and real knowledge: it is this sense which rectifies all the others, whose effects would be only illusions, and produce nothing but error in our minds, if touch did not teach us to judge.

This naturalist is so much prejudiced in favor of the advantages which result to us from touch, that, while speaking of the custom of swathing the arms of infants,

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* Beantwortung de Ackerm. Wilderlelung de Gehirn und Sched elletre.

† Hist. Nat. 5th ed. vol. vi. p. 87.

he expresses himself thus:* One man has, perhaps, more mind than another, only in consequence of having made, from his early childhood, a greater and prompter use of this sense; and we should do well to leave to the child the free use of its hands from the moment of its birth. "Those animals," says he, elsewhere,† "which have hands, appear to be the most intelligent; monkeys do things so similar to the mechanical actions of men, that they would seem to have the same series of bodily sensations for their cause. All the other animals that have not the use of this organ, can have no very distinct acquaintance with the form of things. We may, also, conjecture that animals, which, like the cuttle fish, polypi, and other insects, have a great number of arms or claws, which they can unite and join, and with which they can seize foreign bodies in different places—that these animals, I say, have an advantage over others, and know and choose much better the things suitable for them; and that, if the hand were divided into an infinity of parts, all equally sensible and flexible, such an organ would be a kind of universal geometry."

"A single organ," says Bonnet in his Palingenesia,‡ "may have been constructed with such art, as alone to give to the animal a great number of ideas, to diversify them greatly, and to *associate* them strongly together. It may even *associate* them with so much more force and advantage, as the fibres, which are to be the *seat* of it, find themselves more strongly united in a single organ.

"The *trunk* of the elephant is a beautiful example, which will admirably illustrate my position. It is to this single instrument, that this noble animal owes his superiority over all other animals; it is by the possession of it, that he seems to hold the middle place between man and brute. What pencil could express all the wonders

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*L. c. p. 86. †L. c. p. 82. ‡ P. 129.

effected by this sort of universal instrument, better than that of Nature's painter?

"This *trunk*," says he,* "composed of membranes, nerves, and muscles, is, at the same time, a member capable of movement, and an organ of sentiment. The elephant can lengthen, shorten, bend, and turn it in every direction. The extremity is terminated by an appendage of the form of a finger: it is by means of this kind of finger, that the elephant does every thing which we do with our fingers; he picks up from the ground the smallest coins; he gathers herbs and flowers, choosing them one by one; he unties knots, opens and shuts doors by turning the keys, and pushing the bolts; he even learns to trace regular characters, with an instrument as small as a pen.

"In the middle of this finger-shaped appendage, is a concavity, at the bottom of which are found the common conduits of smell and respiration. The elephant has, therefore, his nose in his hands, and has the advantage of joining the power of his lungs to the action of his fingers, of drawing up liquids by a strong suction, or of lifting very heavy, solid bodies, by applying to their surface the extremity of his trunk, and forming a vacuum by a strong inspiration.

"Delicacy of touch, acuteness of smell, facility of motion, and power of suction, are found then at the extremity of the elephant's nose. Of all the instruments with which nature has so liberally endowed her favored children, the trunk is, perhaps, the most complete and the most admirable: it is not only an organic instrument, but a triple sense, whose united and combined functions are, at the same time, the cause, and produce the effects of that intelligence and those faculties, which distinguish the elephant and elevate him above all other animals. He is less subject than any other animal to the errors of the sense of sight, because he promptly rectifies

* M. de Buffon Hist. Nat., T. 11. p. 51. et suiv. de l' edit. 4to.

them by that of touch, and because, making use of his trunk, as a long arm, to touch bodies at a distance, he obtains, like us, real ideas of distance by this means."

The eloquent historian of the elephant, next unites in a single view the various services, which this great animal derives from his trunk. "The touch," says he, "is that of all the senses which has the most relation to knowledge; the delicacy of the touch gives the idea of the substance of bodies; the flexibility in the parts of this organ gives the idea of their external form; the power of suction, that of their weight; the smell, that of their qualities; and the length of the arm or trunk, that of their distance: thus, by a sole and a single member, and, to use the expression, by a single and simultaneous act, the elephant feels, perceives, and judges of several things at once; now a multiplied sensation is equivalent, in some sort, to reflection; therefore, though this animal be, like all others, deprived of the power of reflecting, still as his sensations are found combined in the organ itself, as they are cotemporaneous, and, as it were, indivisible from each other, it is not astonishing, that he should have of himself a species of ideas, and that he should acquire, in a short time, those which it is desired to impart to him."

*Cuvier, also, thinks that the touch serves to verify and complete impressions, especially those of the sight; and as it is,† he says the most important of all senses, its degrees of perfection have a prodigious influence on the nature of various animals.

‡ Herder asserts that the touch has given us the comforts of life, inventions and arts, and that it contributes, perhaps, more than we suppose, to the nature of our ideas.

According to Richerand,§ the perfection of the organ of touch gives to elephants and to beavers a degree of

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*L. c. p. 534. †L. c. p. 538. ‡ L. c. T. p. 131.
§ Phys. T. 2. p. 87.

intelligence which is not granted to any other quadruped, and which becomes, perhaps, the principle of their social character. If birds, notwithstanding the prodigious activity of their nutritive life, have, nevertheless, an intelligence so limited, are so little susceptible of durable attachment, and show themselves so little capable of education, do not we find the cause of it, in the imperfections of their touch?

According to Vicq d'Azyr, and several professors now living, the difference between the intellectual faculties of man and the monkey, is explained by the difference in their hands; because the hand of the monkey has neither extensor nor flexor; and moreover, the thumb is shorter and cannot be opposed to the other fingers.

It is thus, that, thanks to credulity, and the propensity for imitation, the old doctrine of Anaxagoras,* which taught that the hand was the cause of human reason, has propagated itself without alteration to our age, which styles itself so enlightened. Why, then, ye philosophers, have ye not raised a temple to your idol? Where would have been the enjoyments and the wisdom of your life, without the hands of a Homer, a Solon, a Euclid, a Raphael, &c.? What would your libraries have been without the hands of copyists and compilers? Whatever is marvellous in the history of animals, it is to their trunks, their tails, their antennæ, that you are indebted for it. It only remains for you to place their souls at the extremity of all these hands, these trunks, these tails, and to make them act according to the instructions of Lecat, Buffon, Condillac, &c.;† then will you have established the principle of the wisdom of animals and of men; and you will have reason to maintain, that to seek other organs to form a physiology of the brain, can only be the futile amusement of idle men, a most unphilosophic design, a sort of scientific phrensy, which has hitherto escaped being sent to the madhouse.‡

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* De usu partium, liv. i. p. 367.
† Dumas L. c. 7. u. p. 81.
‡ Pinel, sur la alienation mentale, p. 132.

But, let us return to serious considerations, to determine the real services of touch.

We may, with the aid of attention, exercise the sense of touch, more or less, by means of all parts of the body. Still, this faculty is most perfect in the hand, because the fingers are so many separate instruments, supple and moveable; but it is not correct to say, that they are endowed with the most delicate touch. The feet, toes, tongue, and especially the lips in the horse, for example, also serve for touch in many animals. The tail of a large number of monkeys, of the beaver, the ant-bear, &c., the trunk of the elephant, the snout of the hog and the mole, the beak of birds, the antennæ of insects, the *barbillons* of fishes, the whiskers of the mammifera, serve the same use. By means of these instruments, men and animals can acquire ideas, more or less distinct, of distance, form, size, rest, or motion, solidity, heat, and cold, moisture and dryness, the weight and resistance of objects, &c.

But, are the ideas acquired by means of touch, sufficient of themselves, to establish better order in thought? Can they rectify the errors of the mind, give birth to industry, to the arts, and invention? Is the degree of perfection of the nature of animals a consequence of greater delicacy of touch? Are our intellectual faculties and those of animals, as much more numerous, as the organs of touch are more in number, and more delicate? Does a more perfect touch afford more precise and more extended knowledge? And do animals choose things proper to their preservation, with so much the more certainty as their organs of touch are more supple? Can touch produce attention, memory, judgment, imagination, abstract ideas, curiosity, desire of instruction, the appetites, and the passions? Can we regard it as the first origin of all these faculties? or, must we rather consider it as an instrument, as a means, which have been created for the service of faculties of a superior order, and put in reciprocal relation with them?

By a natural consequence of the opinions of the various writers I have quoted, should we not be tempted to believe, that the polypi, who, following the expression of some naturalists, touch the light, must have the most precise and the most extensive knowledge? Their organs of touch, so numerous and flexible, should they not lead us to hope, that we shall one day witness their geometrical discoveries? The crab, the butterfly, the capricorn, (beetle,) which have antennæ so complicated, is it through philosophic modesty, that they conceal their wisdom from us? It is unlucky, that the greater part of insects, exercise their faculties at the period when they are still imperfect, and when their antennæ are not yet developed, and that those who make use of their faculties in their state of complete development, such as bees and wasps, are inferior to the others in the beauty of their antennæ. Is it true, that the more perfect the organs of touch that animals possess, the more surely they can provide for the security of their existence? Why do not naturalists take advantage of this luminous observation, to explain the extinction of several species of animals of the primitive world? We are, probably, indebted for the existence of oysters, fishes, and horses, as they exist at present, to the care which nature has taken in the present world, to change its march, by imposing on the whole animal kingdom, the condition of consulting the smell in their choice of aliments. If the tail of the beaver, and the trunk of the elephant, are the cause of their social character and of their disposition to be tamed; if the imperfect touch of birds is the cause of their inaptitude to receive education, and their want of attachment, we may doubt whether dogs, sheep, and domestic fowls are tame and sociable animals; we may, likewise, doubt, whether the bulfinch and the black-bird, the parrot and the raven can learn, the one to sing, and the other to speak; and it will even be necessary to forget the marvellous construction of the nests of birds. If the march of thought is so mechanical, that it is the touch, which arranges the ideas in better order, because

it acts slowly, separately, and successively upon objects, it would be to the sight, which, at a glance, contemplates the universe, that we should attribute the advantage of giving ideas the most prompt, the most general, and the most extended. If touch possesses the admirable faculty of correcting the errors of the mind, let us be shown a single error, moral or physical, from which the touch of man or animals has delivered us. Let the maniac, who thinks that he unceasingly hears strange voices whisper in his ear, and who is continually tormented by imaginary insects, exhaust himself perpetually in useless efforts to seize the insupportable prattler and the troublesome insect; let him, in his amorous delirium, have discovered a thousand times that he embraced nothing; the voices, nevertheless, continue to whisper, the insects to harass him, and he embraces a thousand times more, the phantom of his ardent imagination. If it be to the hands, that the origin of inventions and arts, is due, why do idiots and simpletons never invent any thing? Why does the painter let fall his pencil, the sculptor his chisel, and the architect his compass, as soon as their minds become deranged? How, on the contrary, does it happen, that men born without hands and without feet, have very just ideas of distances, forms, &c., and that other individuals, whose hands have been wholly amputated, execute surprising feats with the stumps? Why have artists up to the present time, never found the secret of judging of the talents of their pupils, by the conformation of their hands?

Although it be true, that some muscles of the hand are wanting in monkeys, yet they can hold the smallest objects between the thumb and fore-finger; they seize the finest hairs; they grasp and carry in the same manner as men: they untie the most complicated knots, using their fingers and their teeth like men; they even employ their hind feet for all these purposes; and yet they have never invented a tool or a process of art. They do not want, any more than the dog and the cat, the ability to carry; why, then, do these animals, not-

withstanding the possession of so many faculties, never arrive at the idea of carrying wood to a fire, though at the same time they are shivering with cold?

All which we have said proves, that man and animals do not perform what they execute, by means of touch, because they have this sense more or less perfect, but that it is necessary to admit, that the external organs, the senses, are calculated to adapt themselves to the internal faculties. Would there not exist a perpetual contradiction between the propensities, the faculties, and the external organs; and would not the internal faculties be rendered useless by the impotence of the external organs, if these were not fitted to execute what the internal ones command? Give to the tiger, bathed in blood, the feet and the teeth of the sheep, and to the sheep, the claws and murderous teeth of the lion, and instantly, by this contradictory arrangement of apparatuses, you destroy the existence of these two animals.

The degree of address, industry, and intelligence, with which an animal is endowed, has not for its principle his trunk, or his tail, which serves him for a trowel; man does not invent because he has hands; but the animal and the man have these organs, because their internal organization is endowed with the faculties which are in relation with these. Certain organs may be indispensable to execute certain things; yet we cannot attribute to them the thought, which leads to constructing a nest or a hut; to the invention of printing, or weaving.

It is the more astonishing, that this error of Anaxagoras should have been preserved to the present moment, since Galen had long since victoriously refuted it.

"The body," says he, "is the organ of the soul, and, consequently, all the limbs are useful. Hence, the limbs are different, because the souls themselves are of different natures. The courageous and audacious lion has strong claws and teeth; the bull is armed with horns; the boar with tusks. The timid animals, such as the stag and the hare, are organized so as to withdraw

themselves from danger by a prompt flight. Man, being endowed with something divine, with intelligence, has received from nature his hands, instead of weapons and tusks. These instruments serve him for all acts, both in war and in peace. There is no need of either horns or tusks; by means of his hands he procures himself shoes; the cuirass, the lance, his arrows: he constructs walls and houses, weaves cloths and nets, and, in this manner gains possession, not only of the animals which inhabit the earth, but also, of those which glide in the air, or skim the seas. With his hands he writes laws, erects temples and statues, constructs vessels, makes flutes, harps, knives, pincers, and all instruments needed in the arts. It is by them, that he transmits his meditations to posterity, just as, at the present moment, he can converse with Plato, Aristotle, and Hippocrates. The hands, therefore, were most suitable to man, as an intelligent being; for, he is not the most intelligent being because he has two hands as Anaxagoras maintains; but, he is provided with hands because he is the most intelligent; as Aristotle had already, with reason, advanced. It is not the hands, which have taught men the arts; but it is his understanding. The hands are only instruments for the arts; as it is not the harp which instructs the musician, nor the tongs which make the blacksmith, but both are artists, only, by the aid of their intelligence, though without these instruments they would not be able to exercise their art; so each soul, by virtue of its peculiar nature, possesses certain faculties, though it cannot manifest them without certain instruments. It is especially by observing the young of certain animals, that any one may convince himself, that it is not external instruments which inspire an animal with timidity, courage, or sagacity; for, young animals are already endeavoring to exercise their innate faculties, before their innate faculties have reached their perfection. I have often seen a young bullock making at objects with his forehead before the horns had appeared; a colt kick with his still feeble feet; a young boar without

tusks carry on a combat with blows from his jaw. Each animal has the internal sense of his faculties, and knows the use of his weapons, independently of all instruction. If it were otherwise, why should not the young boar bite with the teeth which he already has, in place of attempting the use of tusks, which he has not? If you have three eggs hatched, one of an eagle, one of a duck, and one of a serpent, you will see the eagle and the duck try to fly before they possess any wings; the little serpent, on the contrary, will roll himself into a spiral, and, however feeble he may be, will make efforts to crawl. If you bring them up in a house, and then take them into the open field, the eagle will direct his flight to the heaven, the duck will make for the water, and the serpent will hide himself under the grass. The eagle, I think, will not fail to *pursue his prey;* the duck, to swim; and the serpent, to seek for holes in the earth; all, as I conclude, without having been taught by any master."

We see, also, by this, that a similitude of occupation exists among several animals, although their organs may differ entirely; or, that similar internal faculties obtain their common object by means of external organs totally unlike. The trunk is to the elephant, what the hand is to the man and the monkey; the swallow attaches its nest by the means of his beak, and the thrush cements the interior of his, with clay, tempered by the same instrument, in the same manner as the beaver covers his habitation with it by means of his tail. The squirrel and the wren, the swamp-thrush, and the reed-mouse, build their nests in a manner almost similar. The eagle holds his prey between his talons, as the dog does a bone with his paws. Whatever difference exists between the hands of the monkey, and the feet of the parrot, and the Polish titmouse, (parus pendulinus,) all three make use of these parts to hold their food in the air in the same manner; the hog roots the earth with his snout, the dog scratches it, and the stag beats it with his feet, to uncover the truffles.

In like manner, phenomena entirely different, result from organs apparently similar. In how many different modes, and with what variety of toils do the different species of spiders seize their prey? What diversity of structure exists in the nests of birds? Even those who construct similar ones, and which belong to the same genus, how much do they differ in their mode of life, in habitual residence, in their food, their notes, and other distinctive peculiarities? The great tomtit, (*parus major*,) for example, builds his nest in hollow trees; the long-tailed tomtit, (*parus caudatus*,) in the bifurcations, and between the bark and the trunk; the bearded tomtit, (*parus barbatus*,) in the reeds; and the titmouse suspends his nest, remarkable for its art and delicacy, from a slender branch; while the cuckoo, though provided with a beak and feet like other birds, builds none.

We challenge those, who assert that the external organs produce the internal faculties, to form a conjecture of any faculty from the configuration of these organs. What would lead you to conclude, that the ant-lion digs a reversed cone in the sand for the ants to fall into? What reveals to you the reason why the hare has his covert in the midst of the fields, while the rabbit burrows? What sign shows you that the rook must live in society, while the pie lives in insulated couples? How do you distinguish the natural wildness of the cuckoo and the chamois, from the facility with which the pigeon and the goat are tamed? Would you not rather have attributed the faculty of building to the hands of the curious monkey, than to the feeble and palmate feet of the beaver? Would you not make the weak wren migratory to the south, rather than the vulture? How will you discover why the hamster lays up food for the winter, and why the bustard, crane, &c., set sentinels?

Thus have I demonstrated, that it does not belong to the touch alone, to give us a knowledge of the world without us; that sensations take place, not only by means of the external senses, but likewise in the interior of the organization; that we cannot call the touch, the

corrector of the other senses; that the hands, when there exists no faculty of a superior order, cannot invent either arts or tools; that the whole use of the touch is limited to procuring the ideas of distance, extent, form, rest, motion, moisture and dryness, and the degree of solidity of objects; that, in other respects, it must be regarded as the instrument of the superior faculties; that these superior faculties, such as the inclinations, propensities, different modes of industry, and the faculties, cannot be determined, conjectured, or explained by the organs of touch. We are, then, obliged to seek other organic conditions, as the causes of all the faculties which we cannot derive from this sense.

It is alleged, as the cause of the numerous advantages of touch, that it supposes a reflection in the animal that exercises it, whereas the others require none. "Light," say they, "and sounds, strike their respective organs without the will of the animal; whereas he touches nothing without some preliminary exercise of the intellectual faculties." *

But this opinion, which embraces only one side of objects, disregards the *active* functions of the other senses; and, as it excludes, at the same time, the involuntary touch and shock, and, consequently, the *passive* function of touch, it does not deserve any more extended refutation.

We may place in the same category, the directly opposite opinion of Dumas,† who says, "the perceptions from touch do not leave after them impressions as definite, as lively, and of which the memory can so easily recal the image."

To this objection, those may answer, who are under the sad necessity of indemnifying themselves by the pleasures of the imagination only, for the loss of those gratifications which they have formerly had from the sense of touch.

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* Bichat, Anat. Gen. T. i. p. 117. † L. c. T. iii. p. 435.

Of the Functions of the Senses in general.

The impressions, whether they come from the external world through the senses, or from the internal by the general organs of sensations, must, then, be considered as indispensable conditions, without which no perception and no thought can take place. But, no impression from without, no irritation from within, can become a sensation or an idea, without the concurrence of the brain. The faculty of perceiving impressions, of retaining and comparing ideas, and making application of them, is by no means in proportion to the senses either in men or animals, as is proved by the example of idiots and simpletons. Thus, could we even have it demonstrated, that man, of all animals, has the most perfect senses, we should not thus obtain the explanation of his surpassing all others in intellectual faculties. Accordingly Condillac* has been obliged to say, "that the senses do not suffice to obtain a knowledge of nature; for the same senses are common to us all, yet we have not all the same knowledge."

The author† of the treatise on the senses is, therefore, wrong in saying, "all the senses have, likewise, produced the arts to satisfy, to perfect, and to guard themselves from painful impressions. What arts has not the sense of touch produced? These dresses, these palaces, these convenient carriages, are all the creations of its delicacy."

We shall oppose to him an observation of Helvetius, much more judicious. "Experience,"‡ says he, "does not show that the mind is always proportionate to the greater or less delicacy of these same senses. Women,

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* Œuvres compl. T. iii. p. 6.

† Lecat. p. 31.

‡ De l'homme, de ses facultés intellectuelles, et de son éducation. Lond. 1786. T. i. p. 185.

for example, whose skin, more delicate than that of man, gives them greater acuteness in the sense of touch, have not more genius than a Voltaire, &c. Homer and Milton were blind at an early age; but what imagination can be stronger and more brilliant? Among those whose sense of hearing is most acute, are any superior to S. Lambert, Saurin, Nivérnois? Those, whose senses of taste and smell are the most exquisite, have they more genius than Diderot, Rousseau, Marmontel, Duclos, &c.? In whatever manner we inquire of experience, she always answers, that the greater or less superiority of mind, is independent of the greater or less perfection of the organs of the senses."

To prove still more amply that all our ideas come from the senses, it is said, with Locke,* that the very expressions for the peculiar functions of the understanding are borrowed from material objects. "The words imagine, comprehend, attach, conceive, instil, disgust, trouble, tranquillity, are all borrowed from the operations of sensible things, and applied to certain modes of thought." And with him it is asserted, that, in all languages, the words employed to express things not within the domain of sense, have derived their first origin from similar ideas. In this sense is continually repeated the maxim of Aristotle, *that nothing arrives at the mind without having passed through the senses.*

I am, myself, convinced, that many expressions which serve to designate internal acts, are borrowed from the external world. But, if we have established a comparison between two sensations, does it follow that it was external impressions which produced these similar internal sensations? It seems to us rather, that, in a great number of cases, it is difficult to decide whether a certain expression has first been invented for an internal sensation, or for an external impression; for man is alive to himself, as early as he is to the external world, and

* L. c. Tom. iii. p. 40.

acquires sensations and ideas from within and without at the same time. It was necessary to designate the motion and rest of the eyes, of the tongue, as well as the motion and rest of an animal; the heart beats as well as a hammer; a stone does not oppress us more than heavy undigested food weighs in the stomach; the painful feelings of distress, pricking, dragging, tearing, and distortion, may affect us from within as strongly as when they are the result of external impressions. Who, then, will dare assert that the expressions, *strain*, *cold*, *warm*, *chill*, *palpitation*, *trembling*, &c., have been designed to designate rather the qualities of external things, than those of internal sensations?

There exists, also, in every language, a number of expressions, which it would be difficult to derive from material objects. Whence comes the words *hunger*, *thirst*, *truth*, *falsehood*, *error*, *friend*, *enemy*, *hatred*, *love*, *pride*, *honor*, *sin*, *evil*, *good*, *wish*, *think*, *joy*, *grief*, *fear*, *hope*, &c. They serve to revive our internal sensations, and we employ them frequently to depict what passes in the external world. We say that a country is *sad*, that a house *threatens* to fall, that the excessive heat does *mischief* to the trees, &c.

Whence come the words which do not precisely designate determinate ideas, but simply the mode of thinking; the prepositions, conjunctions, interjections, adverbs of interrogation and exclamation, &c., such as *but*, *and*, *yet*, *notwithstanding*, *for*, *if*, *nevertheless*, *consequently*, *also*, *then*, *thus*, *alas*, *yes*, *no*, &c.?

Do not the deaf and dumb, who possess reason, but who are deprived of the faculty of expressing themselves by articulate language, depict their internal sensations by gestures, which absolutely have nothing in common with the external world?

If all our ideas come from the senses, what becomes of the general and purely intellectual ideas, whose signification is wholly independent of the material world? For example, "there is no effect without a cause;" "nothing can spring from nothing;" "matter can

neither be increased or diminished;" "a quality, contrary to a subject, cannot belong to it;" "a thing cannot exist and not exist, at the same time."

In fine, I have already shown in my large work, in speaking of hearing, that the faculty of finding analogies between impressions from without and those from within, supposes a faculty of a degree superior to that of articulating words.

Language, then, also proves, in all its relations, that it is not solely the work of the impressions on the senses, but that it supposes an internal and an external source of our sensations and our ideas, and, at the same time, an intellectual faculty much superior.

Some authors, persuaded that the impressions on the senses do not suffice to explain all the faculties of animals and of man, admit an internal and an external source of our ideas, and say, with Cabanis, Richerand, &c., that our ideas come to us from two very distinct sources, to wit, the external senses and the internal organs; that instinct arises from impressions received from the internal organs, while reason is the product of external sensations. They also add, that "in animals, the grosser external senses allow instinct to predominate, and that in man, the perfection of the senses gives to the reasoning a marked preponderance, at the same time that it weakens instinct."

But this mode of expression again supposes the error, that man has senses more perfect than animals; and, as, on the other hand, we generally attribute to savage nations the most delicate senses, it would be from them that we ought to expect the most profound philosophy and the feeblest instinct; which will hardly be admitted. But, we must first agree what instinct, properly speaking, is. If, moved by different principles, man is better able to govern his passions than the animals, it does not at all follow, that those passions or instincts are more feeble. In fine, the propensities, the inclinations, the passions, are as much objects of consideration for reason, as the impressions made on the senses; these, also,

have need of internal organs, when they do not remain simple material impressions, and must be employed by the understanding for higher functions. The eye and the touch, alone, no more form geometry, than the female creates in the male the instinct of generation, or, than the sheep is the cause of the carnivorous appetite of the wolf.

It is said to have been remarked in the man of Puiseaux, blind from his birth, "that the wonders of nature and the course of the stars, did not induce in him a belief in God, because he was unable to perceive them; that the same blind man had no aversion for theft, except for the facility with which others robbed him without his knowing it, and the difficulty he found in retaliating on others without being detected; that he cared not much for decency; and felt not much commiseration for a man whose blood was flowing." By such examples they would make it appear, that we are indebted to the senses even for our moral faculties.*

But, have those animals who possess all the senses which we do, such as the baboon, and ourang-outang, have they more decency, and are they more moved in seeing blood flow, than other animals? Are idiots, who possess their five senses in perfection, more virtuous than the man born blind? Must not every reader perceive, that it is the interior alone which modifies the impressions on the senses, and thus leads us, by a precipitate and limited judgment, to believe their operation immediate? It is for this reason, that external objects act very differently on men and on animals; very differently on the hare and on the fox; on such or such an individual, &c.

The differences of seasons, ages and sexes, produces no essential difference in the number and nature of the senses; why, then, are the intellectual faculties and the passions so different in the child, and in the man, in the

* Diderat L. c. p. 126 et suive.

young man and in the young woman? How does it happen, that, in animals, it sometimes is the inclination to assemble in flocks and travel, and sometimes, the desire to propagate the species, that predominates? Why does the same bird feed on seeds, in one season, and on worms, in another?

All the functions of the senses are gradually weakened in old age. According to some physiologists, this is the consequence of the senses being habituated to external impressions, so that these successively produce feebler irritations. It is even attempted to explain on the principle of habit, why we have so little feeling of what passes within us in the organic or automatic life. It rather seems to me that nature has designedly taken from us the sense of automatic life; and she has probably attained this end by the tenuity of the threads of communication of the nervous systems of the chest and abdomen, with the nervous systems of the vertebral column, the senses and the brain. But in old age, the functions of the senses are weakened, because the organs of sense themselves diminish. The nervous filaments and their nutritive substance waste, as well as the gray substance generally, and all the nerves begin to experience atrophy. This is the reason why Pinel did not find in the labyrinth of the ear of old men who had become deaf, the pulpous substance, which exists in men who hear. This, too, is the reason why the nerves of aged persons are much smaller, than those of persons in the prime of life. This diminution not taking place at the same time in all the nervous systems, it hence results, that all the functions do not diminish equally at the same time; which must happen if they successively become more feeble, only in consequence of the repetition of impressions.

The double nature of each sense does not prevent the sensations we have of objects from being simple; the consciousness of the soul is likewise simple, notwithstanding the five different functions of the senses.

Bacon, Locke, Hume, Helvetius, Condillac, have found

themselves obliged, in order to comprehend in some way, the possibility of the functions of the understanding, to have recourse, not only to the senses which some of these authors had so highly elevated, but likewise to a knowledge of the relations of sensations, or sometimes to attention, experience, reflection, induction. Though they were sometimes greatly in contradiction with themselves, they perceived that none of the faculties which we have just enumerated, could pertain to any of the senses. But if, in this life, no faculty can be exercised without a material condition, as I shall show hereafter in an incontestable manner, we must necessarily suppose a material organization for the exercise of the intellectual faculties.

Men have always regarded, as very important, the researches, which have for their object to determine the organs, by which animals and man receive the material impressions of the external world. Will it be less interesting, less noble, to try to discover the organs of the superior faculties of the mind?

In fine, I will ask, if the five senses, and the faculties of which we have spoken, can serve to explain the various inclinations, the different instinctive aptitudes of animals, as well as all the propensities and all the powers of man; how, by this means, will you explain why the seal, the chamois, and the wild goose place sentinels? Why the bird, the beaver, the rabbit, the ant, construct their abodes with so much skill? Why the quail and the stork migrate and return to the same places? Who can explain to us the love of females for their young, and the indifference of the males of many sorts of animals, while in other species, the males share with their mates, the care of the young? Who can explain to us the sociability of the rook, and the inclination of the pie to live in solitude? the exclusive jealousy of the cock and the bull, and the reciprocal compatibility of hens and cows? Who can explain to us what we call cunning, courage, boldness, rectitude, morality? Is it experience? But all these sentiments precede experience. The spider weaves, the beaver builds, the night-

ingale migrates, before having any experience. Is it attention, reflection, induction? But why does each species of animal direct its attention to a different and peculiar object? Why do all individuals of the same species fix theirs always on the same object? Why, even, does it not depend on man to acquire a high degree of attention or faculty of induction for certain objects? Do we not see that it is in all nature, as in the example of the monkey, who has attention sufficient for filling his pouches with fruits, but knows not how to keep up a fire?

Education perfects, deteriorates, represses, and directs the Innate Faculties, but can neither destroy nor produce any.

Since we have ventured to regard animals no longer as mere machines, many philosophers maintain, that not only man, but animals also, are born without instincts, propensities, primitive determination, faculties; that they are indifferent, equally susceptible of every thing; and, finally, that we must regard them as tabulæ rasæ. Their ingenious aptitudes, instincts, propensities and faculties, it is pretended, are the result of accidental impressions, received by the five senses, or of those which education gives them. Even insects, say they, display their natural aptitudes only as an effect of instruction. The builder-wasp has already learned, while yet a larva, the masonry of his mother; the bird learns from those who have given him life, to build his nest, to sing, to migrate; the young fox is carried to school by his father; and man would not become man, would remain a savage and idiot, without the means furnished by education.

Let us first examine this hypothesis, so far as it concerns animals.

It is true, and I shall give numerous proofs of it in this work, that the great part of animals are not limited

wholly to the means of their own preservation. They are susceptible of much more extended instruction, than their immediate wants require. We teach all sorts of tricks to birds, squirrels, cats, dogs, horses, monkeys, and even swine. They also modify their own mode of action with reference to the position in which they find themselves. But, this faculty of receiving education is always proportionate to their primitive faculties; and they cannot, any more than man, learn things, of which they have not received the first impress from nature. I admire the setter, couching in the pursuit of the pheasant; the falcon in chase of the heron; but the ox will never learn to run after mice, nor the cat to browse on grass; and we shall never teach the roe-buck and the pigeon to hunt.

If animals were susceptible of impressions from all that surrounds them, in a manner to derive lessons from them to the degree supposed, why does not the chicken learn to coo with the pigeons? Why does not the female nightingale imitate the song of her mate? How does each animal, notwithstanding the intercourse of other species, differing the most from his own, preserve his peculiar manners? Why do birds and mammifera, even when hatched or suckled by strange parents, always manifest the character of their species? Why does the cuckoo imitate neither, the nest where he is hatched, nor the note of the bird who has reared him? How do we teach the squirrel which we have taken blind in his nest, and who has never seen another squirrel, to climb and leap from one branch to another? How do we inspire the ferret with the instinct of seeking the rabbit in his burrow? Who has taught ducks and beetles to counterfeit death, as soon as they are menaced by an enemy? Who has given lessons to the spider, which, hardly escaped from his egg, weaves a web and envelopes the captive flies, that they may not dry up? Of whom has the ichneumon fly learned to attach with a thread to the branch of a tree, the caterpillar, in which

she has deposited her eggs? And how do the caterpillars, as soon as they are hatched, roll themselves in a leaf to escape the cold and dampness of the winter? In fine, why do animals do things, which they have never seen done; and why do they almost always do them as well the first time, as their progenitors?

Without the innateness of the faculties of animals, how can we explain the differences of individuals, which have absolutely the same manner of living? When, in a forest, one nightingale sings better and more assiduously than the rest; when in a poultry yard one cock is more ardent in fight, and another more pacific; when one hen, one cow, are better mothers than the other hens and the other cows,—can we attribute these phenomena to education?

How can we comprehend why certain individuals are raised above their fellows, and become, as it were, the geniuses of their species? Locke's translator, Coste, speaks of a dog, who, in winter, whenever his comrades were lying about the fire, so as to prevent his approach, set himself about making a noise in the court; and while his comrades ran thither, he hastened to enter into the house, took a good place near the fire, and let those bark whom he had cheated by this stratagem. He had frequent recourse to it, and yet he always gained his ends, because no one of the other dogs had sagacity enough to discover his trick. Dupont de Nemours had a cow, that, to procure the whole flock a more abundant supply of food, adopted the plan of throwing down with her horns, the fence with which the field was surrounded. None of the other cows knew how to imitate her example; and when they were near the fence, waited impatiently the arrival of their conductress. I have sometimes met mocking-birds who perfectly imitated the birds of the neighborhood, even to the quail and the cuckoo, while the others surrounded by the same birds, could only imitate a small number, or were limited to their own peculiar song.

In fine, if the instincts, propensities, and faculties of

animals, are not determined by their organization, how can you explain the fact, that these instincts, propensities and faculties are always found in harmony with their external organs? What chance should give to each animal, factitious instincts, faculties, always in harmony with their teeth, claws, horns, &c.? Will you maintain that nature acts without object, in giving to the beaver strong gnawing teeth and a flat tail; to the intelligent elephant his trunk; to the sanguinary tiger his terrible claws and teeth?

Or, will you tell me, with those who do not acknowledge final causes, that the bear, the tiger, and the elephant employ their instruments for the sole reason, that they find them fitted for certain purposes? the mole lives under ground because her eyes are too small; the feet of the swan are natural oars, and therefore he chooses of necessity his abode in the water. Neither man nor animals have any limb, any instrument, in order to use it, but they use them because they have them.

Who does not see that, on this supposition, there would be no connection between the interior and exterior, between the instruments and the active force? And would you forget, that the boar strikes with his jaws before his tusks are formed? the young bull and the kid with their head, before their horns have appeared? that the bird shakes his wings before he has any feathers? Take from the lion his teeth and claws, and give them to the sheep, and see if by this means you will change the lion into a sheep, and the sheep into a lion.

We must then admit, that each animal, in consequence of its organization, has received from nature ingenious aptitudes, instincts, propensities, proper determinate talents, and that the power of things external, of instruction and education, is limited to giving it more or less modification.

The hypothesis of the tabula rasa, and of the creative power of education, is it more admissible for the human race?

To attempt to write in a satisfactory manner on the influence of institutions and of education, would be undertaking volumes. I must therefore confine myself to my object, and show, by some general considerations, how far the influence of human efforts extends over the moral and intellectual character of man.

The antagonists of innate dispositions persist in saying, that man, being from his birth surrounded by men, appropriates to himself their faculties and their character.

Might I not ask whence the first men, who were surrounded only by beasts, obtained their faculties, and how they created or invented them? Even at the present time, are not many men, in their infancy, more surrounded by animals than by men? Why do not these children receive the instincts and propensities of animals as well as the faculties of man? If children had not the same dispositions as their parents and instructors, how could they be capable of receiving their instruction and profiting by their example? In the first years, when children are almost solely in the hands of their mothers, of nurses, and of women, boys always distinguish themselves from girls, and one child is perfectly distinct from another. After this period nothing can give rise to a resemblance between the faculties of the man and the woman, nor between those of different individuals. In fine, do we know any art by which an instructor can create in children envy, love, attachment, anger, goodness or wickedness, ambition, pride, &c.? Do we know how to create any talent? This power so little belongs to man, that even when we are our own absolute masters, we cannot escape the changes which the succession of years produces in our moral and intellectual faculties. Every thing confirms the truth of what Herder says, that education cannot take place except by imitation, and consequently by the passage from the original to the copy. The imitator must have the faculty of receiving what is communicated to him and of transforming it into his nature, as he does the meats

by which he is nourished. But the manner in which he receives it, the means by which he appropriates it to himself and employs it, can only be determined by the faculties of the receiver; whence it follows that the education of our species, is, in some sort, the result of a double action, to wit: of him who gives, and of him who receives it. Thus when we see that men take the form which we wish to give them, it is not a legitimate inference, that these forms have been created in them; they have borrowed them from other men endowed with the same dispositions.

The influence of education, instruction, example and of surrounding circumstances, takes place principally when the innate dispositions are neither too feeble nor too energetic. Every sane man, having the essential organization of his species, has, in virtue of it, capacity for whatever is relative to the dispositions proper to man. It is owing to this, that nature bounds herself in the most part of individuals, with a mediocrity of moral and intellectual forces; it is, as it were, passive in relation to the impression of external objects; the internal faculties do not announce themselves; they are in a state of indifference; they seize nothing and repulse nothing strongly; and as nothing draws these individuals toward a marked end, they have consequently no determinate vocation. Of this great majority of men it is said, with reason, that man is an imitative animal. Precepts, institutions, discussion, the severe exposition of the most interesting truths, has but little power over them. It is example and imitation which draws them, which gives a grave air, and often a grave character to the son of a magistrate, and the bold countenance to the son of a warrior; which make the Frenchman, German, Italian, Englishman, Russian; which make slaves, freemen, republicans, &c.: but it will always be mediocrity which falls to their share. It is for these men that education is almost every thing, at least in the relations of social life; it is for them that institutions must be calculated. Still, it is not admissible to conclude, that

their dispositions for receiving this education, are not innate. When Helvetius maintains, that if dispositions were innate in man, education would not be able to change any thing in him, nor to give him any thing, he takes from the nature of man and of animals all possibility of being modified, and confounds simple modifications with essential qualities and faculties.

Still, it must not be imagined, that even for this class, the impressions which come from without, have an influence exclusive, absolute, and always equal. If we succeed in introducing in a nation a certain uniformity in regard to customs, opinions, manners, professions, arts and sciences, laws and religion, it is because all these things are founded, not only on positive relations, but also, on natural dispositions. Without denying the influence of institutions, it is still evident that the general progress of civilization is the result of the organization proper to the human race.

In the midst of these positive things, which seem to have been introduced by institutions, by arbitrary inventions, each individual differs from another by a peculiar character, just as he differs by the external form of his body. Such a quality is given to one, and denied to another. Each has a predilection, or a more decided talent for such or such an object. There is, then, in each man, something which he does not derive from education, which even resists all education. Accordingly, all instructors have experienced, that it is necessary to observe peculiar rules for each pupil, if they would perfect the good qualities and correct the evil ones which belong to him, and put him in a state to employ his powers in a manner useful to society and himself.

This individuality, this character peculiar to each individual, shows itself in a thousand modes at all periods of life, without education having any part in it. From his infancy, man announces the character which will distinguish him in adult age. The moment you exalt his merit on account of some excellent quality, or censure him for a vicious one, he appears to be surprised

himself, as by some new thing, of which he acquires a knowledge for the first time. Urge him still more, and he exclaims, "*Well, it is in my nature: I cannot do otherwise; it is too strong for me.*" Let us follow, then, the example of Marcus Aurelius, who holds it for a maxim,—that it is not in our power, nor in that of a sovereign, to make men such as they ought to be; but that it depends on us and on the prince, to employ men, such as they are, each according to his talent.

How can we attribute to education those most decided dispositions and faculties, which are sometimes observed, even in children, and which, consequently, are anterior to all sorts of instruction. Most great men have manifested their future greatness in their early years. Achilles, concealed under the robes of Pyrrha, seized a sword from among the gifts which Ulysses brought: Themistocles, when still a child, said, that if they would give him a small town to govern, he would know how to enlarge it and render it powerful: Alcibiades, seeing that a carman was going to disturb his game of cockles, throws himself across his path, in the middle of the street, and cries out to him, "*Come on, if you dare:*" Alexander would not contend for the prize in the Olympic games, unless kings were to be his rivals: it was at the age of fourteen years that Cato of Utica developed his great character, and his horror of tyranny; and Pascal, at twelve, gave evidence of his genius, by publishing his treatise on Conic Sections.

Experience proves the small power of education, when we have to deal with energetic dispositions. Men, endowed with striking characters and superior intellect, push on and raise themselves, notwithstanding the greatest obstacles. Moses, David, Tamerlane, Pope Sixtus Quintus, had been keepers of flocks; Gregory VII. was the son of a carpenter; Socrates, Pythagoras, Theophrastes, Demosthenes, Shakspeare, Moliere, J. J. Rousseau, were the sons of artisans. These examples, with which history abounds, refute Hobbes, who holds that the difference of talents, or, of mental faculties, comes

from wealth, power, and the condition in which one is born.

We even observe, that, in spite of the most decided opposition, and education, the most hostile to the innate character, nature, when endowed with energy, gains the victory both in the good and the bad. Tacitus justifies the instructors of Nero. This prince was cruel from infancy, and to all the lessons of humanity which his masters gave him, he only opposed a heart of brass. Philosophers and sages cultivated the heart and mind of Commodus; but nature triumphed over education: men saw in him a second Nero. The energy of the character of Peter the Great could neither be enervated by the corrupt principles with which he was surrounded, nor by the pleasures by means of which, at a tender age, it was attempted to lead him into effeminate habits.

The greatest men, it is true, bear the impress of their age, and cannot entirely defend themselves from the impression of the objects which surround them; still, we constantly see, that he who possesses a dominant energetic quality or faculty, pursues his route, and seizes with force the object which nature has pointed out to him. Thomas, in writing the *èloge* of Descartes, did well not to dwell much upon his education. "For," said he, "when the question relates to extraordinary men, we have to consider education much less than nature. There is an education for common men; the man of genius has the education which he gives himself, and which consists principally in destroying and effacing, that which he has received." Fontenelle, in pronouncing the eulogy of the czar, said,—"Neither does good education make the great character, nor does bad education destroy it. Heroes, of all classes, come ready formed from the hands of nature, and with uncontrollable qualities."

Almost all great men have either been educated by inferior masters, or have received no education whatever. Homer, Petrarch, Tasso, Dante, Raphael, Michael Ange-

lo, Racine, Moliere, Corneille, Titian, Rubens, Poussin, &c., are instances.

It is rare, that great masters form great men. What, then, must we think of the public, that honestly consider it the best choice of a physician, when the individual selected is the pupil of some celebrated professor?

But geniuses of all kinds, say the antagonists of innate propensities, make an exception, and form a separate class; we cannot from them conclude, that the qualities and faculties are innate.

I answer, that genius is only the energetic activity of some quality or some faculty. If, then, in cases where the faculties have the greatest energy, the cause which produces it, and which is most striking, is inherent in the organization, we must naturally conclude that the cause of their ordinary activity is equally founded in the organization. Difference of more and less proves nothing against the common origin of obscure and decided faculties. Otherwise it would be correct to conclude, from the piercing sight of the eagle, and the delicate scent of the dog, that the sight of the mole, and the sense of smell in man, do not likewise depend on their organization.

If, by a concurrence of circumstances, a man endowed with certain very active faculties, has been prevented from following his inclination, this dominant faculty or propensity determines the enjoyments and the favorite occupations of his life. Kings devote themselves to the occupations of artists and of artisans; peasants, cordwainers, weavers, shepherds, become astronomers, poets, philosophers, actors, sculptors. The czar Peter I. exercised the mechanical arts from inclination. Louis XIV. turned locksmith for amusement. The shepherd Hahn made watches; and Haller, in the midst of his anatomical and physiological works, became likewise celebrated for poetry.

Will it be pretended that precocious genius, or any other genius, is the result of education and of surrounding objects? I would then be informed why certain children, who, in regard to one of their faculties, exhibit

extraordinary genius, in other respects do not raise themselves above their companions; and why men, who excel in one point are so indifferent in every thing else? The celebrated Betty, who at the age of thirteen, was already regarded a first-rate actor, used to play in the street with his companions, up to the moment of his appearance on the stage. William Crotch, celebrated at the age of six years, for his musical talents, was, in other respects, a child of only moderate abilities.

I have made the same observation on a boy of five years, who gave evidence of complete puberty and the most decided propensity for women; he had nothing to distinguish him from children of his age, in all his other inclinations. The same contrast is remarkable in adults. The most extraordinary faculties prove nothing in favor of qualities of a different order. Nothing could have made a Horace of Cæsar, or a Homer of Alexander. Helvetius, himself, is forced to confess that education would never have changed Newton into a poet, or Milton into an astronomer. Michael Angelo would never have been able to compose the tables of Albanus, nor Albanus those of Julius Romanus. We can only explain these various phenomena by saying, that certain organs perfect themselves sooner, and others later; that, in certain individuals, some organs remain always in arrear, while others acquire the greatest energy. But this explanation shows again, that all the moral qualities and intellectual faculties are innate.

Philosophers have recourse to small subterfuges to prove, that our propensities and our talents are the result of chance. It is, they say, by insignificant impressions on the infant at the breast, by peculiar examples and events, that sometimes one faculty is determined and sometimes another. If Demosthenes became eloquent, it is because he was attracted by the eloquence of Callisthenes. If Vaucanson became celebrated in mechanics, it was because he had seen, while a child, a clock in the ante-chamber of his mother's confessor; he examined its wheels, made a similar machine with a

bad knife, and, his taste developing itself, he soon constructed an automaton flute-player, and the most astonishing machines. Milton would not have written his poem, had he not lost his place of secretary to Cromwell. Shakspeare made tragadies in consequence of being an actor; in place of being an actor, he would have remained a wool-dealer, like his father, had not some youthful follies compelled him to quit the place of his birth. Corneille falls in love, and writes verses to the object of his affection; it is to this circumstance that we owe this great dramatic poet. Newton sees an apple fall; what more was wanting to enable him to divine the laws of gravitation.

I admit these facts. All that can be concluded from them is, that our propensities and our talents do not always put themselves in activity; that it is often necessary, that the impulse be given them by an external impression, or that the material object, on which they are to exercise themselves, be offered them. The cock will not fight, unless he finds a rival to thwart him in his love; the beaver does not build, if he has no branches of trees; no animal can generate without a female; without obstacle, there can be no firmness; without an enemy, no generous pardon. In all ages, great events have given rise to great men; not that the circumstances produce their intellectual faculties, but because they furnish an ample field for the free exercise of their faculties. Many men, without doubt, acquire, only by this means, a knowledge of their own genius; but if, sometimes, certain qualities remain at first inactive, for want of circumstances, the force and solidity which these faculties afterward display, fully satisfy us that their existence had preceded their action. Is it not evident, that, in the very examples opposed to me, the objects offered by chance, would not, without the peculiar disposition in question, have been seized as they were, nor with the same energy? How many are the children on whom works of art make little impression, or whom the view ofthese works does not render artists?

Vaucanson directs a fixed attention to the arrangement of the clock; he examines it with much care; the first trials he makes to imitate it, with bad tools, prove successful; now, this attention and this rapid success, prove that there existed a relation between his faculties and the mechanic arts. Thucydides shed tears of envy at the reading which Herodotus gave of his history, to the Greeks. It certainly was not this perusal, which created in him a concise, close, lively style, strong and rich in thoughts. Neither was it the reading of the poem of the Death of Henry IV. which inspired Fontaine with his peculiar talent for poetry. How many secretaries lose their places without becoming Miltons! How many are in love, and write verses like Corneille and Racine; yet these poets have found no equals among their successors.

If the most frivolous accessary circumstances produce striking differences in propensities and talents, why does not education, which can produce circumstances at will, seize this new means of forming great men? And why have we, and shall we always have, reason to complain that, notwithstanding so many establishments for education, great men are so rare a phenomenon?

I certainly do not deny, that good models are of great utility, and that the study of these models ought to constitute an essential part of education; but, if it be necessary, or sufficient, to have excellent subjects of imitation, whence have Homer, Petrarch, Dante, drawn their divine art? Why do not the talents of Tacitus, Cicero, and Livy, find their inheritors, though so many scholars know these authors by heart? The Raphaels, Mozarts, Haydns, why do they produce so few disciples? And why do we always need to await a lapse of several ages, before we can see any great men shine in the annals of history?

Again; an objection is drawn from the uniformity which is found among men, on a hasty survey of all the individuals of a nation; and from this, it is concluded,

that the faculties of mankind are only a result of social institutions.

But this uniformity proves precisely the reverse; for, we find it in essential things, not only in a single nation, but in all people, in all ages, however different may be the external influences of climate, of nourishment, laws, customs, religion, and education. It even preserves itself in all the individuals of the same species of animals, under whatever climate, and whatever external influence. This uniformity is, consequently, the strongest proof that nothing can derange the plan, which nature has prescribed by means of organization. For the rest, these panegyrists of the creative power of education, are in direct contradiction with themselves. At one time, the uniformity observed among men, serves to prove that education does every thing; at another, in order to explain the difference in characters, they allege the impossibility of the greater part of individuals receiving a uniform education.

In fine, let us consult persons who devote their whole life to the education of men; such as Campè, Niemeyer, Pestalozzi, Salzmann, Gediké, May, Eschké, Pfingsten, the abbè Sicard, &c. Every day furnishes them occasion to remark, that in each individual, dispositions differ from birth; and that education can have no effect, except in proportion to the innate qualities: if it were otherwise, how could these benevolent men be pardoned, and how pardon themselves, for not rooting out, in their pupils, all the faults, vices, all their fatal passions, and their base inclinations? How should satirical authors, moralists, and preachers have had so little success against absurdities and crimes? Why have not the great and the rich, purchased the art of giving a great capacity to their children? Believe, then, that such an act is not entirely in the power of men. It is nature herself, that, by means of the immutable laws of organization, has reserved to herself not the only, but the first right, over every exercise of the faculties of man and animals.

Continuation of the exposition and of the refutation of different Opinions, on the origin of our Moral Qualities and Intellectual Faculties.

Influence of Climate and Food on the Moral and Intellectual Forces of Man.

Some naturalists would derive certain qualities from the influence of climate, from food, drink, and even from the milk furnished to the infant.

This is to confess, that our qualities and faculties are inherent in our organization; for, the milk of the nurse, food, drink, climate act only on man's physical system. It is incontestable, that all these circumstances act with marked influence on our physical and moral nature; but again, do we not confound the power of *modifying* with the power of *producing*? The varieties of food and drink excite or weaken the action of the organs, but can neither produce them, nor cause their disappearance. The nurse's milk, like any other aliment, may be the cause of a physical constitution more or less healthy, and thus influence the character and the mind; but it can neither give nor take away determinate inclinations or qualities. If parents have a right to impute to nurses the malpractices of their children, why do not we, who feed on beef, pork, mutton, &c., render these animals responsible for our good and bad qualities?

It is equally notorious, that climate does not influence the whole constitution and the form of certain parts of the body only; but likewise the different development of different parts of the brain, and, consequently, the different configuration of the head, and, lastly, the modifications of the moral and intellectual character of different nations. But, however different, and however powerful local circumstances may be, they never have changed, and never will change the essence of an animal or of any variety of the human species.

Influence of Wants on the Instincts, Propensities, and Faculties of Animals, and of Man.

Some, again, would have the necessities of man and of animals regarded as the principal source of their instincts, propensities and faculties.

These necessities may be regarded under two aspects. If they come from without, such as cold, heat, &c., all that we have said respecting external things, which rouse our internal faculties, is applicable to these. The accidents which incommode animal or man, lead them, it is true, to exercise their faculties, in order to rid themselves of the evil; but, it does not follow that these necessities give rise to the internal faculties: if it were so, the same external causes would produce, in all animals and in all men, the same qualities; whereas, each animal and each man reacts in virtue of his organization on things without, and in the manner peculiar to himself. The idiot tries no means to secure himself from the action of the air; the sane man covers himself with clothing. The partridge dies with hunger and cold in rigorous winters, and the swallow falls benumbed from the summit of buildings, while the nightingale and the quail depart for more temperate climates, without waiting for cold and hunger. The cuckoo has no less need to lay eggs, than the linnet; yet he builds no nest. Are the hare and the squirrel both hunted? The one runs to hide himself in his burrow, the other saves himself on the top of trees. Thus all that can be attributed to external circumstances is, that they put the various internal faculties in operation.

If we call necessities, the internal movements, or sensations which lead both animal and man to seek something out of themselves for their satisfaction; if, for example, we give the name of necessities to voluptuous desires, ambition, &c., it is evident, that these movements of the soul are only the result of the action of the inte-

rior organization; since man and animal can have no such desires, so long as the organs adapted to them, are not in a state to act. This previous development and susceptibility of action are indispensable conditions, in order that the interior propensities may make themselves felt, and that the animal and the man may be excited to seek the objects, which find themselves in relation with their active organs. In the new-born infant, the need of the breast acts powerfully; not because the breast itself produces the want, but because, for the preservation of the child, a reciprocal relation has been established between him and the breast. By a contrary reason, the sexual organs of this child and their corresponding organ in the brain not being developed, there is not in him the slightest trace of the want relative to the other sex. But in proportion as these organs increase and become active, a new faculty, a new propensity is awakened in the interior man; and it is the sense of this propensity which we call want. Does the object which is in relation with this propensity offer itself to the eyes of the young man or the young girl? their blood is roused; while, on the contrary, the same objects being no longer in relation with the now worn-out organization of the old man, fail to excite him. Do the limbs develop themselves in the young animal or in the man? the necessity of walking, jumping, running, and of exercising themselves in all sorts of tricks and sports, is likewise felt. It is not because the bird has need of a nest, the beaver of a house, that they acquire the talent of building; but they have this talent because they are destined to build; nature has, in a manner, impregnated their organization with this talent; and when this organization becomes active, they are internally prompted to build. Hence it is, that the weaver-bird forms her tissue even when encaged; and hence the beaver builds, however well lodged he may be already. Nothing shows better that in this they follow the impulse of an internal faculty, without being determined by any external necessity. There are, likewise, men for whom travelling,

music, &c., are almost matters of necessity, because in these individuals, the organs which correspond to these propensities possess a predominant activity. It is, again, by the same principle, that we must explain, why men who have several organs eminently developed, experience a greater number of wants than those whose organs are less energetic. The idiot has few desires, consequently few wants, and he has few desires, because few of his organs arrive at complete development, or any considerable degree of activity. As we advance in age, our internal wants diminish, because the activity of the organs is impaired.

If, then, the internal wants are the result of the action of the cerebral organs, and if external things cannot become the object of our wants, except by means of these same organs, the assertion of M. de Lamark* falls of itself. This author thinks, that the internal organs, as well as the external, are produced by necessity and by exercise. But a necessity can no more exist without a faculty, than the exercise of the faculty can exist without an organ. For the rest, as I do not believe that this strange opinion will find many partisans, I am going to present the leading idea of it, and to reply to it in a few words: Naturalists, says M. de Lamark,† having remarked that the forms of the parts of animals, compared with the uses of these parts, are always in perfect relation, have thought that the forms and the state of the parts may have led to their use. Now this is an error; for, it is easy to show by observation, that it is, on the contrary, the necessities and the uses of the parts which have developed these parts, which have given birth to them where they did not exist, and which, consequently, have given place to the state where we observe them in each animal.

Thus, M. de Lamark supposes, that the sense of necessity exists before the internal organs, and that the

* Philosophie Zoolog. Paris, 1809, T. i. ch. 7.
† L. c. T. i. p. 235.

exercise of the external organs precedes the existence of these organs: "The mole," says he, "preserves her little eyes, only because she exercises them but little; serpents having adopted the habit of crawling on the ground, and of hiding themselves under the grass, their body, by a succession of still repeated efforts to elongate themselves in order to pass into narrow passages, acquire a considerable length, out of all proportion to their size."* Men, moved by the necessity of bearing rule, and of directing their vision both far and wide, have found themselves obliged to stand upright; and this custom having been adopted, from generation to generation, their feet have acquired a conformation fitted to maintain them in a perpendicular position.†

But what will M. de Lamark answer to the following questions? Why does not the mole make use of its eyes, and why has the serpent the foolish notion of crawling on the ground, and passing through narrow holes, as the wire passes under the drawing iron? Whence comes in man the propensity to look far and wide? And, in the beginning, when there existed neither interior nor exterior organ, what prevented the mole and the serpent from adopting different habits of life, and thus acquiring the eyes of the eagle, and the legs of the giraffe? How can we believe that supreme wisdom has not placed each animal in harmony with his external world, and consequently the internal faculties in accordance with the external organs? Without this harmony, animals would be found in a violent state of perpetual contradiction, or would have perished after a few moments of existence. The tiger would have been destined to feed on flesh; but have received neither the inclination nor the faculty to destroy other animals. The bird would have been intended to migrate from one climate to another; but nothing in his

* L. c. p. 245. † L. c. p. 250.

internal organization would have warned him of it, and, perhaps, wings would have been wanting with which to fly. The bull would have been destined to pasture; but he would neither possess scent to choose salutary plants, nor the teeth proper for their due mastication.

And, into what difficulties should we not fall in fixing the limits, where the production and augmentation of external organs should finally be arrested. Man, to whom his two hands are often insufficient, would he always content himself to have only two? Would not eyes make their appearance on his back? How much would the legs of the heron and the stork, and the neck of the swan be still more lengthened? On the contrary, from the time of Aristotle, these parts have been as long as they now are: how is this to be explained? Is it, as M. de Lamark says, because birds have always remained in the same circumstances? But, in stating this, he recognizes the principle, that nature originally prescribed to them to keep themselves in these circumstances. What cause could have prevented the marsh birds from gradually going deeper in the water, and from lengthening their feet and necks more and more by the continuance of their efforts? Why should cats, rats, and sheep, who use their tails so little, not have lost them wholly ere this? To what extent might not the power be increased possessed by animals, of augmenting the number of their limbs, or of being transformed from one species to another, by accidental causes, be increased? The opinion of M. de Lamark might at least be adopted by some sects of philosophers, one class of whom suppose, that the soul herself directs the formation of the body, which serves her for an investment; while another maintains, that the species either ameliorate or degenerate without cessation, in such a manner that man might descend to the rank of the monkey, or the monkey raise himself to that of man.

The reader will now be convinced, that there cannot exist any necessity or natural occasion, without there

existing an active organ, an impulse from within. Without certain vital forces in the interior, there could be neither hunger nor thirst, nor necessity for respiration, nor necessity of the union of the sexes. Thus the exterior necessities always suppose an interior force.

From this we may form an opinion of the vague and obscure language of some naturalists: "The sensibility, more or less cultivated by the necessities and by circumstances, produces the different degrees of intelligence, whether in the species or in individuals. What we regard in them as the natural sagacity of instinct, frequently is only a development of that love of self which is a necessary consequence of sensibility: it is not to instinct, it is to the faculty of perception and its effects, that the means belong, which animals employ to satisfy the wants of their natural appetite. It appears certain, that, if cold and other external agents did not cause the rabbit to suffer, more than the hare is affected by them, this animal, which now digs its burrow, would hardly be induced to take the trouble."

The same George Leroy, otherwise an excellent observer, wished to derive the cunning and in general the inventions and ingenious actions of animals, from a strong sense of want.

The rabbits which we keep in our stables, are certainly not incommoded by the cold; yet we cannot prevent them from digging their burrows. And why does not the hare, when pursued by the hounds, feel the urgent necessity of seeking an asylum under ground? How happens it that such different external circumstances produce absolutely the same instincts, the same inventions, the same ingenious actions in all individuals of the same species; while the same circumstances engender opposite instincts, and very different inventions and ingenious actions in other species? Why attribute to external circumstances the qualities of animals, when it is confessed, that the man of the greatest genius could add nothing to their sagacity, when it is aroused and exercised by difficulties?

Who does not see, that in all discussions on the natural wants, men have constantly confirmed the false notion that external objects create the instincts, propensities, faculties, with this other true notion, that external circumstances can arouse the faculties inherent in the animal, call them forth, and give them activity?

Can Attention give rise to any Instinct, Faculty, or Propensity whatsoever?

It has long been one of the favorite notions of many philosophers, that attention is the source of all the faculties of man; that one may acquire such or such a faculty, according as he directs his attention to such or such an object, according as he cultivates the faculty in question. Helvetius* has gone so far as to say, that there is no well-organized man, who cannot exercise his attention with all the force and the constancy, which would need to be employed in order to elevate him to the rank of the greatest men. Such is the eager zeal for deriving from a single principle all the phenomena of animal life! Condillac made sensation the source of all the faculties. According to him, recollection, memory, comparison, judgment, reflection, imagination, and reasoning, are included in the faculty of perceiving. M. Laromiguiére, seeing that sensations are almost the same in all men, while their moral and intellectual faculties are infinitely different, and that the sensations are only passive, believed himself, obliged to admit *attention* to be the generating principle of all the faculties. The attention of Laromiguiére is the reflection of Locke. Meanwhile no one disputes that sensation, reflection and attention are innate faculties. But, do these faculties give rise to a specific propensity or talent?

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* De la Espirit Dumas, Physiologie, T. iv. p. 12.

Let us see how attention is exercised in animals and in man; and the reader will judge whether the faculties, instincts, and propensities, are an effect of attention, or whether attention is the effect of an innate instinct, propensity, or talent.

Both men and animals are endowed with different instincts, propensities, and talents. With each instinct, propensity, and talent, nature has established determinate relations in the external world. There is, for example, a determinate relation between the silk-worm and the leaf of the mulberry-tree; between the ferret and the rabbit; between the duck and the water; between the hen and her chickens; between man and woman, &c. It is thus, that every living being has certain points of contact with determinate external objects. The more energetic the instinct, the propensity, or the talent, the more numerous are these points of contact; the more intimate are they, and the greater, consequently, the affinity of each quality to its determinate object.

When an animal or a man is excited by the relation which exists between him and his relative object, the man or the animal is found in a state of *attention*. The hungry fox scents the hare; the falcon, gliding through the air, perceives the lark; they are then *attentive;* the philosopher is struck with a happy idea; he is then *attentive*. Now, you will explain why each animal has the habit of fixing his attention on a different determinate object, and why each different man fixes his on different objects. The roe-buck and the pigeon regard with indifference, *without attention*, the serpent and the frog, objects of the attention of the hog and the stork. The child fixes his attention on playthings; the woman, on her children and on dress; men, according to their individual dispositions, on women, horses, battles, the phenomena of nature, &c. Hence, the difference which travellers make, in their descriptions of the same country and the same nation; hence, the diversity of the judgments which different men pass on the same objects; and, as La Bruyére says, if each reader expunged, or

changed according to his fancy, every thing in a book repugnant to his taste, or, which he judged unworthy his attention, there would not be a word of the author's left in it.

Every instinct, propensity, and talent, has, therefore, its attention. Attention is, therefore, an effect, an attribute of a pre-existing innate faculty, and any thing rather than the cause of this faculty.

If instincts, propensities, and talents are feeble, their relations to their objects are equally so, and neither man nor animal will have a long or a strong attention. It is for this reason that, in infancy, when certain organs are still undeveloped, and, in old age, when the organs have lost their energy, we regard with coldness the same objects, which, at the age of manhood, excite our liveliest interest.

There is no attention, not even the possibility of attention, where there is no interest, no propensity, no talent, in relation with external objects. Who will inspire the horse with attention for the monuments, which we erect to glory and to immortality? or, the ram, for our arts and sciences? To what purpose to attribute, with Vicq d' Azyr, the want of attention of monkeys, to their turbulence? Show one a female, or a good fruit, and you will find him attentive. To wish to make him attentive to your lectures on neatness or decency, is to forget that his organization is imperfect in comparison with that of man, and that there exists no point of contact between these qualities, and the innate qualities of the monkey. The same thing takes place in idiots.

No one, I suppose, will be tempted to derive from attention, the ingenious aptitudes, instincts, and propensities of animals. Who would maintain, that the beaver, the squirrel, the loriot, and the caterpillar, build, only in consequence of an attention, which they must have directed to these objects, when they were still unknown to them? Even among men, genius ordinarily commences its great works, as it were by instinct, without being aware of its own talent.

In other respects, I leave attention and exercise, as well as education, possessed of all their rights. It is not enough for one to be endowed with active faculties; exercise and application are indispensable to acquire facility and skill. To awaken the attention of men of coarse minds, we must either make a strong impression on their senses,* or we must limit ourselves to the ideas and objects with which they are familiar; that is to say, with which they have already points of contact.

These considerations willl suffice to reduce to its just value the merit of the abstraction so much cherished by philosophers,—*attention.*

Can Pleasure and Pain produce any Moral Quality, or Intellectual Faculty?

Some rest on the doctrine of Aristippus, who explains, in an arbitrary and very inexact manner, the principle of his master, Socrates, with regard to the happiness of man; to regard desire and aversion, pleasure and pain, as the sources, not only of our actions, but likewise of all our qualities and all our faculties.

Animals, children, and half-idiots, are as sensible to desire and aversion, to pleasure and pain, as adult and reasonable men; they ought, then, according to the opinion of Aristippus, to possess as many qualities, the one as the other. It is with desire and aversion as with attention. For what object does a man or an animal feel desire? Is it not for the object, which is most in harmony with his propensities and his talents? The setter has a desire for the chase; the beaver for building, &c. Such a man tastes the most lively pleasure in generously pardoning offences; another rejoices when he succeeds in satisfying his vengeance; this man places his happiness in the possession of riches; the pride of

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* Propensities.

this man is a philosophy, which elevates him above human vanities. Desire and aversion, pleasure and pain, have, therefore, their origin in the activity of the different innate propensities and faculties.

Are the Passions and the Desire of Glory, the Source of our Qualities and Faculties?

Helvetius maintains, that the sources of all the qualities of the soul and mind, are the desire of distinction, and the passions; and that, consequently, the moral and intellectual forces are not innate.

Helvetius and his partisans ought first to demonstrate, that ambition and the passions, are strangers to the nature of man. If they are innate, then they must become, like any other internal impulse, excitants of the other qualities. The innate desire of distinction, an ardent passion for a woman, will certainly animate the courage of the young warrior; but I should vainly wish to shine in the first rank of poets, or of musicians; all my efforts would be useless. Cicero never succeeded in making verses; and Voltaire remained only tolerable in mathematics.

The desire of glory, again modifies itself according to the predominant talents. The actor wishes to distinguish himself in the histrionic art; the warrior, in battle; the musician, in music; the architect, in monuments; the physician, in the art of healing. Whenever this desire amounts to ambition, to the love of glory, it is, at once, a proof that the actor, the warrior, the musician, &c., feel themselves penetrated with an energetic faculty, which sustains their activity in spite of all obstacles; and which never fails, not only to give, but likewise to consolidate a brilliant reputation.

The reasoning of Helvetius is a *petitio principii*. He would derive the faculties from the passions; whereas the passions are the strongest expression of our faculties. Each instinct, propensity, each excessively active

talent, is a passion. Hence, the passion of love, the passion for travelling, the passion for music, building, war, &c. Consequently, the passions suppose the existence of the qualities or the faculties of which they are the extraordinary manifestation.

When Helvetius, to prove his assertion, advances that he has never found an idiot girl, whom love did not render intelligent, we must conclude, that when he was in love, he found all the girls whom he met with intelligent.

Does Social Life give rise to Factitious Qualities or Faculties?

Numberless works contain *reveries* on the natural state of man, and on the number of good and bad qualities which, as some say, he has acquired, only in social life. In this hypothesis we easily start with the supposition, that man was made for solitude; that he has been led, contrary to his nature, to unite himself with other individuals, to form a family, a tribe, or nation. These new relations, for which he was not designed, have caused to spring up in him, all those vices and virtues, of which, in his natural state of insulation, he would forever have been ignorant.

Let us examine, for some moments, the instinct of *sociability* in man and in animals.

Some animals lead a solitary life, the male even separated from the female; in other species, the male and female remain united. In some species, the parents separate from their young, as soon as these are in a state to provide for their subsistence. In others, the parents and all the race of the year, form a little society till the return of spring, when the young ones seek to form for themselves an independent establishment; and, finally, several species form flocks and live in common. In some, a single male couples with several females; in others, each male joins for life with his particular mate.

All these modes of living have always been invariable, and are, by no means, the result of an arbitrary choice; an evident proof that insulated existence, like social existence, are natural institutions for the different species of animals.

Do not believe, what some naturalists imagine, that it is weakness and the need of mutual succor which brings together certain species in society. While so many powerless insects bring forth and live by themselves, why do the gnats, the ants, the bees, the hornets, live together by thousands? The fox is more feeble than the wolf; but we never see him, like the wolf, associated with several of his comrades: the wren, the mock-bird, the linnet, the nightingale, insulated in our groves, charm our ears by their melodious accents; while the bold sparrow and the babbling rook, assembled by hundreds, deafen us from morning till evening. What advantage do the linnets, the sheep, derive from their union, when a single hawk, a single dog can disperse them? Have the headlong boar and the powerful bull more need to lend each other succor, than the timid hare, and the feeble insulated quail?

If it be social life which produces certain faculties, how do you conceive that each of the different species of animals which live in society, enjoys faculties so different, so opposite? How should the mere plurality of individuals produce so many peculiarities, diversities of instincts, propensities and faculties?

Let us penetrate still farther into the mysteries of nature? Each species of animals is destined to fill a void, to accomplish an end in the order of things. As soon as a species was ordained to live in society, it became necessary that all the individuals should be furnished with the qualities necessary to attain this end of the great family. Each individual must be fitted for the whole society. The qualities of each bee, and chamois, and beaver, had to coincide. According as this general end is different, the faculties of the individuals of whom a certain number is destined to form a society, are equally

different. The establishment of sentinels among the bustards; the direction of the herd by the leading chamois; the common labors divided between several individuals among the bees and the ants; the mutual aid which swine and monkeys give each other; the direction of a flock of wild geese, always formed in a triangle in their flight; all these instincts have been given to these animals, at the same time as the social instinct.

It is absolutely the same with the human race. Man has been destined to live in common. No where, and at no period, has man lived alone. As far as we can go back into history, man has been united in families, tribes, and nations, and, consequently, his qualities must have been calculated for society. The phenomena which we witness in whole races, are no more the effect of this union, than those which take place in each man in particular. Always, and every where, the human race has manifested the same propensities and the same talents; always and every where, there have resulted the same virtues and the same vices, the same employments and the same institutions. There exists no crime against which we cannot find a law in the bible; calumny, theft, usury, incest, adultery, rape, murder, had already spread over the earth like a torrent. On the other hand, there exists no virtue, no moral precept, which has not been recommended, no faculty relative to human occupations, which has not been more or less exercised. Cain was a laborer; Abel, a shepherd; the children of Jubal played on all sorts of wind and stringed instruments; the children of Tubal Cain were skilful workmen in iron and copper; Nehemiah established regulations of police, &c.

The only changes we remark in the progress of human society, consist in this, that the same propensities, and the same faculties, are exercised on different objects, and produce modified results. The manners, customs, laws, different religious ceremonies of different nations, all rest upon the same basis. Every where, men profess to do and believe what they regard as just and true; every

where, they profess to honor a Supreme Being; every where, there are objects of vanity and glory, marks of honor and disgrace; every where there are masters and servants; all nations make war; men and women are united in all climates, however different their creeds and the ceremonies of their union; every where, there are mournings for deceased husbands and wives, children and friends; and every where is their memory honored, whether they embalm their bodies, place their ashes in urns, or place over them mounds or monuments. Sing your lines on the straw, or on the harp; dress your chiefs with feathers or with purple; your women, with flowers or with diamonds; inhabit huts or palaces; it will be still the same faculties, which lead men to act within the circle traced for him by his Creator.

But some think to prove that man is born without propensities and without faculties, and that he acquires these faculties merely by social life and by education; by citing the example of some individuals found astray in the woods, who, having received no education, have all the brutality of animals, and appear to be not only deprived of human faculties, but even of those of the least intelligent animals.

The objection falls, when we learn that these savages found in the forests, are ordinarily miserable creatures, of imperfect organization, as M. Roussel* and de Tracy† have already remarked. The following is the organization of these pretended savages: Their heads are found to be either too large and affected with hydrocephalus, or too small, compressed and deformed; almost always with a scrofulous constitution; the eyes small, sunken, slightly opened upwards, closen horizontally; the mouth very large, the lips pendant, the tongue thick, the neck swollen, the pace staggering and insecure. Their primitive organization is, therefore, defective;

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* M. Roussel, Syst. Phys. at moral de la fermme.
† Idéologie, p. 246.

they are real idiots, who can receive no instruction, and no education, and it is this fact which accounts for their being found in woods. As they are a charge to their families, and, as in certain countries, the people of the lower classes regard these unhappy beings as bewitched or as changelings, it often happens, that they expose them, or allow them to wander at their will without interference. It has even been remarked, in hospitals, that these deformed beings have a decided propensity for living in forests, and that they always try to escape. They told us at the hospital at Haina, near Marbourg, that some of the idiots whom they kept there, made their escape, and that, in pursuing them, they sometimes found others who had escaped before, and who had nothing more than fragments of clothing. We saw near Augsbourg, an insane woman, who had been found in a wood. At Brunswick we were shown a woman completely idiotic; she had been discovered in a wood, lying on her side, with her eyes open, but unable to articulate.

The savage of Aveyron, placed in the deaf and dumb institution at Paris, is not different from those of whom I have just spoken. He is weak-minded to a great degree; his forehead is very little enlarged laterally, and very much compressed from above downward; his eyes are small and greatly sunken, his cerebellum little developed. We were not able to convince ourselves that he had the sense of hearing; for, they could not in our presence render him attentive, either by calling him nor by sounding a glass behind his ears. His mode of existence is tranquil; his attitude and manner of sitting are decent; it is only remarked, that he is constantly balancing the upper part of his body and his head; he salutes by inclining his body, to the persons who arrive, and manifests his satisfaction when they depart. The sexual propensity does not seem to be active in him. He knows a few letters, and even points to the objects which the letters designate. In other respects, his favorite occupation is to restore to their former place any

articles which have been displaced. Such is the result of the hopes which were formed of him, the efforts which have been made, and the patience and mildness which a benevolent woman has shown towards him. We may pronounce, with confidence, that these labors will never be crowned with any better success.

The wild man found in the forests of Lithuania, who is cited by many authors as an example of the powerful influence of education, was certainly a similar being.

When M. de Tracy,* in speaking of man in general, remarks that the individual who has received education has less resemblance to him who has received none, than an egg to a chicken, or an acorn to an oak, he speaks truth only in relation to these unfortunate beings; but the experience of all times has proved, that they remain simple, whether they live in forests, or continue in the bosom of their family. The most immoderate panegyrist of the effects of education, Helvetius, is obliged to acknowledge, that a favorable organization is the primary requisite of education.

It is difficult to believe, that, in our populous regions a well-organized man can wander for a long time as a savage. Should such an individual be found, who has gone astray from childhood, it is impossible that in his state of insulation he should have acquired any knowledge dependent on instruction. But even in this situation, he certainly must have exercised the faculties which belong to him as a man. As soon as such an individual finds himself in the midst of society, he will be seen to develop human dispositions, not only by a prompt imitation of social usages, but by his capacity for instruction. It will not be possible to imagine, as was done in the case of the individuals referred to, that he has adopted the mode of living and the character of wild beasts. Example and instruction will soon change his mode of life; or, if there is no change, the

* Idéologie, p. 244.

subject is an idiot; and education and circumstances can only act upon a man so far as he possesses the necessary dispositions, and is prepared for them by his organization.

Locke, to demonstrate that the qualities of the mind and soul have an accidental origin in social life, adduces the case of children, who, according to him, still want certain propensities and talents, and are destitute of passions.

If Locke had been for a single day a mother or a nurse of children, he would have seen, in a very little time after their birth, the most evident marks of their passions, or rather of their affections. "It is useful," says Cabanis, "to remark all those passions which succeed each other in so rapid a manner, and are depicted with so much simplicity on the changing face of children. While the feeble muscles of their arms and legs can hardly execute some uncertain movements, the muscles of the face already express, by distinct motions, although composed of very complicated elements, almost the whole succession of general affections proper to human nature; and the attentive observer easily recognizes in this picture the characteristic traits of the future man. Where shall we seek the causes of these expressions, which are composed of so many diverse elements? Where find the principle of these passions, which could not have formed themselves at once? Certainly not in the impressions of external objects, still so new, so confused, so discordant."

Children possess, to a wonderful degree, the art of manifesting externally what passes within them; their movements and their cries are very different, when they are irritated by unjust treatment, and when the same accident happens without any intention of offending them; they cry very differently to express pain, and to manifest weariness, anger, the desire to be changed, or to have the breast, &c.

And, if it be maintained, that at the age of some years, children have no passions, affections, or decided propen-

sities, this is confounding the objects, on which the propensities act at different ages, with these propensities themselves. Children are not ambitious for places of honor; they have no idea of robbing their fellow-pupils of their property by fraud; they are not goaded by the desire of achieving conquests; but they cheat each other for birds' nests; fight for playthings; are proud of occupying the first places at school; and the vexation at losing a kite which has got free, afflicts a boy more severely, than the loss of a fine horse would do at a later age. Who does not observe daily, in children, envy, jealousy, the most furious anger, compassion, the love of gaming, avidity, ambition, and even pride, cruelty, extreme sensibility, &c.? We shall say, then, with much more truth, that children are, in almost every thing, the diminutive of adults. Let us concede to Locke that children do not yet manifest all the qualities and all the faculties proper to the adult, what consequence can be drawn thence against their innateness? Must we not regard as innate, the instincts of animals, the greater part of whom do not act immediately after their birth, nor even at all seasons of the year? They do not always build their nest or their covert; they are not always laying up provisions; they do not emigrate, or sing, or couple at all times. Locke was compelled to acknowledge, that he could not resist the proofs and the objections drawn from the animal kingdom; but he pretends to answer them by saying, "that he did not write a philosophy of animals," and thus has fallen into an error amply refuted, that man and animals have nothing in common between them, and are governed in all respects by opposite laws. But, not to go beyond men, will Locke and his partisans deny, that the propensity of love, for example, is allied to the organization? Yet we find no trace of it during their earliest years. If Locke had had more just ideas of the primitive faculties, he would have attributed to each of them a proper organ; he would have known that the various nervous systems, and particularly the different organs of the

brain exercise their functions independently of each other; that their development and their activity are not complete in the same time; but that they develop themselves successively, some sooner, some later; that each organ, even when perfectly developed, may be sometimes active, sometimes inactive. Had Locke known all this, he would not have deluded himself with false observations; and the principles which he has established, to explain the origin of the qualities and faculties of man, would not have been in contradiction with the nature of man and with that of animals.

For the rest, many of these proofs have already struck and convinced some, both of the ancient and modern philosophers; and they have, with me, acknowledged that there are no primitive qualities either acquired or factitious; but that, in man as well as in animals, all the dispositions are innate, and that their manifestation is rendered possible only by the organization.

Plato* acknowledged that the talent of organization is innate. According to him, it is not enough, in order to be a philosopher, to join to the desire of knowledge a vast conception, good memory and penetration; it needs, also, a peculiar disposition, which cannot be acquired any more than these auxiliary faculties. He says, also, that the aptitude for mathematics is innate. He regards the desires and the sentiments of pride, courage, and sensual appetite not only as innate, but as founded on organization.†

Hippocrates, in speaking of the conditions necessary to make a good physician, says, that above all he needs the natural dispositions.

Quintillian ridicules the ancient maxim, "that any body, by means of constant application may become an orator." "If precepts," says he, "could bestow the art of eloquence, every one would be eloquent."

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* De Repub. vi. † Let. Num. ii.

Locke himself admits innate faculties. Condillac,* though not consistent throughout his works, thus expresses himself on innate faculties: "Men are ignorant of what they can do, so long as experience has not led them to take notice of what they actually do from nature only. Hence, they have never done by design, any thing but what they had already done, even without intending it. I think that this observation will always hold good; and I also think, that if it had not escaped notice, men would have reasoned better than they have done. Men never thought of making analyses, till they found they had made them; they never thought of speaking the language of action to make themselves understood, till they found that they were understood. In like manner they would never have thought of speaking with articulate sounds, unless they had observed that they had spoken with such sounds; and languages have commenced without any design of making them. It is thus that men have been poets and orators without dreaming of being such. In a word, all that they have become, they have first been by nature alone; and they have not studied to be such, till they had noticed what nature herself had led them to do. She has commenced every thing, and always well: this is a remark which we cannot repeat too often.

"If laws,"† says he, elsewhere, "are not conventional, they are then arbitrary! There may have been arbitrary ones; there are even too many, but those which determine whether our actions are good or evil, are not such and cannot be such. They are, indeed, our work, because they are conventions which we have made. But we have not made them alone; nature made them with us, she dictated them to us, and it was not in our power to make others. The wants and faculties of man being given, the laws themselves are given; and though we make them, the Deity who has created us with such

* Œuvres complètes, tom. iii. 8vo. p. 115. † L. c. p. 115.

wants and such faculties is, in truth, our sole legislator. In following these laws thus conformed to our nature, it is him whom we obey, and this is what constitutes the morality of actions."

St. Paul* spoke in the same sense, in addressing the Romans. "If," says he, "the Gentiles, who have not the law, do by nature the things contained in the law, they show the work of the law written in their hearts."

Hume regards covetousness, the sense of justice and injustice, the moral sense, &c. as innate.

George Leroy speaks of compassion and religion, as innate sentiments.

Herder† regards the sociability of man as innate, and thinks with me, that the law, "do not to another what you would not have another do to you," is founded on the sympathy natural to man. He even regards, as innate, the disposition of man to religion, and his propensity to honor superhuman beings and those of a superior order.

I shall, elsewhere, completely prove these same truths. I shall, likewise, while treating of the different organs and the various primitive faculties, demonstrate that the talents for music, painting, architecture, the mechanics, imitation, geometry, mathematics, &c., which seem to be only talents acquired and produced by social life, are innate in man, and are indicated to him by his organization, as the laws of the hexagonal cell are to the bee; to the nightingale, his melody; and to the beaver, his building. I shall, also, make evident, that if the qualities of man were not determinate, society would only be confusion. I shall show that the determination of justice and of injustice supposes the internal sense; that if the positive laws of thought were not innate, there could exist neither logic nor philosophy; in fine, that all the propensities and all the primitive faculties depend on a determinate and peculiar organization.

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* II. v. 14, 15. † L. c. Th. I. s. 252.

SECTION III.

ON THE CONDITIONS REQUIRED FOR THE MANIFESTATION OF MORAL QUALITIES AND INTELLECTUAL FACULTIES.

In the section preceding, I have stated our opinion on the origin of the instincts, the propensities, the talents; in fine, on the origin of our moral qualities and intellectual faculties. There now presents a second question, which is likewise of the highest importance to the physiology of the brain, to wit: whether these qualities and these faculties can, in this life, manifest themselves independently of material conditions; or, whether they require for their exercise certain organs, with which they are in immediate relation.

If our moral and intellectual forces can manifest themselves independently of corporeal conditions, we might in vain seek in the organization, the apparatuses of the moral qualities and the intellectual faculties. It would always be impossible to found a doctrine on the functions of the brain and its parts, or a physiology of the brain. Man, considered as a moral and intellectual being, would be placed beyond the sphere of the observer. If, on the contrary, I can show that there exists an essential relation between his moral and intellectual forces and his organization, it will follow, that the researches to discover these material conditions, are the most important study for the true physiologist. If, again, I can show, as I shall do in the second volume, that these material conditions are the brain and its parts, we shall then have a glimpse of the possibility of creating a doctrine of the functions of the brain, a doctrine which exhibits the organs, by means of which all our propensities, sentiments and faculties are manifested.

The Manifestation of Moral Qualities and Intellectual Faculties depends on material conditions.

When I say that the exercise of our moral and intellectual faculties depends on material conditions, I do not mean that our faculties are the *product* of organization; this would be to confound conditions with efficient causes. I limit myself to what can be submitted to our observation. Thus, I consider our moral and intellectual faculties so far only as they become phenomena to us by means of the cerebral organs. The physiologist must never trust himself beyond the material world, and must neither affirm nor deny any thing but what can be proved by experience. He must not direct his researches to a spiritual substance alone, nor to this inanimate body alone; the living man, the result of a vegetative life and an animal life is his object. Consequently, he must not enter into these metaphysical questions: What is the nature and the essence of the faculties themselves? Are they the attributes of a spiritual substance, or the properties of organized matter? In a word, he must not seek to explain the union of the soul and the body, nor their reciprocal influence; nor how the influence takes place, whether by the immediate action of the Deity, by an ethereal fluid, or by a divine emanation. Whether souls are united to bodies sooner or later; whether they are endowed with different qualities in each individual, or are entirely similar in all; whatever may be the decision of theologians and metaphysicians on this subject, my principle, that the manifestation of the moral qualities and intellectual faculties can take place only by means of organization, rests immoveable.

The reader knows already, although I shall not prove it fully till the second volume, that the brain is the exclusive organ of our moral qualities and intellectual faculties. He will then be prepared to find that most of my arguments to establish my proposition, are relative to this grand and noble nervous system,

1. *The moral qualities and intellectual faculties manifest themselves, increase, and diminish, according as their organs are developed, increase in strength, and are impaired.*

What takes place in the functions of an inferior order and their organs, likewise takes place in the functions and the organs of a higher order. Now, I have shown in sections first, second, and fourth, of the first volume of my large work, that the different nervous systems develop and perfect themselves at different periods. It is thus, for example, that the nervous systems of the viscera of the abdomen and the chest are almost wholly formed, while the brain seems, as yet, only a pulpy mass. The olfactory nerve, and the nerve of taste, perfect themselves sooner than the auditory and the optic: we also see that the functions of taste and smell acquire their perfection sooner than those of hearing and sight. This phenomena especially takes place in those animals, which, when born, are deaf and blind. The same progress is remarked in the development of the brain. In newborn infants, we hardly discover any trace of fibres in the apparatuses which serve to strengthen and perfect this organ. These fibres show themselves distinctly in the posterior and middle lobes sooner than in the anterior. The fibrous structure of the cerebellum becomes visible only by degrees, and it is not till after several months, that the anterior and superior parts of the brain develop themselves with a decided energy. The brain is formed and increases gradually until it has attained its perfection, and this perfection takes place only between twenty and forty years of age. At this last period there seems to be no sensible change for some years; but in proportion as we advance in age, the system gradually lessens, the brain emaciates and diminishes in size, and its convolutions become less compact.

This successive and gradual order of development, stationary state, and failure, is the cause, and serves to explain, why, in the new-born infant, the only functions are those of the senses of voluntary motion, the expression of the want of nourishment, and of obscure sensations of pleasure and pain, desire and aversion; why all this takes place only to an imperfect degree; why the infant begins, by degrees, to attend to external objects, to act on them, to manifest determinate desires and propensities; how the impressions are preserved, and how these impressions become ideas and notions; how the qualities and the faculties, begin to act and to manifest themselves under the image of different talents as well as different propensities; for example, love, friendship, vanity, ambition, pride; how the infant becomes successively a child, a young man and an adult; how, at this period, all the moral and intellectual forces of the man have acquired their greatest energy, up to the moment when they begin to fail, and to lose insensibly more or less of their permanency and activity; in fine, how in old men there remain only blunted sensations, and weakness of mind. We see, clearly, by this succession of development, that the faculties of the mind and soul, and their manifestation follow, step by step, the state of their material conditions. The progression of the functions is the same as that of the organs. Nothing can show more evidently, that the manifestation of these faculties depends on the organization.

2. *When the development of the organs of the moral qualities and intellectual faculties does not follow its usual order, the manifestation of the functions of these organs likewise departs from its usual regular progress.*

We frequently observe in the rickets, that the intellectual faculties of children are more lively, than their age would warrant. The reason is, that one of the or-

dinary effects of this malady, is to give the brain an extraordinary degree of development and of irritability. Sometimes, indeed, a particular part of the brain is developed prematurely, without there being any disease to occasion it; and, in this case, the function proper to this part fails not to manifest itself at the same time. We have, for example, observed several children, in whom the part of the brain appropriated to physical love, had acquired an extraordinary development at the age of three or four years. These children were mastered by this unhappy propensity, although their sexual parts, even when they experienced some excitement, had rarely acquired an analogous development. Other children, in whom the same organization was remarked, manifested the phenomena of complete virility, while the other faculties were still undeveloped. I shall, elsewhere, cite several similar facts relative to the organs of each faculty. Does it happen that the different parts of the brain, or the totality of the organ, acquire their maturity and their solidity only at a very late period? The state of infancy and of half imbecility then prolongs itself to the age of from six to twelve years. But, at this period, nature seems to labor with new energy, for the development of the parts; and children from whom, until this moment, no capacity had been expected, become, in a short time, remarkable for their talents. This was the case with Gesner, one of the best and most amiable poets of Switzerland. Born of a family in which rickets were hereditary, his instructors, when he had attained the age of ten years, declared him entirely incapable of making any progress. One of the most distinguished physicians of Berlin could not, till his thirteenth year, combine his ideas nor make use of the organ of language.

The simultaneousness of the manifestation of particular functions, and of the irregular, precocious or late development of their organs, is, therefore, a constant phenomenon which cannot be called in question. Now it necessarily results from this phenomenon, that the ex-

ercise of the qualities of the mind and soul depend on material organs.

3. *If the development and the perfection of the cerebral organs has not been complete, the manifestations of the respective qualities and faculties remain equally incomplete.*

Although the energy of the functions of organs does not depend solely on their development, but also on their excitability, we may yet determine with confidence the degree of development of the brain necessary to its functions. The observations of all ages have established, that the brain is incapable of fulfilling its destiny, when its bony case or the cranium has only from thirteen to seventeen inches in circumference, the measure being taken on the most prominent part of the occiput, passing over the temples and the most elevated part of the forehead.

Willis has described the brain of a young man, simple from birth: its volume hardly equals the fifth part of that of an ordinary human brain. I have had a copy drawn after Willis in my large work. (Pl. XVIII. fig. 2.) M. Bonn, professor at Amsterdam, possesses two little skulls of idiots, and the brain of a simpleton who lived to the age of twenty-five years. (Pl. XX. fig. 1.) He was so stupid, that, though born at Amsterdam, they made him pass for an African savage, and exhibited him for money. M. Pinel has a similar cranium of a young girl of eleven years, perfectly idiotic. Among the anatomical preparations of the school of medicine at Paris, is also found the undeveloped cranium of an idiot child. I have had two similar skulls drawn, taken from my collection; both are remarkable for their smallness;* one is the skull of a child of seven years;

* Pl. XVIII. fig. 2.

the other* of a girl of twenty. These two individuals were perfectly imbecile. I have observed heads equally small, in several congenital idiots, still living. All these skulls and heads are from thirteen to fourteen inches in circumference, and eleven to twelve from the root of the nose to the great occipital foramen. If dwarfs, who enjoy their intellectual faculties to a certain degree, appear to form an occasional exception to this law, the size of the head has not been duly noticed, which, in these cases, is always very disproportionate to the rest of the body. Even when the head is a little larger than those which characterize complete imbecility, the intellectual faculties are still almost entirely benumbed.

In the different degrees, which characterize imbecility, the faculties manifest themselves in the same proportion as the brain becomes more perfect in its organization. Individuals, who are in this degree of development, exhibit some peculiar dispositions and propensities; their gestures become more significant; they go so far as to produce short phrases sufficiently well followed out. The functions thus elevate themselves together with the organization, until the feebleness of the mind betrays itself in a small number of points, or even in a single point.

We see, by this, that all individuals who are reputed simple, are not completely so. Parents and physicians sometimes have trouble in comprehending how a child, who acquits himself well in all there is to do in the house, and who exhibits exact sensations, sensibility, and even cunning, can be ranged in the class of simpletons. Such is, notwithstanding, the state of many children, who hear, but do not learn to speak. I have directed my attention to this point, while occupying myself with the functions of the sense of hearing;† and when I treat of the articulate language peculiar to man, I shall show that this accident has for its cause an organic

* Pl. XIX. fig. 1 and 2. † Anat. et Phys. du Cer. T. 1. s. 6.

malady of the brain, and a consequent want of power to exercise all its functions.

At Hamburg, we saw a young man of sixteen, in whom the anterior-inferior parts of the head were well developed; but his forehead was hardly an inch in height, because the anterior-superior parts had been checked in their development; and he enjoyed, in consequence, only the exercise of the functions belonging to the anterior-inferior portion. He learned names, dates, numbers, history, and repeated it all mechanically. But combination, the comparison of ideas and judgment, were entirely wanting. They regarded him with reason as simple, and could employ him in nothing. I shall have occasion in the course of this work, to cite several examples which confirm the proposition, that the defective development of the brain, or of particular organs, has always for its result the feebleness of their action.

4. *When the organs of the mind and soul have acquired a high degree of development and perfection, there results to these organs, a power of manifesting their functions with great energy.*

I shall prove the truth of this result, when I treat of the influence of the development of organs on the excise of the corresponding faculties. I shall show, at the same time, that when individuals distinguish themselves peculiarly, and in a remarkable manner, by a determinate quality, or when they fall into a fixed idea, propensity, partial mania, or monomania, by too great exaltation, it is almost always the extraordinary development of some particular organ which occasions it. Without now entering into these details, I shall content myself with fixing the attention of my readers on the manifest difference which every one may remark between three sorts of heads, to wit: the heads of idiots, the heads of men whose talents are only moderate, and those of illustrious men, of vast and eminent genius. The first are

characterized by their smallness, as we have just seen, and the last by their great size. The heads of idiots, unless the brain be otherwise diseased, are characterized either by deformity, or their smallness; the heads of men of eminent qualities, by their magnitude.

This difference is conspicuously evident in the productions of the fine arts. We see that in their works which conforms to the indications of nature, artists make large heads to denote energetic intellectual qualities, and especially large foreheads; and they give small and depressed foreheads, and a head very strong in the posterior parts, to individuals who distinguish themselves only by qualities of an inferior order. The ancients gave to the statues of their priests and their philosophers much larger foreheads than to those of their gladiators. Remark, especially, the distinction they have adopted in their Jupiter of the capitol; the form of no head has ever been so strongly prominent in the anterior and superior part of the forehead. What a difference between this and the head of Bacchus!

In all the peculiar cases, in which men of talent and genius have not been of large stature, their heads are observed to be disproportionate to the body, and we no longer find the proportions usually adopted for beauty, and which are fixed by the form of Apollo. So long as artists wish only to represent fine forms, they may, without doubt, continue to take Apollo for a model; but if they wish to express a great character, or great talents, they must sacrifice the point of general proportions.

It is in this way that we must explain the errors which several artists have committed. Even in the golden age of Grecian art they represented Pericles covered with a helmet, to conceal the size of his head. The Athenian poets laughed at this head, because they found it disproportionate to the body of Pericles. I have seen the same fault committed by our modern artists: they left the head of Napoleon of its natural size; but, in order to establish a proportion conformable to their ideas, they placed it on a colossal body. In general, artists are

still, almost every where, imbued with the prejudices of antiquity, or with prejudices which some of them have introduced, in relation to what they call beauty. Let them be directed to cut in marble the bust of a great man of the age, and let them meet with unusual prominences,—for example, the organ of poetry unusually prominent in the head of Voltaire, they will not fail to plane away, to soften down these inequalities, and even to claim great merit for having thus corrected the faults of nature. These great artists do not know, that one day the organization will explain to posterity the glory or the shame of these great men; and that it will be by the fidelity of the forms which they will transmit to our grand-children, that men will rectify the partiality and the falsehoods of historians.

Let me be pardoned a little digression on the head of the Venus de Medicis. Artists agree that this small head has been substituted for the true one, which is lost; and yet they all imitate it in defiance of the laws of organization. With so small a head, every woman would of necessity be a simpleton; and the artists, certainly, will not maintain, that imbecility and beauty can be in harmony.

Those who would satisfy themselves, that the favorable development of the organs is always in relation with the more energetic exercise of their functions, have only to examine the heads of men who have distinguished themselves by eminent talents. Let them observe the heads of Socrates, Bacon, Sully, Golbert, Galileo, Boerhave, Haller, Leibnitz, Voltaire, Pascal, Montaigne, &c.

I observe, however, that a man who really merits the title of *great*, but only in a single relation, will not always have a vast, extended, voluminous head, because he is not endowed with great and extended faculties. The greatest mechanician or architect, the greatest musician, the first painter, &c., may excel in his art, without the whole brain participating in the great development of one or some few of its parts.

5. *It is only by the difference in the organization of the two sexes, that we are enabled to explain, how certain faculties are more energetic in the man, and others in the woman.*

From the different gradations of fibres in the brain of the man and of the woman, Malebranche* attempted to account for the difference in their manner of thinking and feeling. The two sexes, both in man and animals have the same brain, and consequently the same organs. But commonly some of these organs are more perfect in one sex, and some in the other. The parts of the brain situated towards the anterior-superior part of the forehead, are smaller in most women; thus their foreheads are in general smaller and shorter. They have, on the contrary, the parts situated in the superior region of the occipital bone, much more strongly developed. Their cerebellum is commonly smaller than that of men. We may, consequently, assume as a principle, that, in the heads of women who conform to the ordinary structure, the diameter from the forehead to the occipital bone is greater, and all the other diameters smaller. Such are the physical differences. Now these differences explain perfectly, the superiority of the intellectual faculties in man, and the greater energy of the love of children in women, &c. The two sexes offer, without doubt, a great number of exceptions which are the cause that, frequently, the talents proper to women are met in man, and *vice versa*. But all that I should say here on this point, could not be well understood, until I shall treat more particularly of each organ of the functions which have relation to it. Then only will men be convinced, that if certain organs are smaller in one sex, their functions are also

* Recherches de la vérité 5th edition. Paris, 1700, t. 1. p. 155.

more feeble; and that if other organs are larger, their functions are executed with more energy. It will then be seen, that it is not education, but nature, which, by means of a varied organization, has assigned to each sex its particular sphere of moral and intellectual activity.

6. *When the conformation of the brain of several individuals is similar, the propensities and the talents are similar, however different the form of the rest of the body; and when the conformation of the brain is different, the propensities and talents differ, whatever resemblance may exist in the rest of the body.*

Men of all nations possess all the same essential parts of the brain. Hence, there always has been, and always will be observed, in all nations, the same propensities, talents, moral qualities and intellectual faculties. The differences are only modifications, as the differences in the cerebral organization are likewise mere modifications. If certain parts of the brain are generally very much or very little developed in a nation, they will determine the national character, or the talents of which a nation is more particularly possessed or deprived.

It has always been remarked, that the brothers and the sisters who most resemble each other, or who, in the form of their heads, have most resemblance to one of their parents, also resemble each other as to the qualities of the mind and the soul. I know two twins, whom it is difficult to distinguish from each other, and who offer a striking resemblance in their propensities and in their talents. Two other twins, the brothers Fauchè, had many traits of resemblance; they were united from their infancy by an extraordinary attachment. I have compared with care the different parts of their heads. In comparing my remarks with their autobiography, which they severally brought me in writing,

it was found that my observations were, in all respects, conformable to their own statements of their characters. Wherever the development of their cerebral organs was nearly equal, the respective functions of these organs were the same; in those points in which the different structure of their skulls announced a different development of organs, there existed a difference, not less sensible in their faculties. Of two other twins, of different sex, the boy resembles his mother, a woman of limited capacity; the daughter takes after her father, a man of uncommon talents. The son displays in all things the most humble mediocrity; the sister, on the contrary, raises herself, in many respects, above her sex.

But, if a case occurs of twins, whose organization is different, it is in vain that diet, education, examples and circumstances are similar, there results no resemblance in character. In two twin girls, the head and the physical constitution differ totally. In the one, nature seems to have thought only of developing the bones and the muscles; in the other, she appears to have occupied herself solely with the nervous system. Thus, the first is possessed of very moderate intelligence, while the second is endowed with brilliant qualities.

7. *When the physical constitution is transmitted from fathers to children, these participate in the same proportion, in their moral qualities and intellectual faculties.*

> Fortes creantur fortibus et bonis;
> Est in juvencis est in equis
> Patrum virtus.

From the time of Horace, men have never ceased to observe, that certain moral qualities are often propagated for ages in the same family; which proves the close connection between the organization and the exercise of the moral and intellectual forces. Hence it happens, not only that certain maladies, such as gout, phthisis,

, &c., but also certain disorders consider-
al, are hereditary. Ganbius speaks of a
ner was possessed by a violent passion for
flesh, which induced him to commit sev-
This daughter, though separated from
ne, and brought up in the midst of re-
ons, was a prey, like her father, to this
desire of devouring human flesh. Gan-
g this anecdote, concludes with me, that
qualities are hereditary. I shall, here-
ral instances in which a propensity to
enness, and even the unhappy propensity
re hereditary. Now, how could these
od and bad, be transmitted from family to
ey not founded in organization?

f waking, of sleep, and dreaming, also
he exercise of the moral and intellectual
subordinate to organization.

substance, independently of organization,
l and intellectual functions, how could
at this pure spirituality could be fatigued,
uld have need of repose and of sleep?
g but inactivity, the perfect rest of the
of health. During this suspension of
nctions, the brain receives new forces,
its functions are performed with facility.
al organs, irritated by any cause what-
action, while the action of the others is
e result sensations and ideas which con-

of these dreams is almost always in har-
physical dispositions of the individual.
n dreams of pleasure and agreeable events;
ies with voluptuous delight: valetudina-
female, meet nothing in their dreams, but
osses. We dream that we are dying with

inflammation of the bowels, and awake with cruel griping. It is the same with somnambulism; and hence, the dependence on the organization is manifest.

9. *Every thing which sensibly changes, either weakens or irritates the organization, and especially the nervous system, and also produces considerable alterations in the exercise of the mental faculties.*

It has always been remarked that too rapid an increase, or a hastened development of organs weakens their special functions.* This especially happens in the climacteric years or periods of development, of which physicians and physiologists cannot too highly appreciate the importance. The mind, the body, all then suffer at once. The individual is incapable of steady application, and instruction is at once arrested. This state ceases, only, when the interval devoted to this development has been passed; and we readily perceive that this is the case, because the intellectual faculties at once resume all their energy.

On the other hand, are the intellectual organs developed too early, and kept in a state of excessive activity? There will often result an incurable exhaustion and paralysis of these organs; and it is thus that men of precocious genius sink into mediocrity, and even below it, if the exhaustion has been carried to its highest degree. I have already said, that the intellectual faculties, which are feeble in many children, especially in those which have collections of water in the cavities of the brain, often become strengthened and developed in a very striking manner, when the brain has acquired its complete growth and consistency.

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* This is true in relation to growth in the natural world. A tree is materially injured by hastening its growth. It lives but a short period, and it fails to bear fruit oftener than every other year.

Again, it is a constant observation, that, in hydrocephalic patients, the intellectual faculties are weakened or regained, according as the effusion is increased, or as we succeed in lessening it.

In animals and in man, when already formed, the organs of the body are still subjected to different periods of an activity altogether different, according as these organs are developed or diminished by the influence of the seasons, temperature and food, and especially by the influence of the laws peculiar to the organization, or according as they are more or less irritated by the afflux of the fluids. Hence, we see the mechanical aptitudes and propensities of animals appear and disappear at different periods; for example, the propensity to procreate, to sing, to build, to migrate, to separate or collect in bodies, to gather fruits, &c. It is the same with the dispositions of the mind in the human race, and especially in women. These dispositions are subject to periodical changes of greater or less continuance. Malebranche* directs our attention to the fact, that, at different periods, the same object does not inspire us with the same feelings, and that we form very different judgments in regard to it. The object, meanwhile, has remained the same, but our organs have undergone some alteration. How much does our manner of feeling and thinking differ, at the moment when the senses are heated, and some instants afterwards, when one is more calm, and the senses are satisfied! What a powerful influence is exercised on our propensities and our faculties, on our will and our judgment, by the different affections, such as anger, hatred, jealousy, despondence, sadness, chagrin, terror, envy, disquietude, fear, compassion, desire, joy! Who can mistake the influence of the approach or presence of periodical evacuations, such as the menstrual, hemorrhoidal, &c., the influence of pregnancy, of retained evacuations, suppressed secretions, of food

* Recherche de la vérité tom. i. p. 157.

and digestion; of the immoderate evacuation of semen, milk, blood, &c.; in short, the influence of every thing which exhausts the strength, such as fasting, prolonged watching, too constant and uniform mental effort? Who can deny the influence of a considerable approaching change in temperature, especially at the approach of a violent wind, or a storm; that of castration, of disease of the testicles, the womb, and other viscera? the influence of inflammations and suppurations in general, of inflammations of the brain in particular, of abscesses, wounds, and concussions of this organ; that of narcotic and irritant poison; that of rabies, worms, &c.? Finally, who can avoid perceiving the influence which agreeable sensations have over us, and that charm which we find in surrounding objects, such as a clear sky, a fine climate, &c.; that of music, dancing, tranquillity of mind.

All these, and many other causes produce the most astonishing changes in the exercise of our faculties, moral and intellectual, and yet they act directly over the organization only. Must we not conclude, that if, in certain cases, these same causes have for their result the most extraordinary propensities, such as the most shameless lasciviousness, a despair which refuses all consolation, the most arrogant pride, the most gloomy distrust, and even a propensity to commit criminal acts, the principle of all these propensities is inherent in our nature, and that the strength with which they manifest themselves, has, likewise, its source in a derangement of our organization?

When occasion offers, I shall cite examples of all these phenomena; for the present, I shall confine myself to the following facts. Father Mabillon possessed, in childhood, only the most limited faculties; but in the midst of this mediocrity, he received a rather severe wound on the head, and from this moment displayed superior talents. We were told, in our travels, of two well-known young men, to whom a similar accident happened. One of them, till his thirteenth year, could never succeed in anything. He fell from the top of a staircase,

made several holes in his head, and, after his cure, pursued his studies with the most marked distinction. The other, when fourteen or fifteen years old, gave equally little hopes of himself. He fell at Copenhagen from the fourth story of a staircase, and after this fall, displayed great intellectual qualities. This change was not the only one. No one, till then, had ever remarked in him any bad quality; but, after this same fall, he exhibited a very bad character, which, in the sequel, deprived him of an eminent office, and caused his confinement in prison. I knew a girl, nine years of age, whose head received a blow on the right side. From that time, she complained of a pain which she felt on the left side of the head, and which corresponded to the place where the blow had been received. By degrees her arm became weakened, and almost paralyzed; her lower jaw trembled unceasingly; she was frequently attacked with convulsions. But, as an offset to these misfortunes, her intellectual faculties had acquired an uncommon degree of vigor; and though she was only in her eleventh year, the features of her face, and her singularly sedate behavior, would have made her pass for a grown-up woman.

Grétry, in his memoirs of himself, tells us, that he owed the development of his genius for music, to a violent contusion he received on the head, by the fall of a large log.

Haller* tells us of an idiot, who, having received a severe wound on the head, exhibited some understanding so long as the wound continued open; but relapsed into imbecility so soon as a cure was effected. The same phenomenon often happens in regard to the other organs. Haller again relates, that a person attacked with inflammation of the eye, acquired, in consequence, such energy in the organ of vision, during the course of his disease, that he could see even by night. It is thus with all the inert organs, and those whose development

* Phys. tom. iv. p. 293.

is defective; irritation developes or greatly augments their faculties. These examples prove, more and more, that the innateness of the properties of the soul and mind, and their dependence on organization, must pass for demonstrated truths.

It is true, that in a state of health, man does not feel that he exercises his intellectual faculties by means of material organs; but he is equally unconscious that digestion, nutrition, and secretion are exercised in him by material apparatuses. Inattentive to the nature of his being, to the phenomena which relate to it, and to their causes, he hardly dreams that the difference which shows itself in him, according to the difference of age, in the exercise of his propensities and his faculties, is the result of the change which has taken place in his organization. "We must, consequently," as Herder says, "pardon the error of the people, when, in the midst of the dream of life, they regard the reason with which they are endowed, as independent of the senses and the organs, and raise it to the rank of a primordial and pure faculty. The observer of nature, on the contrary, who knows, by experience, the origin and the whole course of human life, and who, by the study of the history of nature, can trace the chain of the gradual perfection of the animal kingdom, up to man, is unceasingly reminded of the influence of organization. Every thing shows him, that man no more makes himself, as respects the use of his intellectual faculties, than he depends on himself for his birth." Malebranche has also said with reason, "that* the difference in the tastes of nations and even of individuals, for the various kinds of music, arises in a great measure from differences in organization; that, in general, our propensities and our faculties depend on the same cause; and that, consequently, we cannot better employ our time, than in seeking the material causes of the changes which befal us, in order to

* L. i. c. tom. i. p. 113 et 157.

learn to know ourselves. Let us hope that men will not long defer to acknowledge, generally, as Bonnet* says, that it is only by the physical, that we can penetrate into the moral nature of man, and that, consequently, the basis of all the philosophy of the human mind, is a knowledge of the functions of the brain.

SECTION IV.

OF FATALISM, MATERIALISM, AND MORAL LIBERTY.

In the preceding sections, I have proved, by indisputable facts, that the faculties of the soul and the mind are innate, and that their exercise depends on the organization. I have also shown that the origin of the moral and intellectual faculties, and the different modes in which they are manifested, can be explained in no other way. But, there is a kind of objection, which new truths never escape, especially when they may lead to great results. Ignorance, prejudice, envy, and often bad faith, endeavor to combat these truths. If they cannot attack the principles of a doctrine, they try at least to render it suspected, by the dangerous consequences of which they accuse it. Thus, it is reproached to the physiology of the brain, that it overturns the first foundations of morality and religion; that it eminently favors materialism and fatalism; and that, consequently, it denies free will. History teaches that the same has always happened to every discovery.

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* Palingen, tom. i. p. 13.

The followers of the different schools of philosophy among the Greeks, mutually accused each other of impiety and of perjury. The people, in turn, detested the philosophers, and accused those who sought to discern the principles of things, of invading, in a presumptuous manner, the rights of the divinity. The novelty of the opinions of Pythagoras, caused his expulsion from Athens; those of Anaxagoras, threw him into prison. The Abderites treated Democritus as insane, because he wished to discover in dead bodies the cause of insanity; and Socrates, for having demonstrated the unity of God, was condemned to drink hemlock.

The same scandal has been renewed in all ages and among all nations. Many of those who distinguished themselves in the fourteenth century by their knowledge in the natural sciences, were punished with death, as magicians. Galileo, for having proved the motion of the earth, was imprisoned at the age of seventy years. Those who first maintained that climate influences the intellectual faculties of nations, made themselves suspected of materialism.

In general, nature sports in a singular manner, and yet always uniformly, with new truths and those who discover them. With what indignation and what animosity have men repulsed the greatest benefits. For example, the potatoe, Peruvian bark, vaccination, &c. As soon as Varolius made his anatomical discoveries, he was decried by Silvius as the most ignorant, the most senseless, the most infamous of men: Vesanum, literarum imperitissimum arrogantissimum, calumniatorem, maledicentissimum, rerum omnium ignarissimum, transfugam impium, ingratum, monstrum ignorantiæ, impietatis exemplar perniciosissimum quod pestilentiali halitu Europam venenat, etc. Varolius was reproached with dazzling his hearers by a captious eloquence, and with producing, artificially, the prolongation of the optic nerve to the thalami of the same name. Harvey, maintaining the circulation of the blood, was treated as a visionary; and the envy of his enemies went so far

as to seek to ruin him with the Kings James I. and Charles I.; and when it was no longer possible to cut short the optic nerve, or to arrest the blood in its vessels, the honor of these two discoveries was suddenly transferred to Hippocrates. The physical truths announced by Linnæus, Buffon, and that pious philosopher Bonnet, by George Leroy, were represented as impieties which threatened to commence the total ruin of religion and morality; even the virtuous and generous Lavater has been treated as a fatalist and a materialist. Every where, fatalism and materialism, placed before the sanctuary of truth, served to deter the world from entering it. Every where, those, whose judgment the confiding public awaits, not only attribute to the author of a discovery, the absurdities of their own prejudice, but even renounce truths already established, as soon as they are opposed to their ends, and resuscitate exploded errors, provided they will serve to ruin the man who allows them their due weight.

Such is a faithful picture of what has happened to me. I have therefore, some reason to be proud of having experienced the same fate, as the men to whom the world is indebted for so great a mass of knowledge. It would seem that nature had subjected all truths to persecution, in order to establish them in a more solid manner; for, he who knows how to wrest one from her, presents always a front of brass to the darts hurled against him, and has always the strength to defend and to consolidate it. History shows us, that all the efforts and all the sophism, directed against a truth once drawn from the abyss, fall like dust, raised by the wind against a rock.

The examples of Aristotle and of Descartes ought in a special manner to be quoted, when we would make known the influence of prejudice on the good and bad fortune of new doctrines. The antagonists of Aristotle caused his books to be burned; afterwards they burned the works of Ramus, who had written against Aristotle, and declared the adversaries of the Stagyrite,

heretics; and there were even legislative acts, forbidding to attack his philosophy under pain of the galleys. And yet no one now concerns himself with the philosophy of Aristotle! Descartes was persecuted because he maintained innate ideas, and the University of Paris caused his books to be burned. He had written the sublimest thoughts on the existence of God; Voet, his enemy, accused him of atheism.* Still later, this same university declared itself for innate ideas; and when Locke and Condillac attacked innate ideas, there was a cry on all sides of materialism and fatalism.

It is thus, that the same opinions have been regarded sometimes as dangerous, because they were new, sometimes as useful, because they were old. We must then conclude to take pity upon man; that the judgment of cotemporaries on truth or error, or on the dangerous or innocent consequences of a doctrine, is singularly suspicious; and that the author of a discovery ought not trouble himself about any thing but to know whether he has actually discovered the truth. "Reason," says Anchillon,† following Bonnet,‡ "knows neither useful truths nor dangerous truths. What is, is; there is no compromising with this principle. It is the only answer we need make; and to those, who, subjecting every thing to utility, ask what is this good for? and to those, who, always yielding to their fears, inquire 'whither will this lead?' Jesus, the son of Sirach, has already said, § 'We must not say, what good will this do?' for the use of every thing will be found in its season; but we cannot abuse the truth.'"

I do not pretend to say, that ignorance and ill faith will not abuse my doctrine; for what will not man abuse? Tell him that he must expiate his crimes, and you will see him, in his superstition, immolate his

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* Malebranche Recherche de la vérité, t. 2. p. 49.
† Melange de lit. et de philosophie, Paris, 1809. tom. 2. p. 42.
‡ Palingen, tom. 1. p. 42. § Ecclesiasticus, ch. 39. ver. 26.

children. Have not Lucretius and his disciples employed all their wit to show, that the belief of the immortality of the soul, keeps up the fear of death, and poisons all the enjoyments of life? Yet, who knows not, that this same belief is the basis of social happiness, of order, and of morality, the most effectual consolation in the crosses of life. To found hospitals for lying-in women and foundlings, to introduce inoculation or vaccination; to place lightning-rods on houses, is, in the eyes of some, an inestimable benefit; of others, an outrage against Providence. In a word, man makes of every thing a subject of offence; but, as St. Bernard* says, we must judge differently of the offence of the ignorant, and of that of the Pharisees. The former are offended through ignorance, the latter through ill-will; the former, because they know not the truth; the latter, because they hate it.

Malebranche† thus represents the enemies of new truths: "It is not the persons of true and solid piety, who ordinarily condemn what they do not understand, but rather the superstitious and the hypocrites. The superstitious, through servile fear, are startled as soon as they see an active and penetrating spirit. For instance, one need only give them some natural reasons for thunder, and its effects, to appear an atheist in their eyes. But the hypocrites make use of the appearance of sacred truths revered by all the world, in order to oppose new truths by particular interests. They attack truth with the image of truth; and in their hearts make a scoff of what all the world respects; they establish for themselves, in the minds of men, a reputation the more solid and the more formidable, as what they thus abuse is more sacred. These persons are, then, the strongest, the most powerful, the most formidable enemies of truth."

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* De præceptis et disciplinâ. † L. c. tom. 2. p. 48.

I, too, have something to do with the superstitious, and still more with the hypocrites; but I shall not trouble myself with these last, except to answer their objections.

As for those who doubt in good earnest, I shall seek to let them know the true spirit of my doctrine, on all points which can cause them disquiet. I shall prove to them that my principles are in accordance, not only with the nature of things, but, with the experience and the testimony of the greatest thinkers, and of respectable men, who have most loved the human race; and, as the object is to rectify opinions of the highest importance, they will not be surprised, if I adduce the testimony of the fathers of the church, of the apostles, and even of Jesus Christ. What is there more proper to confound hypocrisy, and to tranquillize the most timorous piety, than the encouraging accordance of my principles with the teaching of those, who, without captious reasonings, without vain subtilties, have so well developed the nature of man; who have mainly occupied themselves in contributing to his happiness, who have revealed to us a morality the purest, and the most appropriate to our wants; who, in fine, have so frequently sealed with their blood, eternal truth?

To avoid all confusion of ideas, I shall treat separately of materialism, of fatalism, of moral good and evil, and of free will.

Of Materialism.

By the term *materialism*, men designate things entirely different. Sometimes, the materialist pretends that there is no other existence than that of matter, and that all the phenomena in the world are simply the effects of matter. The ancient church bestowed the name *materialists* on those who taught that matter existed from all eternity, and that, consequently, the Deity had not drawn the world out of nothing. This sort of materialism ordinarily leads to the denial of the existence of a

Supreme Intelligence, of a God, and then it is confounded with atheism. It is not of such materialism that my doctrine is accused. If any one can become an atheist, it is not the man who occupies himself on a large scale with the study of nature, because, at every step, he meets phenomena, which he cannot explain by any of the known laws of the material world. He perceives not only the incomprehensible wonders of particular organizations, but also the wise connection of the whole. Nothing in the universe is insulated; all worlds have been placed in reciprocal relations; inanimate nature is so with living nature; all living beings are so with each other. Who, then, can mistake a cause of all causes, a supreme law of all laws, an intelligence of all intelligences, an ordainer of all orders—in a word, a God?

Another species of materialism is professed by those who maintain, that man is not composed of two substances essentially different, that is, of a body and a soul; that all the phenomena, which are ordinarily attributed to the soul, are only the results of the combinations and of the forms of matter; or, that the soul is only a fluid of extreme tenuity, diffused through the whole body, which gives to each part its proper life. This second species of materialism, includes a doctrine not less erroneous than the other, and thus destroys the belief of the immortality of the soul. Yet, its partisans would fain convince us, that this consequence is unfounded. "The principles of matter," say they, "are in their nature as eternal, as indestructible, as the spiritual substance; these two substances can be annihilated only by an express order of the Deity, and, consequently, there would be nothing absurd or dangerous in thinking that the immortal soul may be material: we ought, on the contrary, still more to admire the Creator, who has united so many qualities to matter, and raised it to the faculty of thought and of will. If," continue these philosophers, "we choose to regard the soul and the body, as two substances totally different, we can no more explain the action

of one upon the other, than we can comprehend how a material substance can possess thought; so that from the incomprehensibility of the last idea, it does not follow that one doctrine is more true than the other. Hence," say they again, "men for a long time have regarded thought as a property of matter; and those, who teach the resurrection of the body, are equally convinced of the immortality of matter. In fine," they add, "we can gain only a very defective notion of matter, and a purely negative notion of the soul, by representing to ourselves a substance deprived of all the known properties of matter, and retaining the faculties of thought and will; while reason can no more attain to the essence of matter than of mind, and, consequently, we cannot reasonably maintain, that extension and other properties are inconsistent with the essence of the soul, nor that the faculty of thinking is incompatible with the essence of the body."

My doctrine has nothing in common with this hypothesis, nor, consequently, with this species of materialism. I have always declared, that I make no research into the nature of the soul and the body, and that I do not wish to explain the essence of any of these faculties. I confine myself to phenomena. Now we see, that in this world, no faculty manifests itself without a material condition; all the faculties, even those which we call mental, act only by means of matter, and their actions can only be perceived by means of material organs. If, then, I am to be called a materialist, because I say that all the dispositions are innate, and that their exercise depends on material organs, it ought to be proved, that in so saying, I acknowledge no other substance than that of matter, and that I reject every other faculty. The observations which follow, will prove how unjust is this inference.

I call the material condition which renders the exercise of a faculty possible, *an organ*. The muscles and the bones are the material conditions of motion, but are not the faculty which causes motion; the total organi-

zation of the eye is the material condition of sight, but is not the faculty of seeing. I call a material condition, which renders the manifestation of a moral quality, or an intellectual faculty possible, *an organ of the soul.* I say, that man, in this life, thinks and wills, by means of the brain; but, if it be thence concluded, that the being, willing and thinking, is the brain, or that the brain is the being, willing and thinking; it is, as if one should say, that the muscles are the faculty of motion; that the organ of sight, and the faculty of seeing, are the same thing. In both cases the faculty is confounded with the organ, and the organ with the faculty.

This error is the more unpardonable, as it has been committed and corrected very frequently. St. Thomas* answered in this manner, to those who confounded the faculty and the instrument: "Although the mind be not a corporeal faculty, the functions of the mind, such as memory, thought, imagination, cannot take place without the aid of corporeal organs. Hence, when the organs, from any derangement, cannot exert their activity, the functions of the mind are also deranged, and this is what happens in phrensy, asphyxia, &c. Hence, also, it happens, that a fortunate organization of the human body has always, for its result, distinguished intellectual faculties."

In the fourth century, St. Gregory of Nyssus, compared the body of man to an instrument of music. "It happens," says he,† to many skilful musicians, not to be able to give proofs of their talent, because their instrument is in a bad state. It is thus, that the functions of the soul can duly exercise themselves, only, when the organs of these functions conform to the order of nature. But these functions cease or are arrested, when the organs cannot subserve the proper motions; *for, it is a peculiarity of the mind, that its faculties cannot be duly exercised except by healthy organs.*" In another

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* Contra gentiles, ch. 84, num. 9. † De hominis opificio, c. 12.

passage* he says, that the soul begins to exist at the same time as the body; that it is present, though it may not manifest itself; just as the form of the future man is contained in the seed; that the soul can only make itself known when the successive development of the corporeal organs permits it.

If we do not take into consideration the difference which exists between the organs and the faculties, and if, to be a materialist, it is sufficient to declare that the exercise of the intellectual faculties depends on the organization, who is the writer, ancient or modern, whom we have not the right to charge with materialism?

Either we must admit the whole body as the instrument of the moral and intellectual forces, or we must say that the brain is this instrument; or, finally, we must adopt several distinct instruments in the brain. It is to these three propositions that all opinions may be referred. Now it is evident that each of these propositions has, for its result, to make the intellectual qualities and moral faculties depend on material conditions.

In the first case, it is the body which we admit as the necessary condition of the exercise of the faculties of the soul. If this were materialism, it is the Deity himself who would be the cause of our error. Is it not God, says (Boerhaave,) who has united the soul so closely to the body, that its faculties are defective when the organization is defective, and that they are disturbed when the body is diseased? Saturninus† derives the differences in the moral and intellectual qualities of man, from the different structure of his organs. All the ancient moralists, Solomon,‡ St. Paul,§ St. Cyprian, St. Augustin,‖ St. Ambrosius,¶ St. Chrysostome,** Eusebius,†† &c., regard the body as the instrument of the

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* L. c. ch. 29 and 30.
† Pluquet du fatalism, tom. 1. p. 158.
‡ Wisdom, ix. ch. 15 v.
§ 18 Ep. to tom. ch. xiii. 11 v.
‖ Lib. de libero arbitorio.
¶ Lib. 1. de off.
** Hom. 2, 3 Super. epist. ad. Heb.
†† Preparat. Evangel. lib. 6. num. 6.

soul, and plainly profess, that the soul always governs itself by the state of the body. Philosophers, also, admit with Herder,* that all the faculties, even thought, depend on the organization and the health, and that if man is the most accomplished being of the terrestrial creation, it is because the most perfect organic faculties which we know, act in him by the most perfect instruments of organization, in which these faculties are inherent. Lavater† accuses those, who, in this matter, allow nothing to the primitive organization and formation, of insulting reason and of defending a system belied in every living being.

In fine, from Hippocrates and Galen, physicians and physiologists have all established the same doctrine; and whatever diversity there may be in their opinions, the basis of all is the same. Some make the moral character depend on the organs of automatic life; while others seek for the principle of the passions in the numerous nervous plexuses and ganglia of the chest and abdomen; others explain the thoughts and desires by deriving them from the liver. But, it is evident that one party, as well as the other, subjects the faculties of the soul to material conditions; and, consequently, were *this* language sufficient to charge me with materialism, the same charge would apply to all physicians, all philosophers, and all the fathers of the church.

Shall we, then, reserve the charge of materialism for those, particularly, who regard the brain as the organ of the soul? This doctrine is not less diffused than that of which we have just spoken. We find it already in the sect of Pythagoras. The physiological physicians, and the philosophers, make every thing depend on the brain; at least, the qualities of the mind, attention, memory, imagination, &c. Boerhaave and Van Swieten attribute to the brain, not only the ideas, their combinations, and the judgment, but also the moral charac-

* L. c. th. 2. s. 108. † Essai. Phys. La. Hage. tom. 1. p. 144.

ter of man, and all his human essence. Some, among them, maintain that the impressions received, leave traces in the brain; they explain, by these traces, memory, the comparison of ideas, and judgment. Others, with Malebranche, attribute to the firmness and softness, the dryness and moisture of the cerebral fibres, the difference of the faculties and propensities. Haller, Buffon, and Bichat,* regard the inequality of the two cerebral hemispheres, as the cause of mental alienation. Here, then, are so many opinions tending to materialism.

There are none, not even my adversaries, who are not forced, either to admit the brain to be the organ of the soul, or to suppose a very subtle material substance, to serve as a medium of communication between the soul and the body. Such is the case with professors Ackermann, at Heidelberg, and Walter, at Berlin, whose objections have been repeated by most of my opponents. The first does not confine himself to regarding the brain as the organ of the soul; he also admits an extremely subtle nervous medulla, soft and almost fluid, which converts itself, by degrees, in the cavities of the brain into animal vapor, and which becomes a medium between the soul and the nerves of sense.† Walter says, "in the infant, the brain is like pap; in old age it is hard, and in middle life of an intermediate consistence. The brain must have a certain degree of firmness and elasticity, in order that the soul may exhibit itself in its greatest brilliancy, and the man attain his greatest mental perfection. This mode of viewing the subject does not lead to materialism: it has no other object than the reciprocal union of the soul and the body." Thus, there is no writer, who does not make the moral and intellectual functions depend on material conditions, and my adversaries, if I were a materialist, would be no less so than myself.

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* Sur la vie et la mort, p. 16.

† Beantwortung der Ackermann, schen Beurtheilung und Widerlegung der Gall's schen Hirn-Schedel-und Organerlehre. Halle, 1806, § 32.

Finally, do my opponents think to impute materialism to me, because in place of one organ of the soul I admit several? But, is one more or less a materialist, by admitting one or several organs? Is the organ immaterial because it is single? Whether the whole body, or the whole brain be the sole organ of the soul, the body and the brain belong to matter. The admission of several organs in the brain, makes no difference, in that respect. The hand is not less material than the five fingers.

It would seem that my adversaries must have felt the want of vigor in their deductions; for, in order to save, at least in appearance, the simplicity of their organ of the soul, they have been obliged to imagine a central point, where the soul might have its seat, and where it might perceive all external and internal impressions. "The organization," says Prof. Ackermann,* "though divisible into several organs, yet offers one complete whole, in which all the organs depart from one point, and in which they must all re-unite." But, unhappily, he is obliged to concede, that the anatomy of the brain does not offer this principal point, where all the nerves of sense unite, which transmit sensations to the organ of the soul. On the contrary, I have proved in the anatomy of the brain, that its different parts have their origin in different points, and spread themselves in large nervous expansions in places equally different. Van Swieten and Tiedemann have already remarked, that a general point of union, where impressions of all sorts should arrive at once, would produce only confusion. Yet Professor Ackermann thinks, that such a union of the divergent nerves would be very possible, by means of an intermediate substance in which they should terminate; and as, according to his opinion, this might happen, he concludes peremptorily, that it is so. But to what purpose this point of union? This intermediate, very subtle substance, must occupy a space at least

* L. c. s. 91.

equal to that of the divergent nerves, or it could not possibly come into contact with them ; and, supposing this point to be as small as an atom, would it, therefore, be any the less material ?

Supposing that the plurality of organs has no existence in the manner that I shall show it to exist in my second volume, all those who have regarded the whole body, or the brain alone, as the organ of the soul, are not less liable than myself to the charge of having admitted more than one organ of the soul. It is in fact certain, and all anatomists agree, that the total of animal life, and, consequently, the brain, is double. This organ is composed of two hemispheres, each of which comprehends the same parts. Thus we have all a double organ of the soul, and we should all be materialists, if it were sufficient, in order to be such, to believe in the plurality of organs ; and in this manner, the Deity himself would have established materialism in an incontestable manner. If I am a materialist because I admit more than a single faculty of the soul, and because I recognise several primitive faculties, I ask if the ordinary division of the faculties of the soul into understanding, will, attention, memory, judgment, imagination, affections and passions, expresses only a single primitive faculty ? If it be said, that all these faculties are only the modifications of a sole and single faculty, who will prevent me from advancing the same assertion of the faculties which I admit ? It is very evident, that we remark different properties of the mind and soul in man. It must follow, then, either that the soul is composed of different faculties, or that a single and same soul produces different phenomena by means of different organs. Now it is infinitely easier to imagine the unity of the soul in the last case than in the first ; and, consequently, materialism is no longer a bugbear which ought to deter any one from my doctrine, any more than from others.

Analogy, again, comes in support of this last proposition. Every one allows, that several wholly different functions, which we feel obliged to attribute to the soul,

take place in us by means of different organs. The voluntary motions, for instance, are executed by means of the nervous systems of the vertebral column: the functions of sense are each attached to a different internal and external apparatus.

It is true, that men are not willing to admit the comparison of the voluntary movements and the functions of the senses with the moral qualities and intellectual faculties, because these first functions are regarded as material. But, as these functions are performed with consciousness, and in part voluntarily, this would imply that organs, purely material, have consciousness and will. This doctrine would approach much nearer to materialism than mine. We should even find ourselves obliged, after the example of a great number of philosophers, to include among the properties of matter, memory, intelligence, imagination, the affections, passions, propensities and inclinations. What could prevent these materialists from going one step further, and allowing to matter other faculties, as the reason and the will, which are called, by preference, faculties of the soul and mind.

The case is very different in my manner of viewing the subject, and my doctrine is not open to any of these objections. There exists, according to my view, only one single principle, which sees, feels, tastes, hears, and touches, which thinks and wills. But, in order that this principle may gain a consciousness of light and sound, that it may feel, taste and touch, that it may manifest its different kinds of thoughts and propensities, it has need of different material instruments, without which the exercise of all these faculties would be impossible.

It results, then, from this discussion, that those who charge me with materialism, because I regard material conditions as indispensable to the exercise of the faculties of the soul, confound these faculties with the instruments, by means of which they act. It also results, that the brain being double, anatomists are forced to admit the plurality of these material conditions: it finally re-

sults, that the profoundest writers of all ages have subjected the exercise of the faculties of the soul and mind to material organs; and that, consequently, if this truth establishes materialism, we must make this charge against all the physicians and philosophers that ever flourished, and even against the fathers of the church, and the apostles.

Of Fatalism.

We have seen that, under the name of materialism, very different things have been included; it is the same with fatalism.

If it be affirmed that every thing in the world, and even the world itself, is *necessary;* that whatever is and happens, is the effect of chance or of a blind necessity, and that no Supreme Intelligence ever has, or at present does concern itself with existing objects, this doctrine is a species of fatalism, which differs very little from atheism. But this fatalism has nothing in common with the doctrine, which asserts the innateness of the faculties of the soul and mind, and their dependence on organization. I cannot, therefore, in this sense be accused of fatalism.

Another species of fatalism is, that by which it is taught that, in truth, there exists a Supreme Being, the Creator of the Universe, as well as of all the laws and all the properties which exist in it; but that he has fixed these laws in an immutable manner, so that what happens, cannot happen otherwise. In this system, man is necessarily drawn along by the causes which lead him to act, without his will having any influence. His actions are always a necessary result, without voluntary choice, and without moral liberty; they are neither punishable nor meritorious, and the hope of future recompense vanishes, as well as the fear of future punishment.

This is the fatalism of which superstitious ignorance accuses the physiology of the brain; that is to say, the

doctrine of the functions of the noblest organ on earth. I have incontestably proved, that all our moral and intellectual dispositions are innate; that none of our propensities, none of our talents, not even understanding and will, can manifest themselves, independently of this organization. Add to this, that man has no part in endowing himself with the faculties proper to his species, nor, consequently, with such and such propensities and faculties. Now, must we infer that man is not master of his *actions?* that there exists no free choice, and, consequently, can be no merit or demerit in any action?

Before refuting this conclusion, let us examine, with all the frankness worthy of true philosophy, to what degree man is subjected to the immutable laws of creation; to what extent we must acknowledge a necessity, an inevitable destiny, or fatalism? To disentangle these confused notions, is the best means of placing the truth in a clear light.

Man is obliged to acknowledge the most powerful and most determinate influence of a multitude of things on his happiness or misery, and even on his whole conduct, without being able, of his own will, to add to or diminish this influence. No one can call himself into life: no one can choose the period, the climate, the nation, where he shall see the light of day: no one can fix the manners, the customs, the laws, the form of the government, the religion, the prejudices, the superstitions, with which he shall be surrounded from the moment of his birth: no one can say, I will be servant or master, elder or younger; I will have robust or feeble health, I will be a man or woman; I will have such a temperament, such inclinations or talents; I will be foolish, idiotic, simple, intelligent, a man of genius, violent or calm; of a sweet or peevish temper, modest or proud, heedless or circumspect, cowardly or inclined to debauchery, submissive or independent: no one can determine the prudence, or the folly of his instructors; the hurtful or useful examples he shall meet, the results of his connections, fortuitous events, the influence which external

things shall have on him, the condition of himself or his parents; or the sources of the irritation which his passions and his desires shall experience. So far as the relations of the five senses to external objects, so far as the number and the functions of the viscera and the limbs have been fixed in an immutable manner; so far is nature the source of our inclinations, our sentiments, our faculties. Their reciprocal influence, their relations with external objects, have been irrevocably determined by the laws of our organization.

As it does not depend on us to hear and see, when objects strike our eyes and our ears, so are our judgments the necessary results of the laws of thought. "Judgment," says M. de Tracy with reason, "is independent of the will, in this sense, that when we perceive a real relation between two of our perceptions, it is not free for us to feel it otherwise than as it is; that is, as it must appear to us by virtue of our organization, and such as it would appear to all beings organized like ourselves, if placed precisely in the same position. It is this necessity, which is essential to the certainty and reality of all our knowledge. For, if it depended on our fancy to be affected by a large thing as if it were small; by a good thing as if it were bad; by a true thing as if it were false, there would no longer exist any reality in the world, at least for us. There would be neither largeness nor smallness, good nor evil, falsehood nor truth; our fancy alone would be every thing. Such an order of things cannot be conceived, and it implies inconsistency."*

Since the primitive organization, the sex, age, temperament, education, climate, form of government, religion, prejudices, superstitions, &c., exercise the most decided influence on our sensations, ideas, and judgments, and the determinations of our will; on the nature and force of our propensities and talents, and consequent-

* Ideologie, p. 208.

ly on the primary motives of our actions, we must confess that man, in many of the most important moments of his life, is subjected to the power of destiny, which sometimes fixes him to a rock, like the inert shell-fish, and sometimes raises him in the whirlwind, like the dust.

It is not then surprising, that the sages of Greece, the Indies, China, and Japan, that the Christians of the east and west, and the Mahometans, should have mingled with their several doctrines this species of fatalism. From periods the most remote, men have derived from the Deity our moral and intellectual faculties; in all ages it has been taught that all the gifts of men come from heaven; that God from all eternity has chosen the elect; that man, of himself, is incapable of any good thought; that all the difference which exists between men, with respect to their qualities, comes from God; that it is only those, to whom it has been given by superior power, who are capable of certain actions; that each one acts according to his innate character, just as the fig-tree does not bear grapes, nor the vine figs, and as sweet water cannot flow from a bitter fountain; in fine, that all cannot find out the mysteries of nature, nor the secrets of God.

It is this same fatalism, this same inevitable influence of superior powers, which has been taught us by the fathers of the church. St. Augustine,* would have this same doctrine preached, in order to exhibit clearly the belief of the infallibility of Providence, and our entire dependence on God. "As," says he,† "no one can give himself life, so no one can give himself understanding." If some persons do not understand the truth, it is, according to him, because they have not received the necessary capacity to comprehend it. He refutes the objections, which would be hence drawn, against the justice of God, and remarks, that the grace of God has no more distributed temporal goods equally to all, such

* Lib. de bono perserverantiæ, ch. 20—2. † Lib. de fide, c. 1.

as address, strength, health, beauty, genius, and taste for the arts and sciences, riches, honors, &c. St. Cyprian* had already said, that we ought not be proud of our qualities, for we have nothing of ourselves.

If men had not always been convinced of the influence of external and internal conditions on the determinations of our will or our actions, why, at all times, and among all nations, should they have made laws, civil and religious, to subdue and direct the desires of men? There is no religion which has not ordained abstinence from certain meats and drinks, fasting, and the mortification of the body. From Solomon down to our own days, I know no observer of nature, who has not acknowledged that man, both physically and morally, is wholly dependent on the laws of creation.

Moral Good and Evil.

The same laws to which I have alluded, prove, that the conviction has always existed, that mankind are inclined to evil. But, does it not seem contradictory, that evil should have been created by an infinitely good Being?

Some, to escape this contradiction, have ignorantly admitted two principles, a good being, and a wicked being, almost equally powerful, and existing in a state of perpetual warfare.

Others have maintained, that all the original qualities of man have been given him for a good end; that none leads necessarily to evil, and that even the best things in the world may be prostituted to a bad purpose. Eusebius† says with Philo, that matter in itself is not wicked, and cannot be the cause of evil, which consists only in action, and in the bad use of original faculties.‡

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* Lib. de concepti one et gratia, ch. viii.

† Euseb. præparat, evang. lib. 7. n. 22.

‡ Evil is not a substance; and there is nothing bad, but what the abuse of man has made so. St. August. chap. 20.

Others add, that in order to decide that any thing is an evil, we must know, what man cannot know, the immense and universal end of creation.

Others, in fine, not being able to deny the existence of moral evil, explain its origin by free will. But, as soon as we admit free will, we pre-suppose moral good and evil; for, what would free will be, if there were not two distinct things, good and evil, between which the free man can choose? May it not even be objected, that this same boasted free will, since it occasions so much evil, is itself an evil? The instant we recognize free will, does not man find himself on the slippery edge of the precipice? It is said, and I also say, that man abuses his liberty; but what motive has man to abuse it, unless something stirs within to excite him to illegal actions?*

I am bitterly reproached for admitting in man, innate evil inclinations and propensities to injurious acts; and my antagonists especially, never fail to remark, that, among these evil inclinations, are found the propensity to theft, and the propensity to murder.

Let these admirers of the excellence of the human species, answer me why, in all ages and in all countries, men have robbed and murdered, and why no education, no legislation, no religion, neither prison, hard labor, nor the wheel, has yet been able to extirpate these crimes? Could these men have robbed and murdered, for the sole pleasure of exposing themselves to these dangers without any temptations? Will you throw the fault on their ancestors, as if their example had given rise to these unholy inclinations? Then explain to me, how the first examples could have occurred, and how children and grand-children, who had dispositions essentially good, should have become so powerfully disposed to robbery and murder, contrary to their nature?

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* Nous sommes pécheurs et enclinus au mal. *Catéchisme a l'usage des églises de l'empire Francais.* 1806. p. 23.

Besides, allowing it to be education, and not nature, which gives us vicious propensities, the difficulty always remains the same, because education is not in the power of him who receives it; and education never could develop either good or evil inclinations, did not their germs positively belong to human nature. In vain will you endeavor, by any education, to change the pigeon into an eagle, and the eagle into a pigeon.

Unhappily, it is not robbery and murder only, which prove the evil dispositions of men. The just man always has had, and always will have reason, to complain with Moses, of the bad actions and dispositions of men. The Lord said that the malice of men, who lived on the earth, was extreme, and that all the thoughts and purposes of their hearts were altogether wickedness. Gen. vi. 5. Men always have been, and always will be, inclined to all sorts of perverse actions; they have always been besieged by temptations within and without; they always have been, and always will be, tormented by carnal desires, covetousness, ambition, pride, &c. The world never has ceased, and never will cease, to be the theatre of all vices; such as lying, calumny, jealousy, envy, avarice, usury, immodesty, vengeance, adultery, perjury, rape, incest, idolatry, drunkenness, discord, enmity, injustice, &c.

The good man draws good things from the good treasure of his heart, and the wicked man draws evil things from the evil treasure of his heart. St. Luke vi. 45. For out of the heart proceed evil thoughts, murders, adulteries, fornications, thefts, false witness, blasphemies. Matt. xv. 19. They are full of all unrighteousness, fornication, wickedness, covetousness, maliciousness; full of envy, murder, disputes, deceit, malignity; whisperers, backbiters, haters of God, deceitful, proud, boasters, inventors of evil things, disobedient to parents; without understanding, covenant-breakers, without natural affection, implacable, unmerciful. Epistle to Rom. i. 29, 31. Now the works of the flesh are manifest, which are these: adultery, fornication, uncleanness,

lasciviousness: idolatry, witchcraft, hatred, variance, emulations, wrath, strife, seditions, heresies, envying, murders, drunkenness, revellings, and such like. Galatians v. 19, 21. In this world we are born with our temptations, and the flesh sometimes leads us to do good works, and sometimes excites us to do bad ones. [S. Gregory, Hom. ii.] As it is written, there is none righteous, no not one. Rom. iii. 10. For the good that I would, I do not, but the evil that I would not, that I do. Now if I do that I would not, it is no more I that do it, but sin that dwelleth in me. I find then a law, that when I would do good, evil is present with me. Rom. vii. 19, 21. But every man is tempted, when he is drawn away of his own lust and enticed. Nulla mens est, nulla anima, que non recipiat etiam malarum motus agrestes cogitationum. S. Ambros. lib. de Noe. &c. No man can say that he perceives in his thoughts, in his propensities, nothing but what is innocent and virtuous. Let him, who, with his hand on his heart, will contradict this, take the first stone and cast it at me.

Thus it is in vain for you to be humbled for your weakness and your imperfection; you must acknowledge the moral as well as the physical evil, and submit yourself for both to the incomprehensible decrees of the Creator. Both exist, not, as some say, because the Creator permits it; for such a state of things would suppose on the one hand a mere accident, and on the other, the impotence of the Creator; but they exist because they enter into the plan of eternal Providence. As temporal advantages are distributed unequally and without any respect of persons, so physical evils frequently happen without the fault of him who is the subject of them. Is there not a continual opposition in all nature? Do not the air, the earth and the water, offer a perpetual scene of destruction and production, of suffering and pleasure? What have animals done, that man to whom they render the most useful services, should feed them ill, and maltreat them in every way? If parents beget children in the excesses of debauch, why must the children

themselves expiate the fault? When the storm carries away the house of the idle rich man, does it spare the poor and industrious vine-dresser? "There is a just man that perisheth in his righteousness, and there is a wicked man that prolongeth his life in his wickedness." Eccles. vii. 16. "All things come alike to all: there is one event to the righteous and to the wicked; to the good, and to the clean, and to the unclean; to him that sacrificeth, and to him that sacrificeth not; as is the good, so is the sinner; and he that sweareth, as he that feareth an oath. This is an evil among all things that are done under the sun, that there is one event to all; yea, also the heart of the sons of men is full of evil, and madness is in their heart while they live, and after that they go to the dead." Ibid, ix. 2, 3. "I returned, and saw under the sun, that the race is not to the swift, nor the battle to the strong, neither yet bread to the wise, nor yet riches to men of understanding, nor yet favor to men of skill; but time and chance happeneth to them all. For man also knoweth not his time; as the fishes that are taken in an evil net, and as the birds that are caught in a snare; so are the sons of men snared in an evil time, when it falleth suddenly upon them." Ib. ix. 11, 12.

I have said that evil dispositions and perverse inclinations, enter into the plan of eternal Providence. In fact, what would those say, who affect to act as the apologists for the happiness and the virtue that is to come, if it was proved to them that, without propensity to evil, there would be neither virtue, nor reward, nor punishment? For, as we have already said, what can be called liberty, if we do not mean by this expression, the power of choosing between good and evil? If men had no propensity except for good, where would be the possibility of doing evil? And without this possibility, on what could we found the idea of vice and virtue, the merit and demerit of actions? He who does not do evil, because nothing tempts him to do so, is certainly to be envied, but he cannot pretend to virtue, nor to the

merit of actions.* What would be the merit, the chastity of those of whom Jesus Christ says† that they came eunuchs from their mother's womb. Why boast so much the denial of one's self, if it supposes no injurious propensities which one has succeeded in subduing?‡ All philosophers, ancient and modern, Plato, Aristotle, Cicero, Seneca, Pascal, Kant, as well as the fathers of the church, have founded the notion of virtue on the victory, which we obtain over our vicious propensities.§ Can the old man, who has passed his youth in dissoluteness, be called continent and moderate, because his desires have abandoned him?‖ It is precisely those evil propensities, which many persons consider incompatible with the glory of God, with the dignity of man, and the welfare of society, which give to man the possibility of being virtuous and vicious: it is only by means of these that actions can have merit or demerit; and whoever should extinguish in man the belief in perverse inclina-

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* Non virtus est, non posse peccare. Cum renunciatur improbitati. Statim adsciscitur virtus. Egressus enim malitiæ virtutis operatur ingressum *St. Ambrosius.* Posse peccare datum est primo homini, non ut proinde peccaret, sed ut gloriosior appararet, si non peccaret, quum peccare posset. *St. Bernardus, de libero arbitrio.*

† St. Matthew xix. 12.

‡ Castitas est virtus sub jugo rationis impetum libidinis refrenans. St. Augustinus de finibus.

§ Vita nostra in hac peregrinatione non potest esse sine peccato, sine tentatione; quia profectus noster per tentationem nostram fit, nec sibi quisquam innotescit, nisi tentatus; nec potest coronari, nisi vicerit: nec potest vincere, nisi certaverit; nec potest certare, nisi inimicum et tentationes habuerit. *S. August. super psalm.* 60. Caro si sale non aspurgatur, quamvis sit sana et præcipua, corrumpitur; ita et anima nisi tentationibus assiduis saliatur, continuo resolvitur et relaxatur. *Origines, super lib. arbitr N. S. Chrystomus, Hom. iv. de pœnitentia.* Nulla sine labore virtus est. *S. Ambrosius in psalm.* 118. Non est gloriosa victoria, nisi ubi fuerint glorio-a certamina. *S. Ambrosius de off.* Nulla sunt sine tentationum experimentis opera virtutis; nulla sine pertubationibus fides; nullum sine hoste certamen, nulla sine congressione victoria. *Leo*, sermo 35; etc.

‖ Quidam in juvente luxuriose viventes, in senectute continentes fieri delectantur et tum eligunt servire castitati, quando libido eos servos habere contempsit. Nequaquam in senectute continentes vocandi sunt qui in juventute luxuriose vixerunt; tales non habent præmium, quia laboris certamen non habuerunt; eos enim exspectat gloria, in quibus fuerunt gloriosa certamina. *Isidor. de summo bono*, lib. i. c. 31.

tions, would also extinguish in him the fear of punishment, and the hope of future reward.

How do primitive Dispositions, essentially good, degenerate into evil Propensities?

Bad propensities and moral evil are, therefore, inherent in human nature, notwithstanding the efforts which some men think it their duty to make, to conceal their true origin.*

Let us, as physiologists, examine how far the fundamental qualities and faculties of man, may become evil propensities, and, consequently, the source of moral evil.

The brain, the instrument of the moral qualities and intellectual faculties, is essentially the same in all well-constituted men; but the various integrant parts of the brain, or the different organs, are not equally developed in all. The relations of these developments are infinitely varied. Hence, the infinite variety in the moral and intellectual character of men.

In the same individual, all organs do not receive the same degree of development. It follows, hence, that no man possesses all qualities and all faculties to the same degree.

The function, or the tendency of the activity of an organ, is graduated according to the degree of its development or excitement; the function of an organ, moderately developed, is not similar to the defective or excessive development of the same organ. The propensity to propagation is, certainly, the most necessary institution of the Creator; but, when its organ is too little developed, we experience impotence, indifference, or even aversion to the other sex. Too much developed, on the contrary, it degenerates into a propensity to salacity and all its excesses. The love of children is one

* It would be more correct to say the *abuse* of the propensities, than to denominate them bad. There can be nothing *bad*, absolutely, in nature.

of the first qualities of a mother; but too small a development of the same organ produces indifference, and even hatred to children, and may become one of the causes of infanticide. This organ, too much developed, is the source of the weaknesses which fathers and mothers allow themselves toward their children. There have even been instances of females, condemned to celibacy or to sterility, being tempted to commit the crime of child-stealing. The instinct of self-defence, a necessary quality, becomes, in its exalted action, courage, inclination for combat, temerity; in its depression, on the contrary, timidity, dastardliness, cowardice. No one will say, that it is a misfortune for man to be destined to live on flesh, as well as on vegetables; yet, it is an excessive activity of this same inclination, which produces, step by step, insensibility to others' sufferings; pleasure at causing and witnessing pain; the inclination to destroy, kill, burn. The sentiment of property, innate in man, and even in animals, will always be one of the principal bonds of social order; but, give too much energy to this same sentiment, and the man will be tempted by inclination to fraud, usury, corruption, venality, theft. The love of honor, the source of so many noble actions, if too eager and ill-directed, seeks flattery, luxury, ostentation. Noble pride degenerates into presumption, insolence, contempt, and despotism. It is thus, that raillery, mockery, the spirit of sedition and independence, insubordination, disobedience, obstinacy, credulity, superstition, idolatry, have their origin in dispositions primitively good, and essential to the human race.

Qualities and talents, peculiarly distinguished, are of the same origin. It is always a very favorable development of an organ, an unaccustomed energy of its function, which produces the disposition to benevolence, religious sentiments and ideas, the talent for poetry; without such development there would be neither great musicians, nor great sculptors, nor great orators; all the arts and all the sciences would remain in a state of obscure mediocrity.

This explanation of the degeneracy and of the improvement of man's moral and intellectual forces, of the origin of his vicious and virtuous propensities, of genius, and of weakness of intellect, is most in conformity with his nature.

It is now time to meet the great question, namely, as man cannot, in any manner, arrest the development of his organs, nor, consequently, relax the energy of their functions and cause himself to be urged either more or less imperiously to do good or evil, are his actions, also, submitted to the same fatality? Does he do good or ill by irresistible impulses? or does his organization permit him a voluntary determination? Are actions evidence of merit or demerit?

It is important, that I should put this subject in the clearest light; and as there result from it the most important practical consequences, I shall treat it with peculiar attention and perfect frankness. May my readers bring to the examination the same love of truth, which will guide me in the whole of this great discussion!

Free Will.

Free will has always been the stumbling-block of most of the philosophers. A great number have succeeded, by force of reasoning, in proving that all which happens, happens necessarily; and as all actions are the necessary consequence of preceding ones, in the same manner as an effect is the necessary consequence of a cause, they have concluded from this necessity, from this relation between cause and effect, that there can be no voluntary act, and have, therefore, denied all liberty. Others, on the contrary, have made a romance of the nature of man, and, comparing him to the Deity, have assigned to him liberty without bounds. Others, again, think, that they see freedom, where there exists in fact nothing but its image. A few only have regarded free will in its true and correct point of view.

Whether we allow too much or too little liberty to man, we shall always do wrong to morality; and the judgments we form on our own actions, and those of others, will even lead to error. It is, therefore, important to clear up this obscurity, and to determine, to what extent a man in possession of his faculties, enjoys the power of choosing between such and such an action.

Unlimited Liberty.

There are not wanting philosophers, who, seeing in man the image of the Deity, make him almost as free as God himself. They give him unlimited liberty; but unlimited liberty would imply, that man created his own nature; that he is himself the author of his desires and faculties; that he governs himself independently of all law. As man has not unlimited power over his birth, nor over the duration of his existence, nor over his sex, nor his temperament, nor the influence of external things, such a liberty is completely in contradiction to his nature. All that can be said in favor of this boastful opinion reduces itself to emphatic declamations, void of sense and truth.

Absolute Liberty.

Other persons think it proper to admit at least an absolute liberty, by virtue of which a man may act without motive, internal or external. But, as there is no effect without a cause, as one thing is always the cause of another, and as nothing in nature can happen except in accordance with determinate laws, it follows that every phenomenon, such as that of an absolute liberty which might take effect without cause, is absolutely impossible. If man could act without motive, and solely from caprice, there would be no certainty, nor even probability, that, under given circumstances, he would

act in such or such a manner. Sex, temperament, and organization more or less perfect, the education received, habits, principles, laws, morality, religion, circumstances, natural propensities and faculties, fortuitous excitements, nothing, in fact, would enable us to divine, with any probability, on what an individual, so constituted, would determine. For the rest, this liberty would be a faculty in contradiction with itself, since it would make a man act reasonably or unreasonably, justly, or unjustly; finally, well or ill, but always without motive. Why should we expect of a man in such case, friendship and fidelity rather than hatred and perfidy; virtue rather than vice? All institutions which have for their object the welfare of individuals and society, would be useless. Of what use would be education, the culture of the mind and heart, morality, contracts, promises, oaths, religion, punishments, rewards, when nothing for such a man would be a determining motive? In this hypothesis, man alone would form an exception to the general laws, by virtue of which each phenomenon has its cause; and the ideas, the sensations, the propensities, thoughts and actions of man would not be determined by previous causes in the manner every event without him would be regulated. Such liberty, then, is an absurd chimera.

M. Ancillon,* in maintaining the doctrine of absolute liberty, says—"The dignity of human nature is founded entirely on moral liberty: moral liberty is the power of obeying the law under all circumstances, the power of commencing a series of actions in spite of all the causes and all the motives, which would seem to involve, necessarily, a different series. To present actions in their relation with liberty, is to start with the principle that the actions of man belong to himself always, and that he is always at liberty to omit or to do them. When we are satisfied in history with simply explaining actions,

* Melange de lit. et de philo. tom. 1. p. 245.

we degrade man; he becomes a passive instrument, an integrant part of nature, and freedom disappears. We cease to take into account the power, which the man had of doing otherwise than he has done, and it follows that this was the only course left for him."

Thus, according to this author, man, as man, is an entirely insulated being, who has nothing in common with the rest of nature. On the one hand, M. Ancillon, abandoning himself to vain reveries on the noble nature of man, thinks* that always, and under all circumstances, he has the power to withdraw himself from the influence of all causes, of all motives, and of entire nature: liberty, according to him, is the only force which submits to no law, to no cause, and which has its support within itself.† On the other hand, he confesses that nature exercises a great control over man, that the laws of nature tend, without ceasing, to encroach upon those of liberty,‡ and that the power which nature has over man, explains his actions.§ By adopting the true view of a subject, one does not fall into such contradictions. Kant,‖ therefore, and Feurbach,¶ have reason to say that absolute liberty has nothing real, and is only speculative. That I may avoid difficulties arising from too much obscurity, I shall not enter into the discussion of the question—how actions can be necessary, and nevertheless voluntary and free.

In maintaining that man has only to will, in order to be capable of every thing, philosophers endeavor to establish a principle in conformity with good morals. But, can a principle which is belied at each step we make in nature, and in the study of man, be a principle of good morals? A principle, which always tends to make us forget the motives, the true sources of our actions, and which, by that circumstance, deprives us of the

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* L. c. tom. 1. p. 245. † L. c. tom. 2. p. 224. ‡ L. c, tom. 2. p. 287.
§ L. c. tom. 1. p. 245. ‖ Metaphysische Anfangsgrinde.
¶ Revision der Grundsatze und grundbegriffe der positiven Rechts, Jena, 1799.

means of directing them; a principle, which makes an independent will, or rather a caprice, the author of our good and evil actions, and which consequently destroys all the equality of our judgments on the actions of others, all justice in criminal legislation, all tolerance, all charity: such a principle is certainly not a principle of good morals.

Of Illusory Liberty.

To those who deny free will, is commonly opposed the internal sense of individual freedom. It is said that every one has a consciousness, that so long as no constraint, physical or moral, forces us to act, we act freely,—that is, that we might have acted in a different manner. But, as the adversaries of free will, prove that this feeling, this internal consciousness, is only an illusion, it would be better, for the good cause, to abandon this argument.

In fact, even when acting under the influence of desires more or less imperious, without choice, without will, man experiences a sense of satisfaction which connects itself with the accomplishment of his desires and which is the more lively, in proportion as these desires were the more urgent. It is this satisfaction which misleads the individual, and makes him imagine that in this case he acts with freedom. Thus, he thinks he acts with freedom when he walks erect, although his organization obliges him to do so: the man agitated by jealousy and the desire of revenge, and he whom the fire of love is consuming, regard themselves as free, so long as their desire and its accomplishment cause them to feel satisfaction. When the storm is hushed, they change their tone and acknowledge, that they were carried away by the impulse of passion. We are often entire strangers to every idea of sensual appetite; but hardly does an object excite our organs, when immediately we experience the desire of possessing what we should have disdained an instant before, and yet we believe, that we have deter-

mined with freedom. Animals do not enjoy real liberty; yet they act without feeling any restraint. Like men, they experience the pleasure which follows the accomplishment of their desires. Can we say that the sheep and tiger are free, because the one browses on the grass, and the other tears his prey with a feeling of satisfaction?

It is because men have confounded this internal feeling with true liberty, that they have thought to oppose to it the following reflections:

"A ball," says Hommel, "placed on a board, allows itself to be moved forward and backward, to the right and left. If the board is at rest and horizontal, the ball remains motionless. If this ball had consciousness of its motion and not of the cause, it would believe that it moved voluntarily." Leibnitz compares liberty to a magnetic needle, which should have pleasure in pointing to the north. "In this case," says he, "it would imagine that it moved freely and independently of any other cause; for it would not perceive the subtle movements of the magnetic fluid."

In a variety of circumstances, even our judgments are accompanied with a pleasurable sensation, without being, in consequence, the results of our reflection. Hence it is that we judge the same object differently, according as from one instant to another, what has passed within or without us, has produced some change in our internal feelings. In this sense, M. Lamark* is right in saying, "that the diversity of our judgments is so remarkable, that it often happens, that the consideration of the same object gives rise to as many particular judgments as there are persons who undertake to pronounce on the object; and this variety has been taken for freedom in judgment, but erroneously; for, it is simply the result of the different elements, which in different individuals enter into the judgment thus formed."

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* Zool. philo. tom. 2. p. 343.

It is in the same sense that we must interpret the following passage of M. Feurbach. "The faculty," says he, "of being determined by the ideas to realize an object, or, to act, is accompanied with the consciousness of an independent activity, of absolute *free will*. When of two possible opposite determinations we decide for one or the other, when we reject the one and desire the other, we believe, in accordance with what immediate consciousness teaches us, that the cause of this choice resides entirely in us; that the faculty of desiring is the principle of desire, and that, under the same conditions, it might as well have determined for one thing as for another. Although we thus appear, in this case, not as determined, but as determining, this feeling does not secure to us our freedom; and we cannot regard it as a proof of our independence of natural causes, without exposing ourselves to the well-founded objections of the *determinists*, and contradicting the natural law of the constant connection of causes and effects. This internal feeling may be an illusion. We have this feeling of liberty, solely because we do not discover the secret threads which connect causes with effects, and which draw us toward such or such an object."

It will be seen, then, that these passages are directed against those, who would prove free choice by this internal consciousness, by this illusory feeling of liberty, founded solely on contentment, on the satisfaction of the desires.

What, then, in fine, is the kind of liberty which we must admit for man, as a being endowed with inclinations, sentiments, talents; in a word, with moral qualities and intellectual faculties?

Moral Liberty.

We cannot, and we ought not, admit any other liberty than that which is in accordance with the general laws of nature and with the nature of man. We have seen

that an unlimited liberty and an absolute liberty are in contradiction with the nature of a being created and dependent. The liberty which we ought to acknowledge, must consider man as a being subject to the laws of causes and effects: this liberty must render the individual and the lawgivers responsible for good and evil: in this liberty our acts must have the quality of merit and demerit: the development of this liberty must convey the full conviction, that it depends not only on the organization, but also on the influence of external things, whether man is more or less master of his actions; and that social institutions, education, morality, religion, laws, punishments and rewards, are eminently useful and indispensable. A liberty, which has all these characteristics, is a moral liberty.

Moral liberty is the faculty of being determined and of determining one's self by motives; or, in other words, liberty is the power of willing, or not willing, after deliberation.

It is this liberty, which has been the subject of the lessons of the ancient philosophers and lawyers, the only liberty, the application of which to social life and to each individual, can have the most extended influence. The moral code and the religion of all nations themselves, suppose only this species of liberty; since their only object is to furnish to us the most powerful and the noblest motives to direct our actions.

There are, then, two principal points to consider in moral liberty; the faculty of being determined, and the faculty of determining one's self by motives.

To make these two points clear, it is first necessary to remove a difficulty which results from my two propositions already proved, that all our dispositions, propensities, and talents are innate, and that their manifestation depends on the organization. It may be asked, to what extent moral liberty can reconcile itself with these two truths? "Man," it is said, "can in no wise change what is innate; no more can he change his organization. He must, consequently, act as the innate faculties and

qualities, and their organs permit, or rather command him."

It is true that man cannot change his organization, nor the results which follow directly from it. Moreover, he has no control over accidental impressions produced from without. Thus, when by the effect of his organization, or of external stimuli, there arise in him sensations, propensities, feelings, ideas, wishes, we must consider him, as respects these impressions, desires, and thoughts, as the slave of his own organization and the external world.

Each organ, when put in action, gives him a sensation, a propensity, a succession of ideas, and, in this respect, he has no empire over himself, except so far as he might prevent or produce the action of the organs. As it is impossible for him not to feel hunger when his stomach acts in a certain manner, so it is impossible for him not to feel the desires of the flesh, or any other propensity whatever, for good or for evil, when the organs of these propensities are in a state of excitement. It would, therefore, be unjust to render man responsible for the existence of these sensations and desires, and for him to make of them a personal merit or demerit.

But we must be cautious; for it is a great mistake to confound *propensities* and *desires* with *will*. To will, is nothing less than to feel desires, as M. Richerand* quotes with approbation from M. de Tracy,† or as Fichté says, the simple tendency of the faculties to act; and desire is nothing less than a movement of the will towards a good which one does not possess, as it is defined in the *Dictionary of the French Academy*.

The ancients spoke of desires, concupiscences, volitions, or inclinations, and distinguished them carefully from will. Kant has with reason followed them, and Condillac‡ says, on this subject, with much justice, "As

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* 7th ed. tom. ii. p. 189. † Ideologiè, p. 69.
‡ Œuvres compl. tom. iii. p. 26.

it does not depend on us, not to have the wants which are the result of our conformation, it no more depends on us not to be inclined to do that to which we are determined by these wants."

It is then, also, from having confounded these various affections, desires, concupiscences, inclinations, with true will, that men have found inextricable difficulties relative to moral liberty. There is reason to deny freedom, as respects the existence of the desire; but it is a false inference, to conclude that the will and the acts are equally wanting in freedom. The desires, the propensities, are the result of the action of a single organ, as I have shown in treating of the origin of moral qualities and intellectual faculties. Will, on the contrary, is a decision, a determination, produced by the examination and comparison of several motives.

Let us examine how man becomes capable of will, and, consequently, of moral liberty; how man can be in opposition with his desires; and how this same will, this same freedom, acquires, in different individuals, a different extent.

Let us represent to ourselves a being, endowed with a single organ. This being could perceive only a single species of sensations or ideas, and would be capable of exercising only a single species of faculties. Such a single organ might well be put in action by internal and external irritations, and be exercised in this action by frequent repetitions. But this individual would not be susceptible of any other sensation or idea. It would be impossible for him to compare sensations and ideas of different kinds, and to choose between them. Consequently, as soon as the single organ should be put in action, there would be no reason why the animal should not follow the propensity put in motion, or the idea awakened by this action; he would, therefore, be under absolute restraint; or, rather, he would have no possibility to do otherwise than submit himself to this motive, to this single impulse. The inaction or action of this being, would result simply from the activity or inactivity

of this single faculty. It is thus that the inferior animals are invariably limited to their aptitudes or their instincts.

As soon as animals are endowed with several organs, as happens especially in the more perfect orders, they also become susceptible of different species of sensations and ideas. It is true that, in this case, the action of one organ destroys neither the existence nor the action of another; consequently, it can no more destroy the sensations and ideas excited by this organ. But an organ may act with more energy, and furnish a more powerful motive. The instant you have presented food to a hungry dog, and when he is on the point of devouring it, make a hare pass before him, and he will run after the hare, though he has not ceased to feel the sensation of hunger. If you repeatedly employ violence to prevent the dog from pursuing the hare, he remembers the blows which await him, and, though the ardor of his desire occasions him tremors and palpitations, he will no more trust himself in the pursuit. If the dog were only susceptible of hunger, or if he had propensity and faculty only for the chase, this mode of action would be impossible to him. It is, then, the plurality of organs which renders him susceptible of different ideas and sensations. But, as these ideas and these motives are not of a high order, we cannot call this faculty in animals, a moral freedom, a real faculty of willing; we must regard it as simple *spontaneity*, or the faculty of being determined by the strongest and most numerous excitements.

Now let us compare man to the most perfect animals. How are the motives, of which his more elevated organization has made him susceptible, ennobled and multiplied? Beside the propensities and the faculties which he has in common with animals, he distinguishes truth from error, justice from injustice; he compares the present with the past, and reads the future; he seeks and discovers the connection of causes and effects; he has the sense of shame and decency; he has sympathy and compassion, and can, of himself, dis-

cover the duties which he owes to others; he is furnished with internal organs for morality and religion, for knowing and honoring an eternal and independent Being. His internal organization, his language, tradition, education, &c., secure to him an abundant source of knowledge, and furnish him an infinitely larger number of motives than animals can have. By means of his reason, he compares ideas and sensations, weighs their respective value, and can especially fix his attention on determinate motives. From all these operations, finally, results decision. It is this decision, the result of reason, and of the comparison of motives, which is properly willing, and the act of willing, in opposition to the propensities, desires, volitions, the inclinations, and the simple sensation of contentment.

It is now easy to conceive, how man may have desires and inclinations altogether different from his will, and how his reason places him in opposition to his desires. The senses are inflamed, and man feels himself incited to obey this movement; but if he abandons himself to his desire of vengeance, he knows, by means of his intellectual faculties, that a base action will dishonor him, and that he will be rather regarded as the slave of his passions than as master of himself; if he throws himself into the arms of voluptuousness, the frightful image of his health destroyed, and his domestic felicity overthrown, presents itself to his eyes; the regulations of social life, the shame of abusing confidence, the disastrous results of his conduct as affecting the beloved object, &c. &c.; all these motives act in his mind, and by their force or their number succeed in overcoming him. It is thus that a man comes to will a thing precisely the reverse of that to which his desires would have led him.

Each one, then, ought to feel that, so long as the propensities and the desires are not awakened and nourished by the participation of the individual, he cannot be made responsible for them; but that he is so for his de-

termination, for his will and actions.* Thus it is, and always will be true, that the organs of the moral faculties given by the Creator, are the principle of what we call sometimes propensity, sometimes inclination, desire or passion, according to the different energy of action of these organs. Every one allows that, in this respect, the empire of man is limited; it is not in his power to annihilate his propensities, nor to give himself inclinations at will. But, in the midst of the most earnest desires of man, if several faculties of a superior order, the exercise of which is maintained by a perfect organization, act in him, and join themselves to the external motives which education, the laws, religion, &c., furnish him, these same desires are overcome. The will which man then manifests, is no longer the action of a single organ.

It is the business of the man, secured within and without by multiplied motives, and endowed with the faculty of comparing them, to weigh them, and to be determined, or to determine himself, according to these motives. Now it is incontestable, that, so long as man enjoys his good sense, he can act thus, and that he often wills and does the entire contrary of what his propensities direct him; consequently, he is morally free. It is this liberty which makes of man a moral being, which gives to his actions morality and responsibility.

But, let us not believe, that this faculty of willing or not willing, this moral liberty, has been given up to chance by the Creator.

The determination which takes place by motives, is also submitted to laws in such a manner that, in the exercise of moral liberty, there can never be any question as to unlimited or absolute liberty. The laws of nature, for instance, ordain that the faculties of an inferior order

* Nec tardum ingenium, nec labilis memoria, nec inquietus appetitus, nec sensus obtusus, nec vita languens reum per se statuerunt hominem, sicut nec contraria innocentem, et hoc non ob aliud, nisi quia et hæc necessario et præter voluntatem posse prævenire probatur. (S. Augustinus, de liber. arbit.)

should obey those of a superior order; that every living creature should love himself, and, consequently, employ all his means and his faculties for his own happiness. "All men," says Pascal, "desire to be happy. This is so without exception. The will makes no effort except toward this object. It is the motive of all the actions of all men, even of those who destroy themselves." Man must, then, necessarily desire a good, and dread an evil, which he acknowledges as such. If several motives present themselves, it is not in the power of the man to decide indifferently for one or the other; but he is determined, according to the laws of thought, by the motive which acts most powerfully upon him, or offers him the greatest good.† Without this necessity, man, with all his moral liberty, would fall into that unreasonable contradiction against the laws of nature, of which I have made mention in speaking of unlimited and absolute liberty.

Meanwhile, this liberty, conformable to the dependence in which we are placed in the creation, to the laws of nature and of our organization, fulfils all the conditions which we can expect from a finite, but reasonable being. It not only renders those who direct man, responsible, but makes each individual so, for his actions; it is the only liberty which can be useful in life, and, as Locke‡ says, the only one which is supposed in human institutions; while, in admitting an unlimited or absolute liberty, all the efforts which tend to guide man, would be absurd.

When certain philosophers require, that we should practise virtue and justice, without any motive, for the sake of virtue only, far from doing away with the ne-

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* Pensées sur la religion, p. 162.

† Quelles facultés sentez-vous en vous-même? R. Deux facultés principales: la faculté de connaitre et la faculté de vouloir, ou de me porter *a ce quil me plait.* (*Catechisme à l' usage de toutes les eglises de l' Empire Francais.* p. 22.)

‡ L. c. tom. iii. p. 454.

cessity of motives, they present to you virtue and justice as the most sublime motives, and the most worthy to lead you to act. Every thing, then, proves, that in all states of human society, men have supposed no other freedom than that of being able to be determined, or to determine one's self, by the most powerful motives.

It is certain, that all individuals do not enjoy moral freedom to the same extent. How happens this?

We have seen that the faculty of appreciating motives of a superior order, constitutes the first condition of moral freedom. Now, all motives are founded either in our own constitution, on a happy organization, or on external circumstances. As our internal faculties are more limited, the fewer motives will they furnish us to do good, or to avoid evil; and the more the noble sentiments and faculties predominate over the propensities, the more will these be counterbalanced, when their tendency becomes prejudicial. Thus, the man with great talents has more liberty than the ordinary man; and the more the faculties descend towards idiocy, the more, also, moral liberty goes on decreasing.

The second source of our motives is in external circumstances. The man who has fewest wants, will also be less tempted than the man who is sunk in misery. The man formed and cultivated by education, morality, and religion, and who understands the laws and the duties of society, will have infinitely more motives in his power than he whose heart and mind have been abandoned to ignorance and brutality. In general, the greater disproportion there is between the motives, whether internal or external, and the energy of the propensities, the more precarious becomes the exercise of moral liberty.

Are our Actions uncontrollable by reason of our Propensities and our Faculties being innate?

What I have now said on moral liberty, proves how far I am from maintaining the uncontrollable character

of our actions. It is not because those who accuse me of this absurdity, do not understand my principles; neither will I say that it is through ignorance, or through piety, that they have assumed so bitterly the character of censors of my doctrine. No; let us leave it to posterity to do justice to their motives and intentions, and let us pursue our own task of rectifying erroneous ideas.

Professor Ackermann of Heidelburg, whom my adversaries in Germany have adopted as their leader, and whom my adversaries in France have faithfully copied, has directed himself with a suspicious animosity against the innateness of the moral qualities and intellectual faculties. If these dispositions are innate, said he, we have done with moral liberty; our actions are inevitable, and malefactors of all kinds have gained their cause.* Observe to what means he has recourse to prove this consequence.

Objection.

"*An organ is the real representation of the faculty itself.* The organ being given, its action is so likewise. A muscle which contracts is a different muscle from one which is extended. This is the true definition of an organ; but it cannot be adapted to the trash of Dr. Gall, since he would be obliged to say, that the organs being given, their peculiar action is so likewise, which annihilates the liberty of man."

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* Compare with this passage, the remark of M. Moreau, de la Sarthe: Exposition of the system of Dr. Gall, extracted from the *Decade Philosophique*, etc. and the *Journal de l' Empire;* many passages in the *Dictionnaire des Sciences Medicales:* Tupper on Inquiry into Dr. Gall's System, etc.

Reply.

All the objections of Ackermann turn upon the same false definition of *organ*, and I should be almost ashamed to regard them as worthy of the least attention, if they had not found so many partisans.

If the organ and the manifestation of its functions are the same thing, the organ cannot exist, unless its function takes place, and the agent must disappear every time the function ceases; consequences which Professor Ackermann himself derives immediately from his definition. Thus, not to lose an organ, we must keep them all in eternal activity, together; we must always, and at the same time, taste, smell, hear, look, touch, run, sing, dance, speak, eat, think, learn by heart, judge, will, &c. In sleep, all the organs of animal life would disappear. Who does not see the absurdity of Ackermann's definition, and, consequently, the absurdity of his whole argument?

I call an organ, the material condition which renders possible the exercise or the manifestation of a faculty. According to this definition, it may be conceived that no exercise of a faculty is possible without an organ, but that the organ may exist without the faculty to which it belongs, being put in exercise.

Professor Ackermann will have it, that men cannot refrain from doing things, for which they have received material conditions or organs. He does not perceive that he contradicts himself. According to him, the cochlea of the ear is the organ of music;* according to him, too, the *thalami nervorum opticorum*, (couches optiques,) and well-organized senses are the organs of the imitative arts;† he likewise maintains that the organ of painting is a practised eye.‡ Now, if it be

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* L. c. § 157. † L. c. § 160. ‡ L. c. § 156.

true, that no organ can exist without action and exercise, it follows that every man and every animal which has the cochlea in the ear, must perform or compose music; that every man and every animal possessing the *thalami*, and senses well organized, must be skilful in the imitative arts, and that every man and every animal having a practised eye, must constantly be engaged in painting. I shall not remark how singular it is, to hear it said, that we can *acquire* an organ, to those who pretend to understand thoroughly the true principles of the physical organization.

Objection.

§ 77. "When the organ becomes atrophous, the faculty or the aptitude which has existed by this organ, immediately ceases. This, experience teaches us. A musician of the greatest powers, if he does not cultivate music, loses the faculty of perceiving and producing tones; the painter loses his talent when he no longer exercises it. This is what will hold true of all the organs of the animal body. The muscles of an individual, obliged by disease to remain a long time stretched on the bed, become atrophous, and the faculty of motion diminishes in the same proportion. The eye becomes atrophous in the darkness of the prison, and the faculty of seeing is proportionally diminished. What need we more to prove, that without a manifestation of the faculty, no new organ is produced or exists, and that the diminution and cessation of activity, involve the wasting and gradual disappearance of the organ?"

Answer.

I have several times repeated my confession of faith; it is, that the want of exercise may retard the activity and the development of an organ. It is on this that I

found the advice to control as much as possible, in children, the exercise of organs which may become dangerous; to prevent, by this means, the facility of action which would be the consequence, and to favor, on the contrary, the action of organs whose tendency is advantageous; but I have never inferred from this, that without some manifestation of the faculty, any organ can be produced or can exist. Men and animals bring with them, in coming into the world, all the organs of the functions of the senses, and even the internal organs which Ackermann supposes, such as the organ of will, of comparison, of abstraction. It would be difficult for him to call in question that we are born with eyes and their nerves, with the tongue, nose, ears, hands, and with the nerves of all these parts, with the great cerebral ganglion, heretofore called the thalami; in fine, with the two hemispheres of the brain. These parts, therefore, exist and are born previous to all exercise, before any manifestation of faculty; and though so many animals remain deaf and blind for several days, and new-born infants can neither compare nor abstract, yet all their parts tend, by degrees, to their perfection, and become successively capable of exercising their functions. For the rest, one hardly knows how to answer the metaphysics of Professor Ackermann. It would follow, by taking his opinions literally, that the atrophy of organs is impossible; for if it be true, as he often repeats, that the existence of the organ coincides necessarily with the manifestation of the faculty, it ought to result that the organs, so long as they are not violently destroyed by death, are continually exercised, and thus preserve their existence and integrity.

Objection.

§ 78. "The beautiful hypothesis by which Dr. Gall, in the exposition of his doctrine, thinks to secure the freedom of man, falls of itself; for, as soon as he shows

an organ of theft, the being in whom he observes it, must be a robber; and not only has an assassin the organ of murder, but whosoever has on his cranium the organ of murder, must be an assassin. If he says that one may have the organ of murder without being an assassin, I deny this proposition, because no organ can exist without its faculty being manifested; if he objects that the manifestation of the faculty may be arrested by other organs and other actions, I say that in this case the organ ought also to waste, and that, consequently, the organ of murder should be wanting in him who in fact is no assassin."

§ 79. "It must be confessed that the idea of admitting organs without the presence of the faculties which they ought to represent, is an excellent subterfuge, to escape and to answer all the reproaches and all the objections which can be made to organology. For, if any one whose skull is examined, has the organ of theft, and yet is not a robber, it will be said that the organ only indicates the disposition, and that the man, in not robbing, proves that he has had a good education, which has given him the means of resisting a violent propensity. If an arrant knave has not the organ of theft, the difficulty will be got rid of by showing, that respect for another's property has been somewhat set aside by the preponderating action of the other organs, but that one cannot impute this act to the organ of theft, which is entirely wanting."

§ 80. "Dr. Gall has a vast field open before him; he may traverse it with short-sighted people, and set aside their objections with extreme facility. But he is overpowered in presence of the true observer of nature, whom he resembles only by his mask. He must of necessity confess that, if there were organs such as he imagines, these organs could not exist without a manifestation of the faculties; and that whoever has the organ of murder must be an assassin, in the same way as whoever never has committed murder, cannot have this organ. He must confess, that such a doctrine, if it could subsist,

annihilates the freedom of man, and that then human society could only be governed by the laws of a blind necessity, and not by those of reason. But, fortunately, Dr. Gall's doctrine of organs is worth no more than his logic and his observations of nature taken in a mass. It is evident, that there are not, and cannot be any organs like those, which Dr. Gall has invented."

Answer.

I have combined these three paragraphs, in order to comprehend them in a single answer. Why do my adversaries, when they pretend that I teach the uncontrollable character of actions, always speak of the propensity to theft and the propensity to murder? They know, in the first place, that by the expression, propensity to murder, I by no means design an organ which leads immediately to homicide, but simply the natural propensity to killing other animals, a propensity which belongs to every carnivorous animal, and, consequently, to man; they know that it is only the degeneration and abuse of this propensity which lead to homicide; they know, also, that we admit organs of goodness, as well as moral and religious sentiments; why, then, do they not say that men are irresistibly led to commit good, moral, and religious acts?

Professor Ackermann cannot admit what I have always publicly professed, and what I have now established in this treatise, on the free use of innate qualities, because, then his objections would reduce themselves to nothing. I am, therefore, going to prove to him, by arguments drawn from his own principles of physiology, the truth of what I have advanced above. Though the will has no immediate influence on the vegetable or automatic life, or on the organs of this life, such as the heart, liver, kidneys, still Professor Ackermann acknowledges, with all physiologists, that animal life, and the action of its organs in a state of health, are almost entirely

subject to the will. Now, as he establishes the principle, that there exists an organ of will in the brain, it would result from his own avowal, not only that all the actions of animal life ought to take place necessarily and always, but also, that by a singular contradiction, will and irresistibility would exist together!

As Professor Ackermann always continues to repeat these same objections, I am obliged to hold to the same answers. All his arguments have no other basis than this false definition: *the organ is the true representative of the faculty.* If the organ and the manifestation of its faculty were the same thing, and their co-existence were necessary, all the organs of animals and of man, those of automatic as well as those of animal life, would have to be continually and simultaneously in action, or an instant of cessation of the action would cause them to disappear. Where do we see any example of this in nature? Does a muscle disappear because it is inactive? Ackermann answers, that a muscle in motion is quite another muscle from that at rest. It would result from this reasoning that the same foot, according as it walks or remains immoveable, would be quite a different foot.

Let us again reason on the other avowals which Ackermann makes. He admits the brain as the organ of the soul in general: he establishes, besides this, some peculiar organs in the brain, for comparison, judgment and will; he regards the combination of solid and liquid parts, the nervous plexuses and the ganglions of the chest and abdomen, as being the organs of the affections and passions. Now, if the objections which he makes to me had any foundation, would not these objections be common to his system with mine? Would it not follow, from his own confessions, that man ought without ceasing to compare and judge, to wish, without cessation, good and evil, truth and falsehood; to be unceasingly a prey to all affections, and to all passions; and that, when in sleep, in fainting, in apparent death, these organs cease to act, all should immediately disappear?

The idea which Ackermann conceives of an organ, is

so contrary to good sense, that he has not been able to keep himself invariably to the same language. He says expressly, in parag. 77: "The organ and the manifestation of the faculty belonging to it, are the same thing; without exercise, no organ can exist, or be produced: the cessation of action of an organ involves its diminution, and, finally, its disappearance." He also says, in parag. 78, that no organ can exist without manifesting its faculty; that the man who has the organ of murder, must be a murderer, as he who has never killed cannot have this organ. Now, what I am going to cite, is in direct contradiction with what precedes. Professor Ackermann says, in parag. 73: "The manifestation of the faculties depends solely, or in a great degree, on perfectly developed organs: when the manifestation of the faculties does not take place for a long time, the organs or the dispositions must successively diminish, and, in fine, disappear altogether." He admits, then, here, that the birth of organs, their existence, and their perfection, are anterior to the manifestation of their faculties. He does not, then, regard the organ and the manifestation of the faculty as being the same thing. It is no longer on single organs that he makes the faculties to depend—he makes them thus dependent only in a great degree; and in order that the action may be effected, he admits, likewise, other conditions. In fine, he confesses that the organs diminish gradually, only when they have been a long time inactive.

Ackermann does not content himself with confounding, every moment, the total disappearance of organs with this diminution; he also regards simple alterations and maladies of organs, such as hardening, and paralysis, as being the same thing with the complete annihilation of an organ, and takes the effect for the cause; for, in these cases the cessation of the functions is a consequence, and not the cause of the malady.

In fine, all the statements given by Ackermann are false. Without exercise, says he, no organ could exist or be produced; although just before, he had said, that

they are produced and exist a long time without exercise. Are not all animals and all children born with several organs and senses, though they may not have been able to exercise them in the womb of the mother. At all periods of life, the organs are perfected before they can fulfil their functions or be exercised. They exist, then, very well, without any exercise, and without fulfilling any of the functions which are proper to them. The muscles of the external ear are found in almost all men; but since the creation, there have been but a small number of individuals, in whom they have been exercised. It is commonly by chance, and after having lived thirty or forty years, without using this faculty, that one finds that he can move the muscles of the external ear, or the skin of the top of the head. Thus, there is nothing but error and contradiction in all the objections of Professor Ackermann and his partizans, M. Moreau de la Sarthe, M. Tupper, &c.

M. Kurt Sprengel, eminent for the services which he *has* rendered to science, has addressed some objections to us on the irresistibility of actions.* I sincerely wish, for the honor of German literature, that so distinguished a scholar had not spoken of my doctrine, till after he had been led to understand its spirit and purport, otherwise than by rumors. That has naturally happened to M. Sprengel, which happens to every learned man, who wishes to attack a doctrine before understanding it in its whole extent. Even while urging the consequences which he thinks must flow from this doctrine, he cannot refrain from rendering homage to the truths which form its basis.

M. Sprengel makes the faculties of the soul and mind depend in part on the brain, in part on the temperament. He extols the advantages of the mind, when it inhabits a healthy body. He acknowledges, as we all do, that health is necessary, in order that the functions

* Institut. Med. Amst. 1810. T. ii. § 368. (A Paris chez. F. Schoell.)

of the mind may be duly performed. Too great irritability,* he says, has for its consequences erroneous judgments, an ardent imagination, a faithful memory, a refining spirit, irresolution, inconstancy, profound sadness, and inordinate gaiety. The voluptuous character of the fair sex depends on the delicacy of their physical constitution: the soft temperament produces a feeble but sure memory, an indolent conception for love and hatred; a dry temperament gives, on the contrary, many errors, a durable memory, attention to a single object, an imagination often overflowing, and very lively affections of the soul.

This last and ancient error has maintained itself till now, among all the physiologists: all continue to speak of the different qualities of the mind and soul which must result from such or such a temperament. The most recent physiologists have no scruples in advancing that the man endowed with a sanguine temperament may, in vain, wish to renounce the pleasures of the senses, to have fixed and durable tastes, to obtain by profound meditation the most abstract truths: controlled by his physical propensities, he will incessantly be brought back to the pleasures he avoids, and the inconstancy to which he is destined.

These assertions are repeated from one age to another, without ever asking or examining whether they are proved by constant experience. What is certain, is, that this doctrine establishes at once the innateness of the faculties of the soul and mind, and the dependence of their exercise on material conditions. Whether these conditions all reside in the brain, or whether they are dispersed through the whole body, in the viscera, in the nervous plexuses, in the blood, or in a nervous fluid,—they are, nevertheless, material conditions, which hold the manifestation of the moral qualities and intellectual faculties in their dependence.

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* L. c. p. 276.

Yet, though M. Sprengel regards the properties of the soul and mind, as consequences of the harmony of the solids, and the combination of the fluids, he nevertheless accords to man a free will, and says expressly, that one need only blame himself, if he be led away by his temperament.* Why, then, not be satisfied with my asserting also, that man has only himself to blame if he follows the impulse of his organs; and that I believe with St. Augustin, that God, in giving the power, does not impose any necessity?†

I have proved, that it is only by admitting different organs for the different qualities and faculties, that we conceive how an organ can excite to certain actions, while other organs produce movements and ideas precisely opposite; and that we thus comprehend how man, when evil propensities are stirring within him, can either within himself or without, find opposite motives, and adopt a contrary resolution. But where shall man find opposite motives within him? how shall he be capable of receiving those which come from without, if the principle of his propensities, his desires, his faculties, in fine, of all his sensations and thoughts, resides in a single organ, or in the whole body? When the blood cries for vengeance, what integrant part of the temperament shall give to man, tranquillity, or the power of vanquishing himself? We may, then, affirm, that moral liberty can only exist on the supposition of a plurality of organs.

There is, again, a new difficulty, of which German authors have spoken. From observations which I have made in the prisons, it results, that I have determined

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* L. c. § 375. † Lib. de Lit. et Spiritu. ch. 31.

It is a scriptural as well as a philosophical doctrine, that man possesses no power of his own creation; that he is dependent for all power upon the Deity. If man received from the Deity only the power to act, and not the power to *will*, the power of divine origin is made subservient to the human power. Infinite wisdom and power are absolute causes; and we can as readily conceive of an effect without a cause, as we can understand a cause as not necessarily producing its legitimate effect. [Ed.

in the prisoners, not only the dispositions of the soul and mind, but also the actions of these same prisoners. Might not one be tempted to conclude, that I regard the actions for which our organization gives us a propensity, as inevitable?

My reply to this question can only be completed by discussions, which will find their place in the following volumes. I limit myself, at this moment, to the general explanation of some of my principles. It will suffice to make my procedure in this respect intelligible, and to set aside any false interpretation. The different primitive faculties of the soul belong to different parts of the brain, in the same manner as the various functions of the senses are attached to different nervous systems. The functions of the senses, whose organs are more considerable, more sound and more developed, or which have received a stronger irritation, are, for that reason, more lively. The same phenomenon is produced in the faculties of the soul; the organs of these faculties act with more energy, if they are more excited, or more developed. On the other hand, there are several organs whose greater development shows itself in convolutions, thicker and more enlarged and prolonged on the surface of the brain; and these convolutions are, in their turn, represented by elevations on the external surface of the cranium.

If to this be added, what I shall demonstrate for each organ in particular, namely, that I have found means to determine, that such or such part of the brain, is the organ of such or such a faculty of the soul, it will then be understood, how, from a considerable and determinate elevation of the cranium, it has been found possible to infer a greater development of a portion of the brain, and, consequently, the greater energy of a determinate faculty.

If, in social life, I perceive in any one the external sign of a well-developed organ, I can say with confidence that, in this man, the disposition of the faculty which belongs to this organ is stronger than the dispo-

sitions of his other qualities. But, I am ignorant whether circumstances have permitted this individual to devote himself to the pursuit to which this principal disposition would direct him. Birth, condition, education, laws, customs, and religion, have the greatest influence on the occupation, exercise, and perfection of the organs, as well as on the moral character of the man: it would be rash, therefore, to conclude, that the actions of an individual correspond to the faculty, to which we remark a predominant disposition. On seeing the organ of tones, or that of the mechanic arts, very much developed, we may affirm that the individual has a great disposition or talent for music, or for the mechanic arts; that in his youth, he must have had more success in these arts, than his comrades; and that, probably, next to the duties of his calling, he makes these his favorite occupation; but I cannot say that he is actually a musician, or a mechanic. If the question concerns propensities capable of leading to mischievous actions, contrary to the laws, I abstain from judging, because I admit that sane and reasonable men are capable, by nobler motives, and by the effect of fortunate habits, of controlling these propensities, or of employing them in a lawful manner. For this reason, I do not pursue such researches in my social relations, especially where there can result from them no valuable information.

In a prison, on the contrary, errors are less easy. I can, by the inspection of a greatly developed organ, the abuse of which leads to crime, pronounce with sufficient confidence on the nature of an offence. First, it is on account of a crime that the individual is imprisoned; next, we know that man, excited by energetic propensities, if not retained by powerful motives, ordinarily abandons himself to his natural inclination. There is, then, great reason to suppose, that the offence for which he is punished, is that for which we find in him a marked disposition. We may, indeed, be mistaken; fortuitous circumstances may, sometimes, for the time urge a man to acts for which he feels himself no very strong propen-

sity. We often meet robbers and assassins, in whom the organs for theft and murder have not acquired an extraordinary development. But, in this case, the malefactor has been drawn in by seduction, by misery, by unruly passions, such as jealousy, resentment, a quarrel, or other unfortunate occurrences. We are rarely deceived, when the question relates to incorrigible malefactors, or persons, who, from their childhood, have manifested evil dispositions, or criminal propensities; in these, the development of the organ is evident. If the features, the gestures, mien, or language, betray want of education, or of the exercise of the intellectual faculties; if the rest of the organization of the brain is not favorable, it will almost always happen, that the actions will accord with this unfortunate organization.

It was in conformity with these maxims, that at the conciergerie (stadtvogtey) of Berlin, I pronounced not only on the nature of the crimes of a prisoner, but also on the great difficulty of correcting his obstinate propensity to theft. I declared that this prisoner, named Columbus, was the most dangerous robber among *the adults* that they had presented to us. Columbus was afterwards sentenced to imprisonment for three years, at the end of which time he was released, in 1808. But he had enjoyed his liberty hardly a month, when he was again shut up. In this short interval, he had committed ten thefts, more or less considerable, and very difficult to execute.*

If the individual appears to have received education, or if several of the organs of the higher order are favorably developed, the judgment to be passed is not so certain; the propensity may have been more easily combated; it may at least be presumed, that the illegal action of such an individual may have been modified by

* This fact is reported in the German paper, entitled Morgenblatt, 1809, 16th May, No. 116; but disfigured and confounded in part with another, of which I shall speak hereafter.

some peculiarity. But these cases require a peculiar kind of knowledge, which can be acquired only by long study and multiplied comparisons of cases. This suffices to show my readers that, in passing judgment on malefactors, I take for its basis not the irresistibility of actions, but the organization and nature of man.

Some of my adversaries have maintained, with impudent dishonesty, that I taught, at least in Germany, the irresistibility of actions, and that it was only the mildness and piety of the French which made me more circumspect.

I esteem my doctrine too much, to change or mutilate it in favor of the opinions or the prejudices of any people. I neither speak nor write for the Germans nor the French, alone. As an observer of nature, my purpose is to present and defend a doctrine, which may be useful to mankind in all places; which may be compatible with all forms of government, and with true morality, and which, in all ages, may be appropriated to the wants of human nature, since it is derived from the nature of things. But I affirm, at the same time, that I have never taught the irresistibility of actions, and that I have always upheld moral freedom. I had, at Vienna, and in the whole course of my journey, hearers of all conditions; many monks, curates, pastors, bishops, instructors. Even several sovereign princes condescended to hear me expound the principles of my doctrine. No one of these persons perceived in it the slightest danger for morality and religion. Many of my auditors have had works printed, which serve to justify my conduct in this respect.

Hardly had I obtained any results from my researches, when I foresaw the objections touching materialism, fatalism and the irresistibility of actions. I therefore had inserted in the *Mercure Allemand*, of Wieland, 1798, No. 12, a letter addressed to Baron Retzer, chief of the imperial censorship of Vienna. In this letter I then answered these objections with these same arguments with which I combat them at present. And what best

proves the unfair intentions of this class of adversaries, is, that for more than twenty-five years, no moralist and no ecclesiastic has thought fit to declare himself against my doctrine. On the contrary, better informed as they are than the laity, on the reciprocal influence of physical and moral agents, many of them of different religions, have written works more or less voluminous, in favor of my principles.

Summary of the fourth Section.

I have shown, that in all ages the most contradictory opinions have been denounced and regarded as inspired, by turns; that, consequently, when one makes discoveries, he ought to trouble himself less for the judgment of his contemporaries than for the truth;—that the Gospel the apostles, the fathers of the church, and in general the men who have best understood mankind, those who have most loved and most benefited them, have acknowledged that the qualities of the soul and mind are innate, and their manifestation depends on material conditions;—that those who accuse my doctrine of materialism, confound material conditions with the forces or the faculties, and thereby fall into perpetual contradictions;—that the supposition of a central point which it was thought necessary to consecrate in order to secure the spiritual nature of the soul, does not attain this object, and is at war with the structure and functions of the brain—that even my adversaries, to whom it seems that the plurality of organs favors materialism, are forced to acknowledge this plurality, because the brain is double, and, consequently, each of its parts is so also;—that those who regard as dangerous the division of the faculties of the soul into several fundamental faculties, have, at all times, adopted similar divisions, since they have admitted the faculties of judging, willing, remembering, imagining, &c.; that, consequently, they cannot, in any respect, brand my doctrine, any more than another, with the charge of materialism.

As to fatalism and to moral liberty, I have, likewise, shown, that the most venerable men have acknowledged the most powerful influence of several causes on our determinations; that the sensations, propensities, desires, as well as the ideas and the judgments of man, are submitted to determinate laws; but that we cannot thence infer either the fatalism, which makes the world to be derived from chance, or which does not ascribe the direction of it to a Supreme Intelligence, nor that other fatalism, which subjects the actions of men to a blind chance; that an unlimited and absolute liberty are repugnant to the nature of a created being, but that the reasonable man, by virtue of the faculties whose number and dignity elevate him above the brutes, has acquired the power of fixing his attention, not only on impulses from within and without, but also on those highest motives which he finds within him, or receives from abroad, and of being thereby enabled either to be determined by existing motives, or to determine himself by new motives, which the well-organized man can continually call to his aid; that this faculty constitutes true moral liberty; and that this practical liberty is the only kind which is contemplated by civil institutions, education, morality and religion; that this liberty, submitted to its proper laws, such as the powerful influence of the most numerous and strongest motives, and especially to that of the desire of happiness, render the man who acts, and his instructors, responsible for all their moral actions; that on this notion of liberty repose the dignity and necessity of education, morals, legislation, punishments, rewards, and religion. It follows, from my doctrine, that, whenever a sane and well-organized man has willed a thing, he might have willed the contrary, not without motive, which would be absurd, but by seeking for, and adopting other motives than those which have determined him.

In fine, I have proved, that without the existence of moral evil, and vicious propensities, there could be neither moral freedom, nor choice between good and evil,

nor, consequently, any threatening of future punishments, nor any hope of future reward; that all erroneous opinions and all discussions on practical moral liberty, have had their source in the false ideas which men have formed of the cause of moral evil, and of the propensity to evil; because they confounded contentment, inclination, propensity, desires, the result of the action of particular organs, with the will or wish, the result of the comparison of several sensations and several ideas, as well as of the influence of superior moral and intellectual forces, on the instigations of inferior propensities and faculties.

SECTION V.

APPLICATION OF MY PRINCIPLES TO MAN, CONSIDERED AS AN OBJECT OF EDUCATION AND PUNISHMENT.

Preliminary Suggestions.

THE motives, then, which tend to determine the acts of men, come from two sources. The one class are furnished from our internal forces, the others come from without. Consequently, to direct the will of man, and to appreciate his actions, we must have a profound and particular knowledge of these two elements. This knowledge can be acquired only by the practical study of human nature, by the particular study of each quality and each fundamental faculty, and of the manner in which each one manifests itself, both in the various states of health and disease.

As I cannot fulfil this task, but in the following volumes, I must here limit myself to some general views, which, however, will throw great light on the ulterior discussions of this volume.

First, let us recollect, that man, to a certain degree, has an organization common to him with the brutes, and that he participates in their propensities, feelings, and intellectual faculties. Thus far, man must be considered in the light of an animal. But as a man, he is endowed with superior propensities, feelings and faculties, which constitute in him the character of humanity, and which, as we have seen, render him a moral being.

In his regular state of health, man never shows himself as purely man, nor as simply animal. The various relations which result from his mixed organization, from the intimate union of animal nature with humanity, merit, then, the greatest attention. In this way only shall we have all the data to measure the degree of the moral liberty of each individual, and to divine the use which, according to appearances, he will make of it.

In respect to internal, moral, and intellectual forces, one may establish six very distinct classes in human society. Each of these classes produces a series and an activity of propensities, feelings, and talents, equally differing from the others.

In the first class, the qualities and faculties which are most elevated and proper to man, are completely developed, while the organs of the animal qualities and faculties have only a very feeble degree of development and activity.

In the second class, the organs of the animal qualities and faculties have attained a high degree of development and activity, while the organs of the qualities and faculties peculiar to man alone are but little developed, and have but little activity.

In the third class, the qualities and the faculties common to animals and those proper to man, have acquired considerable development and activity.

In the fourth class, one or at most only a few of the propensities or talents, are developed to an extraordinary degree, while the others have arrived at a degree of development and activity very moderate, or even below mediocrity.

In the fifth class, one or some of the organs are very little developed, and remain in a state of apathy, while the others are more favorably developed and active.

Finally, in the sixth class, the organs common to animals, and those proper to man, are equally moderate in their development.

Let us now observe some general results of these different developments and activities of such and such cerebral parts, when not influenced by motives contrary to their natural impulse or tendency.

When the superior qualities and faculties, proper to the human species, predominate greatly over the qualities and faculties of an inferior order, the man, properly so called, will subdue the animal in him. The internal movements, and the whole conduct of such men, will be conformable to reason, justice, and morality. To judge with candor the weakness of others, to bear with indulgence the errors of their minds, generously to pardon offences, to act always with uprightness, to labor always for the general good, by sacrificing their own interests, to render homage to truth with a wise intrepidity, to show himself above ingratitude and persecution, to ascend from the effect to the cause, and thus to secure himself from prejudice and from superstition; such is mostly the natural tendency of those models and benefactors of our race.

The contrary takes place with those, in whom the organs of the animal qualities and faculties, have reached a very considerable development and activity, while the organs of the superior faculties are but little developed, and have little activity. In these, all is subject to sensuality and error. The animal impulses are numerous and violent, and defeat is the more to be feared as the superior faculties and external aid are more feeble. If

unfortunately, the dominant propensities are of the number of those whose excessive activity overthrows social order, will the philosophic judge be astonished, if these men too often become the victims of their organization?

In the case in which the qualities and faculties, common to animals, and, at the same time, those proper to man, are equally active, there will thence result men, who find themselves placed between the animal and man. They are stimulated by the one, and warned by the other; often degraded by one, and often elevated by the other. They are great in vice, and great in virtue; in many respects, they are excellence or wisdom itself; in many respects, also, they are subject to deplorable failings and vices. The most opposite qualities often make of them the most problematic beings; such were Louis XI., Charles V., Philip II., James II., Catherine de Medicis, who, though under the influence of a superstitious devotion, were the scourge of their subjects. These are the persons, who experience, in the most sensible manner, the struggle of two beings at war within them. Such were Socrates, St. Paul, St. Augustin; who, having the most violent combats to sustain, may claim the most glorious prizes of virtue.

When one or some of the qualities or faculties, whether animal or human, possess extraordinary energy, while the others are only moderate, there hence results great genius; great talents in a particular sphere of action, or certain propensities, good or bad, predominating over the rest. These talents and propensities constitute the character of the individual; and such a man will have the more difficulty in resisting their impulse, as the other forces, moral and intellectual, are less active. You have the musician, the mechanic, the poet, all exclusive and ardent in their pursuits; but you have also the debauchee, the bravo, the robber, who, in certain cases, are passionate to such a degree, that the excessive activity of these propensities degenerates into actual madness, and deprives the individual of all power to restrain them.

You see, on the contrary, apathies and partial imbecilities, when, by the side of other qualities and faculties sufficiently well marked, one or a few organs are very little developed. With such an organization, Lessing and Tischbein detest music; Newton and Kant have a horror of women.

Finally, in the sixth class is found the crowd of ordinary men. But as the organs common to the animal occupy the greatest part of the brain, these men remain limited to the sphere of animal qualities; their enjoyments are those of sense, and they never produce in any respect any thing remarkable.

These six principal divisions are confounded by a thousand modifications, as happens to all the great divisions of nature. We know that the organization is rarely so fortunate as to give to the faculties of a superior order the almost certain power of impressing a favorable direction on the inferior faculties. We may, then, admit as a truth, established by the laws of organization, that, among men, a very small number would find, in themselves alone, the force, or sufficient motives, to make a law for themselves, to determine themselves always to acts conformable to the dignity of the noblest propensities, sentiments, and faculties of man.

This would be the place to discuss the question,—which of the two is the more virtuous man, he who does praiseworthy actions only from natural character, or he who has always temptations to withstand.

I have already answered this question in treating of moral liberty. In fact, there is no real virtue, as Cardinal Polignac says, "except when the will, subjected to the empire of reason, arrests the irregular movements of the heart, calms the tumult of the passions, quells their revolt, and subjugates them; a painful victory, and often the price of the greatest efforts. But the greater the self-denial and the sacrifice, the more elevated and sublime is the virtuous act."

Such is the judgment dictated by justice and reflection. But in this, as in every thing, it is not reason, but obscure feelings, which determine our conduct, and

render us all, without our suspecting it, habitually unjust. Beauty, youth, strength, riches, are every where admired and sought, while ugliness, old age, weakness, poverty, are condemned to the most afflicting privations. In the same manner we give to the man naturally virtuous, as by instinct, all our esteem, all our admiration, while the most approved and the severest virtue of the man in whom we know the existence of a natural propensity to vice, always appears suspicious.

Application of my Principles to Man, considered as the Object of Education.

After what I have now said, it will no longer be objected to me, that the innateness of moral qualities and intellectual faculties, involves the uselessness of education, morality, religion, legislation, punishment, reward. The conviction must have been acquired, that these institutions are indispensable; that in order to determine men to legal, noble, and virtuous acts, and in order that they may determine themselves to such acts, we must develop and cultivate internal means, and multiply and fortify external motives. Pascal has well observed, that one of the most essential advantages of the Christian religion is, that it thoroughly understands human nature; that is, all which is great, and all that is miserable in man, and that it presents to him the purest motives. In fact, the more numerous, noble, and strong are the motives, the more will man be enlightened as to his real interest, and the more disposed to make a good choice of his actions. We shall facilitate the resistance to certain too active propensities with the more success, the earlier the task of repressing them is commenced, and as, by an education appropriate to the individual, and commenced from infancy, we shall give more facility of acting and more energy to the superior propensities, feelings and faculties, and render the idea of the fatal results of immoral actions, more lively and more habitual.

What is the education, public or private; what is the legislation, criminal and civil; what are the measures of government; what are the institutions, social and religious, which give to nations the most virtue, industry, and, consequently, happiness; which engender the fewest vices and crimes, the least persecution, intolerance, atrocities, corruption of domestic manners, trouble and warfare? The solution of these problems would be worthy of the best friends of humanity. Ah! how would the result, obtained in the history of all times, confound those men of darkness, who are ignorant and perverse enough to desire and to order the interdiction of knowledge, and the degradation of nations! who, jealous of the happiness of their fellow-men, substitute for the instruction proper to each condition, for the religion and morality of the Gospel, superstition, prejudices, sterile dogmas and ceremonies, monkish charlatanism, &c., means of extinguishing in every man a sense of his dignity and his rights, and of lording it with little wisdom over dupes and slaves, as vicious as ignorant!

Compare civilized with barbarous times; compare the list of horrors committed among barbarous nations, or, which comes to the same thing, among the ignorant and superstitious! Their false devotion, and their vaunted innocence of manners, will make us shrink with dismay. Who does not know, that these horrors diminish, in proportion as knowledge, civilization, a pure religion, freed from fanaticism, are more generally diffused?

In the prisons, of which we have visited a very large number, we have satisfied ourselves, that the greatest part of the criminals were born in provinces, and in those conditions of life, in which instruction and education, moral as well as civil, are the most neglected. In the same manner, the bands of ferocious brigands, who spread terror in Holland and on the banks of the Rhine, were composed, as similar bands are at present composed, of individual vagabonds, nourished in superstition, but deprived of all positive instruction.

"Why has not Heaven," said Baron Cuvier to the tribunal of legislators, "given me that eloquence of the heart which you admire in your venerable colleague, M. Lainé? How would I depict to you the difference between the poor child, who has received no instruction, and the one, who has been fortunate enough to obtain it? You speak of religion, but how can one preserve religious ideas without establishing their influence over him by reading? You say that misery produces more wretches than ignorance; but is not ignorance itself a source of misery? And the domestic virtues, how are they favored by the habit of reading! Is not the most indifferent book a better and more moral amusement, than the tavern and the debauch?"

The most perfect institutions, it is true, cannot cause crimes and enormities to cease altogether. Yet, we have a right to expect, from good education, a great diminution of moral evil. When we reflect how often it happens to individuals of the lower classes, to be educated without care, or to be imbued only with prejudices and superstition, we are astonished that more evil is not committed, and are forced to acknowledge the natural goodness of the human race. A thousand unhappy circumstances are combined to spread the most dangerous snares, for the man born in the lower class of the people; plunged in profound ignorance, deprived of all that might have formed the qualities of his mind and soul, he has but very inexact notions of morality and religion: even the obligations of society and the laws are generally unknown to him: solely occupied with earning his bread, gross and noisy amusements, gaming and drunkenness, make him a prey to base and violent passions: on all sides he is surrounded with temptations, lies, prejudices, and superstition: he is constantly told of pretended sorcerers, conjurers, treasure finders, magicians, interpreters of dreams, expounders of cards: he has placed before his eyes, lotteries, and all sorts of games of chance, which take the last mouthful of bread from thousands of famished children. These are scourg-

es, of which a friend of humanity cannot, without horror, foresee the eternal duration! How many domestic miseries, how many suicides, larcenies, secret robberies, flow from these fatal sources!*

A mere prejudice is often the cause of the most horrible actions. Some years since, a man killed the neighbor of his deceased uncle, for the purpose of avenging the illness and death of this uncle, the effects, as he said, of the machinations of the neighbor, whom he regarded as a sorcerer. A mother killed and roasted her child, that the fat of this innocent creature might serve to cure the rheumatic pains of her husband. A band of robbers thought to expiate the most atrocious murders, by muttering some paternosters over their victims. Illis Jacob regarded the murder, which he committed on his wife, as entirely effaced, as soon as he had ordered some masses to be said for her and for himself. [History of Schinderhannes.] In such occurrences, I regard those at the head of public instruction, as accomplices and abettors of the crime. What ministers of religion, what shepherds are those, who can suffer their flock to wander thus?

With a view to such considerations, those sovereigns who have conceived the noble and generous wish of giving good morals to their subjects, and securing their happiness, have always favored public instruction, the teaching of morality and religion, the arts and the sciences. The Gospel has recommended to us, to let our light shine among men, and to proclaim the truth in a loud voice;† the apostles and fathers have regarded ignorance as the source of all evils.‡

We ought to say, for the honor of the age in which

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* Let any one read the energetic discourses and addresses made, of late years, by Messrs. Keratry, and Delessert, on the lottery, and on gaming houses, and he will be astonished, that these abominations are still tolerated, and even find defenders.

† St. Matt. v. 16. St. Mark, ch. iv. 21.

‡ All evil comes from two sources, ignorance and weakness. St. *August.*

we live, that most states distinguish themselves by establishing excellent schools. In several places there is even given to adults, who have been neglected, the same education as to children. Schools have been founded for the instruction of teachers. Persons who wish to marry, are reminded of what belongs to the physical and moral education of children, and of the duties of marriage. Governments have begun to cause excellent tracts to be written on morality and education, reduced to the form of tales and romances, and adapted to the understanding of the lower classes, and designed for gratuitous distribution among them.

This is not the place to describe all the useful establishments we have seen; but I cannot refrain from giving to M. Bœrens, of Copenhagen, that venerable philanthropist, my tribute of respect. This excellent man had founded two seminaries of education, to which children of the lowest class were admitted. Not only were they instructed gratuitously, as in the five other public schools of Copenhagen, but their meals were furnished them also. In the morning, on entering the school, they had to wash, then they breakfasted, then received their lessons in reading, writing, and other branches of knowledge for which they exhibited any inclination. In the periods of recreation, they were exercised in gymnastic games. After this, the boys were taught trades and mechanical arts; and the girls were instructed in sewing, embroidery, and divers domestic works. In the evening after supping, they returned home. The proceeds of their labor belonged to the establishment. The sick were attended gratuitously by Doctor Wendts. How many benefits did this institution not produce! It afforded means to poor parents to devote themselves to their occupations, from which they were no longer detained by the care of their children. Those, on the other hand, were accustomed to neatness, order, economy, to labor and social life; their moral and intellectual qualities were formed; they even sought, by edifying hymns, by music, &c. to give more delicacy to their sentiments.

In general, all establishments, where individuals who are in want, find employment, also merit the greatest commendation; but if there do not previously exist in these individuals, a habit of gaining their living honestly the end of these institutions is only in part attained. In fact, either these individuals do not resort to these work-houses, or the police is obliged to employ coercive means to withdraw them from idleness. The wisest regulations cannot always have sufficient influence, because men accustomed to idleness, find, without ceasing, an infinity of subterfuges, to escape the measures of the best regulated administration.

With a rude people, the magistrates are commonly obliged to command and to forbid, what they must do and what they must not. In revenge, the people elude these arbitrary orders of their superiors, whenever they think they can do it with impunity. But when a man has received previous education, he generally holds a better regulated course, and submits himself to the laws and regulations with less repugnance. The authorities act, then, in conformity to human nature, when they join to the ordinances, motives which oblige them, because then, even in the eyes of him to whom they might appear oppressive and arbitrary, all appearance of constraint is withdrawn. On the other hand, a benevolent legislation will avoid multiplying laws, knowing that, as St. Paul says, the more laws, the more sins.

Application of my Principles to Man, considered as an object of Correction and Punishment.

To treat this subject pertinently, would require volumes. I am, therefore, obliged to limit myself to describing the grounds on which our conduct towards malefactors should rest.

Not being well informed on the true sources of our determinations, legislators as well as moralists, have confined themselves exclusively to the will. Under

this expression they imagined to themselves, as it were, a peculiar being, and rendered independent of the organization of the sex, of the constitution, &c. At most, it was only the age of minority, which they considered as deserving some consideration. Did the man show an evil disposition? it was because he willed it. Did he do evil? it was that he had strongly wished to do it. Little was thought of the difference, which exists between the propensities and the voluntary determination; still less of the various motives, internal and external, which cause this determination. Delicts and crimes have been considered in themselves, without regard to the wants and the position of the individual who was their author. To change the will of malefactors, it was long thought sufficient to inflict penalties. Hence, every where resulted criminal laws, which only go to determine what are the culpable actions, and to fix for each of these material acts a proportionate punishment, but always the same, whatever the difference of the individual acting. The aggravating or extenuating circumstances are rather sought in accidental external things, than in the peculiar position, or the internal state of the malefactor.

If any one wishes to bring back this defective legislation to principles founded on the nature of man; if he prove the existence of innate propensities, and that man no more has the choice of possessing propensities, more or less imperious, than of having talents more or less decided; that these propensities are one of the main springs of our actions; immediately they go to the opposite extreme. If the evil propensities are innate, say they, there is no longer any culpability in vice and in crime; no one can prevent himself from doing evil; and a criminal has only to say, that he has such or such a propensity, to excuse all his actions and secure himself from every accusation.

My readers are sufficiently prepared, for me to leave to them the refutation of this language. They must also be convinced, that if men were left to themselves, they would not all find within, motives equally numer-

ous and equally powerful for doing good, and avoiding evil; they know that propensities exist, whose excessive activity constitutes unlawful inclinations, whose abusive action lead to evil: they know also every man is not morally free to an equal extent, and that consequently every man, when the question relates to internal culpability, is not equally culpable, although the material act and the external guilt are the same thing. The same action may be indifferent in one man, while in another it becomes the object of moral responsibility. Thus the same action, which for one is subject of blame and just punishment, in another is only a subject of compassion. To appreciate the degree of internal criminality, it is necessary to measure accurately the influence of age, sex, the state of health, the moral condition, and a thousand other circumstances present at the moment of the illegal act. But by whom is this state of things so well known, that man can pass a uniformly equitable judgment on the merit and demerit of his fellow-men? This is possible only to that Being who searcheth the reins and the heart. This, if the question is in relation to the exercise of justice in its strictest sense, we must refer to God alone.

All wise legislation, therefore, ought to renounce the pretension of exercising justice. It ought to propose an end which it is possible to attain, and which secures the good of the citizens in particular, and that of society in general. This end ought to be, so far as the nature of man permits, to prevent *delicts* and crimes, to punish malefactors, and to place society in security as respects those who are incorrigible. This is all which can reasonably be required from human institutions.

How can we attain this end?

Of Houses of Correction and Prisons.

There are some organizations so defective, and some combinations of circumstances so unfortunate, that it is

absolutely impossible to prevent all crimes, even the most atrocious. We can only hope, whatever means we may employ, to diminish the number of malefactors.

We have seen that the want of instruction, ignorance of moral and religious precepts, of the laws of duties toward men and toward God, are some of the principal sources of the criminal aberrations of men. We must then supply from without, what is wanting to these individuals on the part of internal organization and education. It is necessary, in the first place, that prisons should become houses of correction. The treatment which has been used in prisons toward criminals, and which still continues the same in many places, would entirely defeat the end of all correction.

Ordinary criminals, even when their crimes were different, were commonly collected in large numbers. We have, in fact, often seen individuals merely arraigned for trial, mingled with prisoners already condemned. In certain places, all were idle; ordinarily, they are occupied in labor, sometimes too easy, sometimes too difficult, often filthy and noxious, and almost always unprofitable. They avail themselves of every moment when they can escape notice, to recount to one another their adventures, each one finding great satisfaction in making known to others his own performances; and in this manner, as the prisoners themselves say, the prisons are like schools, in which all kinds of villanies are taught. The corruption of the new comer, especially when from natural propensity he finds pleasure in this species of instruction, is soon accomplished. He soon habituates himself to living in intimacy with the refuse of men. All shame, all horror of crime and of criminals, disappears; they become acquainted, make friends of each other, and concert joint plans for the future. Hardly are any set at liberty, when they seek to unite to resume with more audacity their former mode of life. There remains, in fact, to most of those who leave the prison, no other course to pursue. They are sent out without money, and without being assigned any determinate oc-

cupation. In some countries, they are not even under the immediate watch of the police; many, beside, are banished, and it follows that the neighboring states are infested with banditti. It seems to me, that this last species of punishment ought, at most, to be admissible only for political offences. Is the individual subjected to the punishment of branding? he is then publicly disgraced? what will become of him? who will work with him? who will employ him? Not only are all these punishments without any real object, but they oblige these wretches to devote themselves to crime, on pain of starving to death. Branding can serve no other purpose, than to betray those malefactors who fall again into crime, and who have escaped from the prisons, to which they had been condemned for life.

The prison is not always the kind of punishment, which suits the character of the criminal and his peculiar propensities to evil. The society they enjoy, renders their lives less miserable. If they are ill fed, they are at least secured from all the wants common to this class of men; they are clothed, and preserved from the injuries of the air. We have even seen some, who procured their own arrest, in order to find a refuge in the prison. Men and women are often left together, whence it happens that in the prisons themselves, their numbers are multiplied. Sometimes the prisoners are permitted to have their children with them. On the other hand, the punishments in prisons are often heavier than the law prescribes, especially when the buildings are dirty, or placed in a damp soil, or constructed with stones, which attract and transmit the humidity of the atmosphere. Hence arises the so general alteration of the fluids and the solids; hence emanates tumors, glandular and cutaneous affections, pneumonia, blindness, &c. If the food is bad, and consists principally in dry pulse, this regimen is followed by dysenteries, which soon become mortal. When the punishment of a criminal is limited to a detention for a stated time, it would be in accordance with the spirit of the sentence, to inflict the punishment so as not to destroy the individu-

al's health: Ill constructed and badly organized prisons injure the social state in many respects, and the prisoners who are accustomed to inaction, or to such labors as spinning wool, or sawing dye-woods, which will not answer for them when placed at liberty, often remain a long time without resource. It is not surprising, then, that we find the prisons generally peopled with persons who return to them the second and even the tenth time.

This faithful picture of places of confinement, shows the urgent necessity of combining in them all the institutions, proper to furnish to those who have been seduced, and those naturally wicked, all sorts of means to induce them to act conformably to social order, and to their own good.

These principles were not new at the time of the first impression of my work, and fortunately they are still less so at this moment. Men had long since insisted on the instruction of the ignorant, on the reform of the erring, on the amelioration of criminals, and the extirpation of vices. But these rules have not been very generally executed. It is at Philadelphia, that they have been put in practice for the first time.* The happy effects which resulted hence, have encouraged other humane governments to imitate the example. Several States, besides prisons, have established houses of reformation, and correction, where instruction is the principal object, and where they habituate the inmates to constant toil and an honest trade. On the other hand, punishment is no longer the only object in prisons; there is also regard had to the moral correction. There are daily given to the prisoners, lessons in reading, writing, calculation, morals and religion. It is also sought to direct their attention to the duties of the citizen, and to the mutual relations of social life. Those who know no trade, are compelled to learn one; and those who conduct in the best manner, serve afterwards as masters and overseers. Those who know a trade, practise it.

* Of the prisons of Philadelphia; by a European, M. Liancourt.

We may consider a prison, conducted in this way, as a manufactory. The labor of the prisoners provides abundantly for the maintenance of the house; and by giving them better food, it follows that scarce six in a hundred are incapable of working. Hence is avoided that kind of injustice, which arises from feeding the disturbers of the public peace at the expense of society. What each individual gains above the sum prescribed, is placed in reserve; part is given to his family, if in want, or it is given to the prisoner himself at his departure, that he may not be obliged to commit any excesses while waiting for work.

In such establishments, the principle is duly regarded that food and drink have great influence on the actions of men. It is therefore attempted, by wholesome and simple diet, and by the absence of inebriating liquors, to calm the effervescence of the passions. The efficacy of all these measures, and of the employment of the noblest motives, is made manifest, by a comparison of the recommitments which take place in the common prisons, and those which occur in these establishments. In the first, it is calculated that among the prisoners, there are at least one half, if not three fourths, who are there for the second time; in the second, on the contrary, of an hundred who are set at liberty, scarce two again return.*

Though constant experience has taught, that such treatment is no less profitable to the state, than to the unhappy criminal, yet I have heard the remark made by some, that the only obligation of the state toward such beings, was to punish them, and that, as for education and instruction, it was for them to provide for it.

"But these are precisely the men," said the generous monarch of Bavaria to us, "who have the greatest need of assistance of this kind. How, in fact, can we exact social virtues from persons, who are absolutely ignorant

* To understand this subject more fully, see, besides the work on the Philadelphia prisons, that of John Howard, on prisons, hospitals, and houses of correction, and the introduction to the code of public safety, reduced to a plan for the states of his majesty the king of Bavaria, by Scipio Bexon.

what relations exist between their own private interests and those of society, and who are besides a prey to the violence of their own gross passions? Besides, no crime is ever committed, without the life of innocent men, or their property, being the sacrifice." Let us then do that for society, which we will not do for the criminal. It will only be, when we have united to punishment the care of instructing the mind and forming the heart, that we shall be able to satisfy ourselves, that, in conformity to the law which directs us to prevent crimes,* we have done for these wretches, and for the state, all that is recommended by experience, the laws of man's organization, and the knowledge of his wants. So long as we are contented with forbidding and with punishing, we hold out an inducement to obedience, it is true, but this inducement acts only so long as the punishment appears certain.† By enlightening the mind, on the contrary, by abundantly supplying it with the noblest motives drawn from morality and religion, means are given him, the force of which is never lost. Man then learns to recognize witnesses of his actions, from whose vigilance he cannot escape. Let us never lose sight of the fact, that of two objects, man does not, without motive, choose one in preference to the other, and that the perfection of the will consists in the knowledge of the goodness and excellence of the motives.

The benefits produced for some years by the Royal Society for the Amelioration of Prisons, founded in 1819, under the ministry of the Duke of Decazes, are too striking and too well known, to make it necessary for me to dilate upon this generous enterprise. Let my readers examine the statistics, the various reports made by Counts Dru, de la Borde, &c.

Unhappily, all these generous efforts will fail of entire success, so long as criminal legislation continues to condemn to the *collar* (carcan) and to branding, for crimes which are judged insufficient to deserve perpetual imprisonment.

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* Beccaria on Crimes and Punishments, § 36.
† Homel, Gedanken iiber das Criminat recht.

Of Repentance, or of the Conscience of Malefactors.

It is commonly imagined, that malefactors, who are condemned only to imprisonment of greater or less duration, end with repentance, and finally resolving to renounce their evil habits and return to good behavior. Nay, more; the hope is cherished, that those condemned to perpetual imprisonment, to hard labor for life, to the punishment of death, will make a sincere confession of all their crimes and all their accomplices, and in their effort to obtain pardon, at least in the other world, will be tormented by the stings of conscience and will experience sincere repentance.

But experience, in this respect, gives a very different result. I do not deny that some criminals experience sincere repentance: there are some who have been drawn into crime by want of reflection, by an unfortunate fit of passion, by poverty and want, by seduction, and other very pressing external circumstances. If, for instance, a dishonored and abandoned mother, in an instant of wild despair, lays a trembling hand on her child, and deprives it of life, its innocent blood will always be present to her eyes, and will poison every moment of her existence. When once the fatal concurrence of circumstances has passed, the milder feelings within will again be awakened. There then appears a total contradiction between the natural sentiments and the act committed; and this contradiction is what constitutes repentance, or the *natural* conscience. We saw a man at Spandau, who had killed his wife in a violent fit of anger: this man was so unhappy, that he eagerly demanded death, to be delivered from the insupportable burden of his remorse. Charles Benzel, born of good parents and with an internal disposition to piety, had been well educated; accordingly, he was the only one of all the band of Schinderhannes, who repented of his conduct.

But he, who is drawn into crime by internal propensity, will rarely experience natural repentance. In such a man, the inclinations which lead to evil are predominant—if the expression may be used, they compose his proper character; consequently, all the acts which emanate from him are in harmony with his whole being, and the tranquillity of his soul is rarely disturbed by them. This depraved view of man may naturally displease some of those persons, whose dreams are only of the dignity of the human species. But, examine the usurer, the libertine, the villain, and you will see that each of them is happy, only in proportion as he satisfies his desires. It is in vain, that the cheated orphan, that betrayed and abandoned innocence often console themselves with the idea, that such a villain will one day feel repentance for his criminal actions.* I have, from my youth, made the sad and alarming observation, that the most perverse men grow proud of their talents for deceiving and abusing, and that they always dwell, with a sentiment of delight, on the striking traits of their disorderly course. Go into the prisons; place yourself in the midst of the prisoners; avoid the appearance of a public functionary, lest you be mocked with pretended repentance; inspire these men with frankness and confidence; with what internal satisfaction, with what joy and pride in wickedness, will the distinguished criminals recount to you their crimes, without forgetting the most insignificant details, and the particular mode they adopted in committing them! If, at any time, one of them gives himself the trouble to speak on the subject with pretended horror, there will generally escape a malignant smile, which betrays his hypocrisy. Most of them employ their wit in uttering the gayest sallies on the most atrocious actions; and frequently, at the moment you shudder with horror, they burst into a laugh. Reckon up in

* "The soul of the wicked desireth evil; his neighbor findeth no favor in his eyes." Prov. xxi. 10.

the prisons how many have been remanded, and you will be easily convinced how few have repented.

Finally, examine all the remarkable criminals in state trials, judicial proceedings, follow them to the scaffold; with what obstinacy do some deny the most evident facts! with what surprising audacity do they insult the witnesses who accuse them! with what unblushing sincerity, and scrupulous exactness, do others recount a series of horrible crimes! A soldier had committed robbery in twenty churches. They led him to the scaffold, where he still expected to receive pardon. But in place of showing any repentance, he said to auditor Weldermann, at Vienna, "I see there is no more to be done here; I must try to go elsewhere." At Vienna, one Z—— murdered his mistress, in order to rob her of three hundred florins: he then cut up the body, in order to pack it more conveniently in a box. Instead of being troubled by this crime, he goes to a ball, there passes the night, spends all his money, and gives himself up to all the excesses of brutal enjoyment. M. Bruggmanns, professor at Leyden, showed us the skull of the chief of a band of Dutch robbers. This man had thrown several people into the canals, solely to see them struggle against death. "What can they do to me," said he at his trial, "am I not an honest man?" A girl who had aided her mother to kill her father, did not testify the least repentance; when they reproached her with the crime, she shrugged her shoulders and smiled, Schinderhannes, and Heckmann, his accomplice, derived great pleasure in recounting their crimes; their eyes sparkled during the recital. All the accessory circumstances, which seemed to them proper to convey a great idea of them, gave them great satisfaction.

Rossignol used to boast of his barbarity. "Look at this arm," said he; "well, it has cut the throats of sixty-three priests at the Carmes de Paris!" Repeatedly escaping from prison, he re-commenced, and, like all those who are born for wickedness, repeated his robberies, his cruelties, and the most revolting gluttony.

Gobrino Fondulo invited Charles Cavalcato, the head of his family, to come to his country house with nine or ten of his relations; he had them all murdered at a banquet. After this barbarous execution, becoming master of the government of the city, he there practised all sorts of cruelties, until Philip, Visconti duke of Milan, ordered him to be beheaded. His confessor vainly exhorted him to repent of his crimes; he fiercely answered, that he had but one thing to repent of, namely; that he had not hurled from the top of the tower of Cremona, (one of the highest in Europe,) Pope John XXIII., and the Emperor Sigismund, when they had the curiosity to ascend it with him. Read the biographies of the tyrants who have desolated the earth, who have spilled torrents of blood: read the history of all the famous wretches, of the incendiaries; of the most atrocious robbers; and see if you can find one, who ever abandoned crime before justice overtook him. There have even been some, who, at the moment of their execution, in reviewing all the enjoyments with which they had satiated themselves, boasted that none equalled those which cruelty had caused them. But let us terminate these examples which are revolting to humanity! All judicial proceedings justify my observation, that a hardened criminal is rarely accessible to remorse and repentance.

This observation is even confirmed in criminals of an inferior order, whenever, through an unhappy but decided organization, they have been powerfully urged to debauchery, fraud, theft, &c. I have never seen such a voluptuary, to whatever excess he may have carried his indulgence—such a villain, however unhappy he may have rendered numerous families—I have never seen a determined robber, &c., renounce, by sincere repentance, the horrors of their life; but I have seen many, who, being convinced of the abominable character of their habits, and feeling the impossibility of controlling them, have begged, as a favor, that they should be restrained from having it in their power, to give themselves up thenceforth to their destructive propensities.

Since, therefore, sad experience shows us, that this class of criminals is not led by repentance, or by *natural* remorse to resist their violent inclinations, it only remains to produce in them an *artificial* conscience, that is to say, a clear idea, a lively conviction of the immorality of their actions, and of the disorder and mischief which must result from them, not only for society, but for themselves ; or, in other words, these men have more need than any others, to have supplied from without, what is wanting in them, on the part of their internal organization.

And here, again, appears a principle, which, however opposed to the precipitate conclusions of rash and inconsiderate persons, is immediately derived from a particular study of human nature in detail, viz. that the greater and more obstinate the resistance, which is offered by the natural dispositions and habits of men, the more necessary it becomes to multiply and strengthen the contrary motives—the more necessary it is to proportion the punishments, and the more perseverance it is necessary to use, in combating them ; so that if we cannot conquer, we may at least restrain and paralyze their exercise. For, the question no longer concerns internal criminality, nor justice in its most rigorous sense : the necessary protection of society is concerned in the prevention of crimes, and the correction of evil-doers, and in placing the community in safety, from the attempts of those who are more or less incorrigible.

The degree of culpability and of expiation differ according to the different condition of the individual, although the illegal act and the punishment be essentially the same.

I foresee with pain, that many years will elapse, before my doctrine on the nature of man, will be universally adopted. And even when this period shall have arrived for physiologists, instructors, philosophers, yet legis-

lators will delay much longer to apply it to the criminal legislation. The laws are to them a sort of religion, the least modification of which appears to them a heresy. It is not a single enlightened man, it is an assembly of several men, who make the laws; and where shall we find a mass of legislators possessing equal knowledge? It is then to be feared that the true wants of human nature may yet remain too generally misunderstood, to allow the criminal code immediately to overcome this multitude of obstacles, prejudices, ancient customs, which hold it bound to the cradle of its infancy.

The penal code determines the nature of crimes and misdemeanors, and then fixes the punishment to be inflicted. It is the nature of the act itself, which furnishes the measure of punishment, without regard to the person committing the act, or the person expiating the crime. Without doubt, we shall meet too many difficulties in proceeding otherwise, and this is judged to be the only means of obtaining perfect equality and impartiality in the administration of justice. But it is evident, that it is precisely in this manner that we render ourselves guilty of the most crying injustice, and, while we almost always fail to obtain a just estimate of the crime, fail equally in the proportionate application of the punishment.

I submit to the consideration of legislators, some considerations, which must necessarily have been presented a thousand times, and which will be refuted a thousand times, perhaps for the sole reason, that their principle has not been tested by an acquaintance with human nature in detail.

Crimes and misdemeanors are not committed of themselves; they cannot, therefore, be considered as abstract beings.

Crimes and offences are the result of the actions of individuals; they therefore receive their character from the nature and situation of these individuals; and they can only be estimated and determined, according to the nature and situation of these same individuals.

You appear to deny these axioms. Well! I shall prove them to you.

You judge, and you punish an act committed in intoxication, or in violent rage, differently from the same act when committed in the full possession of reason, and with premeditation. You judge a theft, a murder, committed by an idiot, a madman, otherwise than you judge a theft, a murder, committed by a man enjoying his reason.

You acknowledge, then, and you must acknowledge, that acts are nothing in themselves; that they receive their character from the individual who committed them.

But why do you refuse to be consistent in the greater part of your criminal prosecutions? I ask you, and let your conscience answer me:

Is that the same sort of robbery, which is committed by a dishonest gamester, by a robust idler, by a debauched usurer, as that committed by a feeble widow, lying in extreme want with numerous children, crying to her for bread?

Is that the same sort of murder, which is committed by an insulted brother, against the perjured seducer of his beloved sister, as that committed by a son-in-law, who, the sooner to riot in profusion and debauchery, poisons the parents of his wife?

Pursue, yourselves, the list of crimes and offences, the degree of whose criminality, differs totally, and which

in your legislation, are confounded in the same rank, and say if I am wrong to reproach to you, that criminal legislation is yet in its infancy?

In general, without turning our eyes on a thousand other extenuating or aggravating circumstances, which do not at all influence your final judgment, how have you been able to decide, that the actions of men without education, ignorant even of the existence of a penal code, superstitious, at the mercy of violent and gross passions, &c., ought to be stamped with the same degree of immorality and culpability as the actions of men, who, knowing the whole extent, and the whole danger of their perversity, surround it with cunning and hypocrisy, the better to secure the impunity of their crimes?

For the same reason, you will not persuade me, that the prison, branding, the collar, (carcan,) corporal punishment, hard labor, and even death, are the same punishment to persons of all sexes, ages, constitutions, and of all conditions; to vagabonds, unknown, insulated, degraded, accustomed to privations and to hard and precarious living; for that race of the brazen-faced and impudent, who make a boast of their crimes; who are tied to the infamous post of the pillory, walk to the scaffold, gaily insult the spectators, &c., as they are for persons imbued with the principles of honor, accustomed to the comforts of life, connected to society by a respectable family, by a wife and children, but overtaken by crime in an unhappy moment, &c.

These reflections will suffice to make each one sensible, that the measure of the culpability, and the measure of the punishment, should not be derived, either from the matter of the illegal act, nor from any determinate punishment, but solely from the situation of the individual acting.

But, it will be said, in what difficulties do you involve criminal jurisdiction! Certainly it is very easy to say, such a crime, such an offence, demands such a punishment;—all the science of the judge is then reduced to substantiating and determining the fact; as to the appli-

cation of the punishment, there is no longer the least embarrassment. But it cannot be doubted that, according to these principles, we every instant confound the unfortunate with the wicked; and sometimes must punish too much, sometimes too little, and ever be liable to pass the most misplaced and the most unjust judgments.

The opinions and errors of ideologists and metaphysicians may be indifferent on account of their sterility; but, it is matter of sacred duty, that the opinions of those who exert a more or less powerful influence on the happiness and misery of society, that the opinions of governors, instructors, moralists, legislators, physicians, should be based on the nature and the wants of man.

Of the gradation of Punishments, and of the punishment of Death.

It is with good reason, that men have adopted the principle of the gradation of punishments. We punish the same offence with the more severity, according as it has been more frequently committed, because the repetitions imply a more imperious propensity to crime and greater corruption in the culprit.

We punish differently a simple theft, robberies committed in the night, and with breaking in with armed force, with riot; we act with more severity toward the leader of an insurrection, than his accomplices; against those counterfeiters who coin gold and silver, than those who only stamp coins of copper. We inflict on a mother, who has exposed her infant, different punishments according as the infant has incurred more or less risk of perishing; and by these modifications of the laws, we imply that it is necessary to choose means more and more efficacious, graduated according to the intention of the malefactor, and according to the more or less serious consequences of his crime.

Experience has proved, that, in certain cases, it is even necessary to resort to the punishment of death. But

how many objections has not the sensibility of philanthropists raised against the punishment of death? If we regard the punishment of death, as the destruction of a mischievous and incorrigible individual, or as a means of preventing crime, I think, with Montesquieu, J. J. Rousseau, Sonnenfels, Hommel, Filangieri, Schmalz, Kleinschrodt, Feuerbach, Klein, Bexon, and others, that we cannot call in question the right, which society has, of destroying one of its members. To deny this truth, would be to refuse to society the right of providing for its security and good order, and, consequently, of employing all the means and all the motives capable of preventing crimes. Who can doubt that the punishment of death is an effectual means of intimidating the greater part of those whose inclinations are perverse? *

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* We have serious doubts, not only as to the expediency of capital punishment, but as to our having any right to take life for any offence. Capital punishment must either be defended on the ground that the Scriptures sanction it, or that criminals should be made to receive a certain degree of pain for a certain degree of guilt; or, that the safety of society requires it as terror to prevent a repetition of crime.

We are not satisfied with either position. That there are some passages in the Old Testament, which seem to favor the right of taking life, we do not dispute; but we have higher authority, in the New Testament, for an opposite doctrine. Our Savior sanctioned no such doctrine; although there were many opportunities for him to have done so, if he had considered it just or important.

We cannot conceive of a crime more heinous in its character, than that committed by the Jews—the crucifixion of Christ; yet, what were his last words, in relation to those who were guilty of the greatest crime that ever was committed upon earth? "Father, forgive them, for they know not what they do."

Those who are engaged in criminal legislation would do well to remember this example. The time, we trust, is not far distant, when legislators will not fail to discriminate between the expressions of animal feeling, (revenge) and those which represent the higher and nobler sentiments of our nature, and which are regulated by the intellect; and to respect the latter, while they curb and mistrust the influence of the former. *Retributive* punishment is opposed to the principles of Christianity, and no moral philosophy of modern times upholds it.

The plea, that capital punishment prevents the repetition of crime, we think equally unfounded. We are of opinion, that it is not in the nature of capital punishment to produce the result desired. To suppose that the punishment of one individual will have the effect to destroy

There is room for some very sage distinctions for determining the cases which render the punishment of death indispensable. Can we inflict it on a person whose conduct has always been irreproachable, and who has been urged, by an extremely unfortunate combination of circumstances, to the commission of murder? Such a murderer is neither so wicked nor so incorrigible, as many of the pests of society. Again, it is cruelty to pronounce sentence of death, as the law is in many countries, in crimes to which a large number of individuals are constantly exposed; often by the negligence of others, often by temptations, unhappily too well suited to human frailty, such as theft, &c., or for vices which have little influence on social order, and the immorality of which, however revolting, remains concentrated in the agent, such as certain excesses of sensuality, &c.

If there be a crime, which deserves to be treated as murder the most premeditated, foolish and dangerous, that crime is duelling. Usually for the merest trifles, and sometimes, exasperated by the taunts of a bully by profession, men kill one another, in presence of numerous witnesses! No! I might in vain transport myself to the most barbarous countries and times, I should never be able to conceive their allowing so atrocious, so cruel an outrage on morality to subsist! Prejudice, say you,

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the propensity to sin in another, is unphilosophical, inasmuch as moral reformation is not the natural effect of such a cause. The only sure remedy against crime is to improve the condition of man. If an individual has violated the laws of God and man, he should be treated rather as a moral patient, than a being capable of appreciating moral excellence. The fact that he does not respect virtue and honor, proves that he is insensible to their influence—and shows the necessity of his being educated entirely with reference to a proper development of them. In order that such a person may be subjected to suitable discipline, to develop his moral sentiments, confinement would become necessary; but it should never be attended by circumstances to degrade the subject in his own estimation. His improvement would depend upon the display of those good qualities in the persons of his keepers, in which he proved himself deficient by his acts of moral turpitude.—[Ed.

demands it. Prejudice! To prejudice, then, the laws must sacrifice the life of the citizens, morality, the precepts of religion, the happiness of families! But how destroy this prejudice? How have other nations destroyed it? But it is not well, you say again, to destroy a prejudice, which upholds courage and honor. What honor, what courage, is it to kill or be killed for a few words which happen to displease you, or for the vanity and admiration of a mistress! Die for your country, perish in defence of her rights, and men will acknowledge your courage. The French nation has certainly no need of these follies, of this braggadocio prowess, to convince the world that she has honor and courage.*

As for the gradation of punishment, many governments wholly omit the punishment of death, except in cases of parricide and regicide. Men, then, regard the punishment of death as the final limit of the rights of justice over the guilty.

But is the punishment of death, without aggravation, always sufficient to prevent crime? Frequently, death itself is no evil. The unfortunate man, as Sonnenfels says, wishes it, because it will deliver him from all his troubles; man, in despair, inflicts it on himself; the martyrs to glory, or religion, run to meet it, to gain a

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* Although the custom of duelling is universally condemned, as being barbarous and wicked—yet we are often called upon to read accounts of disgraceful encounters between men high in office and reputation. A few years since, a gentleman in New York wrote a most sensible article against the practice of duelling—and a few months after, fell a victim to the sin which he had so unequivocally condemned.

Phrenology is eminently calculated to do away with this principle of false honor, by teaching men the nature of their passions. They will discover that the principle of honor must have a nobler basis than that of the mere animal propensities. They will discover, that, to be truly honorable is to be truly just, and that the man who cannot control his passions can claim no higher rank than ferocious animals. True honor is a higher sentiment, and to follow the suggestions of the lower propensities where honor has been insulted, is to feel like a man, and to think like an animal. [Ed.

name, or to enjoy the happiness of future life: the laws even suppose that the loss of life will not deter the guilty, since they enjoin the preventing them from destroying themselves in prison. Experience, too, teaches how little the sentence of death agitates them, and with what resolution they go to the scaffold. For those men whose life is a continual scene of crimes and of brutal pleasure, perpetual imprisonment would be a more painful punishment than death. Shame, and regard for the future, are nothing with such wretches: to die is nothing, say they, and there we must end. Does not the consequence follow, then, that the punishment of death ought to be aggravated? Man, considered as a reasonable being, is determined by the strongest and most numerous motives: we must, then, oppose to the criminal, motives the more powerful as his propensity to evil is more energetic, and as the consequences of it are more mischievous; and ordinary death being insufficient, we must seek to deter him by the menace of one more terrible.

To give to this exception an appearance of philosophy and justice, it is said, that the enormity of the crimes for which the punishment of death is established, hardly permits us to perceive the smallest difference between them, and that, consequently, we cannot introduce any modification of the punishment of death.

If we must judge of crimes from the malignity of the malefactor, and the evils which result from them; if it be even established as an axiom, that a crime consists in the act itself, and in the intention of the evil doer, these principles, against which there is nothing to object, cannot agree with the assertion, that all capital crimes are nearly equal, and, consequently, merit equal punishment. Can we maintain that the man who, for revenge kills with deliberate purpose the destroyer of the happiness of his life; that he, who, exasperated by the infamous conduct of a traitor, immolates him to his resentment; that a young girl, without experience and a prey to despair, who destroys her infant, are criminals

as great, as corrupt as the prostitute, who murders the companions of her debaucheries, in order to rob them of the little they possess; as the bandit, whose whole life is but a tissue of robbery and murder? Can we say, that the murderer who destroys a single man, is as dangerous as the monsters, who, urged by infernal cupidity, poison several individuals, and even whole families; who have no horror of the most atrocious means, provided they attain their end, and who spread terror, devastation, and death, on the highways, in forests, and in villages?—as the traitor who plunges a whole nation into the most frightful miseries? On the one hand, is it not deplorable, and on the other, is it not in some sort a subject of pride for the greatest criminals, that we annihilate all distinction between acts so dissimilar? Has not the ferocious wretch reason to heap cruelty on cruelty to gratify his sanguinary and insatiable desires, when, in multiplying his offences, he neither aggravates the enormity of his crimes, nor the punishment he has to dread?

To all this, it is objected, that simple death is the severest punishment which can be inflicted on a criminal; that it suffices to place society in security against the crimes which he might afterwards commit; and that, consequently, the punishment of aggravated death would be barbarity. I answer, that punishments cannot, and should not, be the sole end of the legislator and the judge. The end of arresting and deterring criminals is not gained simply by the punishment of death. It is certain that determined malefactors fear it very little. How many prisoners have put an end to their lives to deliver themselves from perpetual imprisonment! How many have killed themselves to escape public execution! A great number prefer death to blows and torture. We must, then, employ more energetic means to terrify this brood of villains, and to set bounds to their inveterate wickedness. In fact, if the depravity of the criminals, who, under the law, merit death, is not in all to the same degree; if the acts of these criminals are some-

times more, sometimes less prejudicial to the interests of society, it is right that the punishment of death, like every other punishment, should be modified and graduated. Every criminal will not regard, as indifferent, every kind of imaginable capital punishment; the prisoner, the incendiary, the bandit, will not view a slow and painful death with the same indifference as they would regard the destruction which takes place instantaneously.*

All the principles which I have now laid down, on the means of correcting criminals, and of diminishing their number, result as immediate consequences from my doctrine of the innateness of the faculties of the soul and mind, and on moral liberty. Will it now be said, that this doctrine favors crime?

I have spoken thus far of criminals, whose culpability could not be called in question; but it is still my duty to direct the attention to those extremely complicated cases, where we find great difficulty in determining the degree of moral liberty and responsibility of the individual.

Application of my principles to illegal actions, where the determination of the moral liberty and of the degree of responsibility is subject to peculiar difficulties.

Men have always regarded, as extenuating motives, the violent affections and the passions, such as anger, indignation, jealousy, &c., when these emotions surprise men, and hurry them into a criminal action. When a man is irritated, when his rage, manifested by external signs, turns against himself; when he tears

* These are purely the suggestions of destructiveness—and we are not a litle surprised, to find that so discriminating a mind as that of Dr. Gall, should ever sanction such sentiments. Perhaps, however, as he was accused of holding doctrines too mild for the safety of society, so far as criminals were concerned, he was induced to the opposite extreme, by expressing the state of his feelings, rather than the results of a deliberate judgment. [Ed.

his hair, beats his breast, wounds himself, and dashes his head against the walls; and when, boiling and foaming with rage, he stamps with violence; if, at this moment, he seizes the object of his wrath and despatches him; although in this state of transport, notwithstanding the fury which inspires him, he knows the frightful misery into which he is on the point of plunging; though for an instant he recoils, and again regarding the action he is on the point of committing as a lawful vengeance, he imposes on himself by the appearance of tranquil reflection; and, finally, the arrow flies with so much more swiftness as the bow was more strongly stretched. Every one will be inclined to regard this situation on account of its very violence, as a passing folly, a temporary madness, and to view the acts committed during its continuance as, in some sort, acts, without premeditation and without consciousness, and not those of a free agent.

But are promptitude and impetuosity the only characteristics of violent affections and passions? It often happens that, although the storm is raised in the mind, external circumstances retard the explosion, and it is not the case with every man, that the liveliest sensations burst out the most suddenly. He who is moved by strong anger, often succeeds in smothering it, and both the mind and the body are more strongly agitated than if he allowed it free course. Shame, the afflicting sense of injustice, the despair which dishonor produces, the jealousy whose torments are unceasingly renewed, do not less darken the mind of man, than the sudden attacks of a more impetuous affection or passion. The deeper a painful sentiment is, and the longer it gnaws upon the mind, the more does it weaken the powers, and the more violently agitate the soul. An atrocious resolution, adopted in this state, must then be regarded, under many circumstances, as at once the effect of the strongest emotion, and as the consequence of impaired health and perverted judgment.

Of Infanticide.

It is especially in this point of view, that we ought to consider infanticide, as it occurs most generally. I have already expressed, with some warmth, my animadversion against an opinion, which seems to excuse the destruction of the fetus; so that I cannot be charged with wishing to undertake the defence of a crime so odious, when voluntary; but, in the view of justice and morality, it is very important to know in what case infanticide, committed under the circumstances which ordinarily accompany it, deserves this name, and calls for the whole rigor of the law. Legislators and judges are sometimes more severe, sometimes more indulgent, according as they are determined rather by their individual feelings, than with reference to the principles of physiology. "Is it possible," say one class, "to imagine an act more inhuman than that of a mother, who, deaf to the cries of nature, deprives her child of life, even at the moment when it seeks for the first time the maternal breast?" "But," answer another class, "it is precisely because infanticide is repugnant to nature, and because the hearts of all mothers revolt at the idea of this crime, that we cannot suppose such an act possible, except in a moment of mental aberration, when the mind, assailed, pressed, weakened by horrible sensations, is in a state of delirium."

We relate in our course of lectures, the numerous observations with which experience has supplied us on this subject, and we express our opinion without reserve. I shall again refer to this subject, in its physiological relations, when I shall have occasion to speak of the natural disposition of the female, both animal and human, to protect its young. As to the moral judgment we ought to pass on infanticide, and its various degrees of criminality, a letter of William Hunter seems to me so remarkable, and so much in accordance with my own

principles, that, in presenting it to the observation of my readers, I shall but give my own opinions. The letter may be found in the Bul. des Sc. Méd. published in the name of the Medical Society of Emulation of Paris, 5th year, Vol. v. May, 1810, p. 321.

William Hunter to the Royal Society of London.

"GENTLEMEN,

"In those unfortunate circumstances, where the mother of an illegitimate child, is accused of having destroyed it, and, in general, in every criminal and suspected action, reason and equity require, that we should weigh with care the minutest circumstances, in order to be assured of the views and motives which have influenced the accused; for, as there is no crime to which imagination and prejudice may not add particulars which aggravate it, so there is none so odious, or so revolting, that motives and circumstances cannot palliate. Whoever wishes justly to appreciate human actions, ought to be governed, in a great measure, by the state of the mind of those who commit them; and for this reason it is, that the legislation of all countries is so indulgent in cases of insanity. Maniacs are never regarded as responsible for their acts.

"My profession has favored me with opportunities of studying the character of women, in a great number of individuals, in all orders of society, and in all relations. Admitted to their intimate confidence, I have given them my advice in the most cruel moments of physical or moral agony. I have observed how they conduct themselves at the approach of imminent danger: I have heard their last and most serious reflections, when they were sure of having but a few hours longer to live.

"Now, from the result of a long experience, I take it upon myself to advance, that women, who find them-

selves pregnant, and dare not disclose their situation, have, in ordinary cases, a right to all our compassion, and are, in general, less culpable than we suppose them to be. Almost always the crime, even the barbarity, are on the side of the father of the infant; the mother is weak, credulous, and abused. The seducer having obtained what he desires, thinks no more of his promises; the unfortunate woman sees herself betrayed, deprived of the love, the care, and the support with which she flattered herself, condemned hereafter to contend as she can, against disease, chagrin, poverty, shame—in one word, against a desertion which threatens her whole life. An abandoned woman will never be reduced to this deplorable situation, because she is insensible to opprobrium; but the female in whom a vivid sentiment of shame inspires, above every thing, the desire of consideration, frequently has not sufficient strength of mind to support the misfortunes that I have just described. In her delirium, she terminates those days which have become insupportable to her; and what man, however little compassionate he may be, will dare to manifest his indignation against her memory?

"If she had not heard (says she to herself) the faithless vows and protestations of our sex, she might have been, during the happy course of a long life, a tender and chaste wife, a virtuous and respectable mother. This reflection increasing her despair, determines her to throw herself into the arms of eternity.

"It will be objected, that this crime is the more serious, inasmuch as she destroys her child, with the blow with which she destroys herself. Let us refrain from believing, that the action of killing is always a murder: it merits the name only when it is executed voluntarily and with a culpable intention. But, when one is impelled to it by a frenzy, which derives its source in despair, can it seem more culpable in the sight of God, than if it were committed in an access of fever, or in a state of absolute madness? It ought, then, at least to excite as much pity as horror. It would be sufficient to

know all the circumstances attending those cases that are commonly treated as infanticides, to make us tremble to comprehend actions so different in guilt, under a denomination which justly demands the severity of the laws.

"Without doubt, a weak and forlorn being may be deprived of life with a premeditated design: it is then a crime, not only contrary to the universal laws of humanity, but to that active and powerful instinct, which, from wise and benevolent views, the Creator has implanted in the heart of all mothers, and which leads them to undertake every thing for the preservation of their young. The most charitable construction that can be put upon this barbarous action, (and God grant that it may most often be founded in probability,) would be to regard it as the consequence of accidental madness.

"As well as I am able to judge, the greatest number of these pretended murders is very far from deserving this name. The mother cannot support the idea of her shame, and burns to preserve her reputation. She was virtuous and esteemed: she does not feel sufficient courage to wait and avow her infamy. As her hopes decrease of escaping observation, in relation to her pregnancy, or of being relieved from her apprehensions by some unexpected casualty, she sees every day the danger increase, and approach nearer: she is more and more troubled by fear and despair. Many would then commit suicide, if they did not know that such an act would infallibly lead to judicial researches, which would disclose what they have so great a desire to keep secret. In this perplexity, where the idea of destroying the child does not present itself to their imagination, they form many plans to conceal its birth. But on all sides difficulties multiply; irresolute and vacillating, they do not sufficiently regard the fatal moment, and end by trusting too much to chance and events. Often they are surprised sooner than they expected; all their plans are disconcerted; chagrin and suffering deprive them of judgment. If their weakness is not extreme, they

fly at the height of their pains, and are delivered alone in some place, in which their fright and confusion have led them to seek a refuge; there remaining faint and insensible, and, consequently, not in a condition to attend to what takes place about them; and, on coming to themselves, and recovering their exhausted spirits, they find their infant dead. Ought we to expect to see them divulge their secret, when it is of no use? Do not their most virtuous feelings impose upon them a law to save their reputation? They hasten, then, to conceal, the best way they possibly can, the least traces of the event; being well aware, that if they are discovered, this conduct will be evidence against them.

"In general, I have observed, that, the more sincerely women repented of having been weak, the more difficult it was to draw from them a confession; and this is natural. From a great number of examples that I could cite, I will choose the following:—

"I have, on one occasion, dissected two girls, who, during life, enjoyed an unspotted reputation. Called to attend them during their sickness, I was duped by both. One of them had, however, excited in me some distrust, and I endeavored to make her acknowledge to me what I suspected. I promised her that I would do all that depended on me, to screen her from the unfortunate consequences which she might fear; but she preserved a stubborn silence to my attempts and inducements. Both died in the most violent pains, attended with convulsions. When the people came to carry away their bodies, there was found in one of the beds a dead infant, not yet arrived at its full term, laying near its unfortunate mother; the other presented the same spectacle, except that the birth had not wholly taken place. We see, by this, what patience and what courage the fear of shame is capable of producing.

"A young girl, being pregnant, having concealed her situation, was delivered by herself during the night. She was suspected, search was made, and the child was found in a box enveloped in damp clothes. She confess-

ed having given birth to it, but she denied having killed it, or even of having had the intention. I opened the body of the child with Mr. Pinkston, and the lungs floated when we put them in water. The mother thus told her story. She lived in the service of masters, whose regard she had gained by her fidelity, and she was sure, by quitting them, to excite suspicions, which would induce them to neglect nothing to discover her situation, and the discovery, as she supposed, would lose her the situation she held. In this agony of mind, she remained irresolute, and from day to day became more and more uncertain as to the conduct she should pursue. She made, however, some swaddling clothes for her child, a circumstance which pleaded in her favor; she hired, in an adjoining street, a furnished chamber, which she enjoined upon the landlord to prepare for the reception of a woman in labor, at a moment's notice. Her design was, to go there as soon as she perceived the earliest pains, and to have a midwife instantly called: she would have returned immediately to her master, explaining, as well as she could, her absence. She had heard it told of the wives of soldiers, who, after having been confined behind an hedge, took their infant and followed their husband; she thought herself capable of doing as much. During the night that preceded the birth of the child, she felt pains, and dressed herself, for the purpose of keeping herself warm, so as to be in a condition to reach the chamber that she had hired, if her pains should increase. After having waited a little while, she was seized all of a sudden with such violent chagrin and fright, that she lost both the strength and courage to descend and traverse the street in the dark. A prey to despair, she fell upon her bed, and soon fainted. When she came to herself, she found herself inundated with blood, and saw a dead infant before her. Her first attention was directed to the child; being assured that it was really dead, she sat down a few minutes to reflect on what she should do, and, daylight appearing, she rose, enclosed the dead child, with the wet clothes, in a box, put her

chamber in order, and went again to bed. They sent for the hostess of whom she hired the chamber. This woman, who was satisfied with a small gratuity, without requiring any further information, recognized her when she saw her, and confirmed by oath this part of the recital. Mr. Pinkston and myself declared, that she appeared to us worthy of credit, and, at the same time, we proved to the jury that the circumstance of the lungs having floated, proved nothing against the young girl: she was pronounced innocent, and I had the satisfaction of believing, that she was really so.

"In similar occasions, we are but too prone to allow ourselves to be prejudiced; and when we see a manifest intention to conceal the birth of a child, we conclude that there was also a formal project to destroy it: we weigh all the circumstances on this hazardous supposition. If it was not thus, we say, why has the mother acted in such or such a manner? Why has she not done differently? Such questions would have an appearance of equity, and we could draw solid conclusions from them, if the accused, at the time, took counsel from a calm and disinterested mind; but when we reflect that she is violently agitated by the conflict of passions and fears, the more unreasonable her conduct may be, the more natural it ought to be considered."

In the remainder of his letter, Mr. Hunter proves that it is very difficult to judge with certainty, from the inspection of the body of a new-born infant, whether the death was natural or violent. He adds, that frequently natural accidents, such as the swollen state of the head, the dark or very red color of the face, the circumstance of the lungs floating in water, &c., are taken for signs of violent death. "If an infant breathes once, and instantly dies, the lungs will swim in water as readily as if it had breathed longer, and had then been strangled. A child will very commonly breathe as soon as its mouth is born, or protruded from the mother, and, in that case," says Hunter, "may lose its life before its body be born:

especially when there happens to be a considerable interval of time, between what we may call the birth of the head and that of the body. And if this may happen when the best assistance is at hand, it is still more likely to be the case, where there is none, that is, where the woman is delivered by herself."

"We frequently see new-born infants," continues this distinguished physician, "who, from circumstances in their constitution, or, in the nature of the labor, are but barely alive; and, after breathing a minute or two, die, in spite of all our attention; and why may not that misfortune happen to a woman who is brought to bed by herself?"

"Sometimes a child is born so feeble, that if left to itself, after breathing or sobbing, it might probably die, and yet may be roused to life by blowing into its lungs, applying warmth and volatiles, rubbing it, &c. But in the cases we have been considering, such means of saving life is not to be expected."

"When a woman is delivered by herself, a strong child may be born perfectly alive, and die in a very few minutes, for want of breath: either from being upon its face *dans l' arriere-faix* made by the natural discharges, or upon wet clothes, or by the wet things over it, collapsing and excluding air, or drawn close to its mouth and nose by the suction of breathing. An unhappy woman delivered by herself, distracted in her mind, and exhausted in her body, will not have strength or recollection enough to fly instantly to the relief of her child."

My readers will doubtless be struck with the equally sound and luminous manner in which Dr. Hunter has treated the question of infanticide. Still the importance of the subject is such, that I may be excused for permitting myself some further remarks dictated by my own convictions.

Infanticide, as Mr. Hunter agrees, ought to be punished as murder, when committed with premeditation, with mature reflection, in the complete enjoyment of moral liberty, without urgent temptation, solely as the result of an irregular life and abandoned character. In

this case, we may thank the legislature for taking under its protection the deserted and defenceless infant.

It would seem, at the first glance, that the erection of foundling hospitals has, in some sort, provided for the preservation of the existence of these unfortunate beings. But will the mother always be in a condition to convey her new-born child to this establishment? Is not the reverse often the case? Is not a charitable mediator needed to carry the child to these houses? Or, has the mother always the courage to reveal her situation, which she would wish to hide from all the world? Foundling hospitals are, without doubt, of great service, and the evidence of this is found in the fact, that, in places where no such establishments exist, the prisons enclose a large number of mothers, guilty of infanticide. But hospitals do not provide for all contigencies. It is an error to imagine that it suffices to assure the mother respecting the maintenance of her offspring; it is not want which most tends to distract her. Very often it is shame, it is despair, which produces infanticide. Now the causes of this shame and this despair, are not destroyed by the institution of foundling hospitals.

We may assume, as a general principle, that a mother cannot feel either anger or hatred against her new-born infant. This principle would always be operative, if the mother in these circumstances always acted consistently; if, indeed, she retained the power to act thus when overwhelmed with utter humiliation. But, in this fatal moment, the mother thinks only of the ingratitude, the infidelity, the perfidy of the father of her child; he has deceived her in the most infamous manner; he has loaded her with shame, and plunged her into wretchedness; he has destroyed all her enjoyment of the present, all her hopes in the future; and, while he forgets her in the arms of another, the laws afford this injured woman no protection, no indemnity, against her seducer. The idea that all the artifices he has employed to betray confiding innocence, to seduce an inexperienced girl, are now regarded as subjects for mirth; this idea pre-

sents itself to every unfortunate who finds herself deserted; this injustice vexes, torments, revolts her. Her indignation goads her feelings, wears upon her mind, and may, in fine, drive her to distraction.

Infanticide awakens the idea of atrocious barbarity, because it is supposed, that the natural feeling of mothers must be aroused at its very name. Nature, it is true, has placed in most women, and in most of the females of animals, this beneficent propensity. But in women, as in the females of brutes, this propensity is not equally energetic in all individuals. Many domestic animals abandon, kill, or devour their young. Many cows will not let themselves be suckled by their calves; other cows, on the contrary, if separated from them, never cease to call them by lowing, and refuse to eat for several days. Unhappily, the same differences in maternal love are also remarked among women. All do not desire to become mothers; many fear to have children. There are even some, who regard pregnancy as the depth of misfortune. We daily observe in female domestics, that some are very fond of children, while others cannot bear them. Our readers, no doubt, are acquainted with women, who seek and find a thousand pretexts to avoid having their children near them. Observe, with attention, the effect produced by the death of a child on different mothers. Many, though delivered, by the loss of an illegitimate child, from shame, from misery, and from a thousand annoyances, yet shed tears for a long time afterwards at the recollection of the event. Other mothers, on the contrary, though subjected to none of these mortifications, see their lawful children buried, with a smile on their lips. If, then, there are women in whom the sentiment of maternal love is thus feeble, we cannot say that, in their case, infanticide differs in its degree of criminality, or, is more unnatural than any other premeditated murder.

We have examined the form of the head of twenty-nine infanticide women. Twenty-five had the organ of maternal love very feebly developed. True, it is

not this organization which induces a mother to destroy her offspring; but a woman thus organized, has one internal motive the less, not to commit this crime; and, having to combat the impulse of the unhappy circumstances in which she finds herself, she will not make the resistance she would have done, had her internal feelings been strongly excited against the idea of such barbarity.

Almost all laws against infanticide suppose this crime to be premeditated, whenever it is not committed in a transport of anger or of hatred: but are these in truth the only affections, which are capable of excluding premeditation? Let us judge by some of the actions of our own sex. How often does a sentiment of honor, although misplaced, make us risk our life, and that of our fellow-men! How many young men, clever and full of talent, have taken their own life, in consequence of losing the object of their love! How frequently will disappointed ambition, or the loss of our fortune, throw us into despair! And yet we are, *par-excellence*, the firmer portion of the human race; we are never deprived of all support; our misfortunes are seldom incompatible with the hope of future enjoyment, and still more rarely do they take from us the prospect of a companion, a soother of our sorrows. How different is the position of a wretched woman, worn down by affliction! To feebler intellectual faculties, women usually unite a higher degree of sensibility; the lively affections and the passions take hold of them more easily, and bear them along with more violence. How many we see, who, even in the brightest days of their lives, lose their reason in consequence of the most trifling occurrences! The sentiment of honor and of shame is exercised, exalted, and rendered more lively in woman from her childhood; and we demand of these creatures thus sensitive to excess, of the young, timid, and inexperienced, to be cool, calm and considerate, when all that is most dreadful, and most discouraging, has but just overtaken them. The physical effects of pregnancy, the terrible

and frightful play of all the passions, which torment them during its course, go to augment their irritability of feeling, and to distract their intellectual faculties. The decisive moment arrives; abandoned, without consolation, tortured with pain, weakened by the loss of blood, and bewildered by the confusion of the most terrible apprehensions, the unhappy mother extinguishes, with her own hands, the frail existence of her infant: perhaps she commits this very act in a moment of that real delirium, with which mothers, even the most happy, are sometimes attacked at the period of child-birth.

In a report of the counsel-general of hospitals at Paris, which includes ten years from 1804 to 1814, it is remarked, under the head of insane, that the number of those received at the Salpètriére, and the Bicêtre, was 2154 men, and 2804 women. Of this number of cases, 658 are placed to the account of child-birth, its consequences, and preceding circumstances, more or less distant. Among the women, 166 cases were owing to excessive and unfortunate attachments; while in men this cause contributed but 37.

The following very remarkable fact, related by M. Esquirol, proves that a woman may destroy her infant in the delirium consequent on confinement. "A woman was delivered at St. Cloud, killed her infant with twenty-six wounds from scissors, wrapped it in cloths, and threw it in the privy. As she went out every day at an early hour, and as on this day she was observed not to go abroad, the people went to her room and demanded her child; she could give no account of it. Search was made, and the child found as above stated. Being carried to Versailles, where she was to be tried, she would not allow them to bandage her eyes, in order to conceal from her the outrages of her town's-people who followed the coach: she repeatedly said, they will surely do me no mischief; is it not so? for what harm have I done? Having reached Versailles, she refused to eat the two first days. When brought to the bar, she confessed her crime, gave no reason for her justification,

and alleged, that she knew not why she had done it. The judges, very wisely, declared her not guilty, the crime having been committed in a state of mental derangement. How many such unfortunate beings have been, and still are, the victims of a mistaken zeal for justice!"

Why cannot we, the rest of mankind, appreciate so deplorable a situation, and, in doing so, establish grades of extenuation in a crime, which may be aggravated or excused by so many circumstances? Why should so much difficulty be apprehended in demanding satisfaction from the seducer? Why fear to do justice upon a traitor? At least let us not fear to be indulgent and humane for feeble, frail, and injured innocence. The unfortunate, whose excess of misery and despair has unsettled her mind and broken her heart, is surely worthy of compassion, and does not deserve to be punished with that rigor, which the laws reserve for crimes deliberately planned.

To give an idea of the fatal combination of disastrous circumstances, which may lead a mother, though endowed with the good qualities of her sex, to destroy her child, I shall quote the following fact, inserted in the *Journal du Beau Monde*,* on occasion of our visit to the prison of Torgau.

Among a number of criminals detained in the prison of Torgau, who were brought to Dr. Gall, they presented to him a woman, aged between thirty and forty years. Deaf to the prayers of her infant, aged four years, she had drowned him in a river.

Dr. Gall examined her head: he took the hand of M. Soder, counsellor at Halle, who happened to be there, and passed it over the occiput and the sides of the head of the woman, in order to prepare him for some farther observations. The prisoner having retired, he explained to a crowd of persons who accompanied him, that he

* August 1, 1805, No. 92, le Journal paraissait a Leipzig.

had discovered a circumstance very unusual in these cases, namely, that the prisoner had the organ of maternal love very greatly developed; that the organ of murder was very little so; that, otherwise, she was very well organized, and must have a very great facility for learning by heart. The magistrates present then related to Dr. Gall the following facts.

"This person, born of poor parents, whom she lost at an early period, had received almost no education at all; when grown up, she went to service in the country, and had the best certificates from her masters. Unhappily, she was seduced, became pregnant, and the being to whom she thus gave life, was the cause of her misery. She was dismissed from the house where she was then employed, and no one would receive her on account of her child; for a long time she knew not how she should maintain herself and this unfortunate creature, whom she cherished with all the affection of a tender mother, but whose existence was thus rendered a curse to her. At length a poor villager and his wife took pity on her lot, received the child in their house, and kept charge of it for three years. The mother found a place and behaved herself very well.

"The child grew up and gave great satisfaction to his protector, who loved him with the tenderness of a son, and was repaid with equal warmth. This was enough to set idle tongues busy with the rumor, that the villager was the parent of the child, whose mother obstinately refused to name the real father. The good man, conscious of his innocence, despised these calumnies; but his wife was differently affected by them. Hence resulted altercations so frequent and so disagreeable, that the villager, to obtain peace, sent back the child to his unhappy mother. In vain did she supplicate her employers; in vain represent that she had served them with exemplary assiduity and fidelity; she saw herself, on account of this child, again houseless in the severest season of the year. All the other rich peasants treated her with the same harshness; she met with no other

poor and hospitable villager. She wandered from place to place, selling her wretched garments to satisfy her hunger and that of her child, finding no where either refuge or succor. The child was wasting away; overcome and enfeebled by hunger and pain, she implored death for this miserable being and herself, as the only relief to their sufferings. In this struggle between maternal love for her child, who was already dying of hunger and cold, and that voice from within, which plainly told her that the destruction of this child was the only means of saving herself; hopeless of compassion from mankind, in a moment of delirium she seized the boy, summoned all her strength, and, in the fear of seeing him slowly expire from inanition, carried him to the next river; deaf to his prayers, she threw him into the waves, where death soon released him from his sorrows. Exhausted by weakness, she now fainted, and was found in this state. She immediately accused herself of having destroyed her child, and was arrested.

"During her detention, while her trial was preparing, which lasted a year, she behaved in the most regular manner, expressed the deepest repentance for her act, which, however, she did not regard as a crime, and awaited her punishment with resignation. The clergyman, who visited her from time to time, reported that she had not received any kind of instruction, that she had not the least notion of religion, but that she seemed very docile, very attentive, and very gentle. The persons who watched her, gave an equally favorable account. These various motives induced the regency to soften the sentence, pronounced in the first instance by the tribunal at Leipsic, which condemned this unfortunate woman to be beheaded. This punishment was commuted for imprisonment for life in a prison where she was not treated with too much rigor, and where she was instructed in religion. She learned to read with extraordinary application and facility, and seized with readiness whatever was taught her; so that, besides the task imposed on her, which she readily per-

formed, she learned by heart, so as to repeat verbatim and fluently, several spiritual songs, the catechism, and many chapters of the Bible. She is one of those prisoners who give the most satisfaction."

In the prison of Çelle we examined another prisoner, guilty of infanticide. We found the organ of maternal love equally well developed in her. M. Bergk has inserted this history in his Recueil de causes Célèbres, tom. ii. This unhappy woman had, likewise, been urged, by the most pressing necessity, to destroy her child.

Truly, if it were not so painful to a mother to resolve on the commission of such an action, infanticide, the consequence of unlawful connections and of the perfidy of men, would be far more frequent. It may be conceived how great must be the violence of the impulse, which urges to such an action, when it is remembered, that the attachment of a mother to her offspring, often silenced during pregnancy, becomes singularly active and energetic during the period of child-birth. We must, then, suppose, that when a mother yields to this dreadful suggestion, she is almost always violently tempted to it, and that thus in the midst of the contradictory passions which agitate her, it is fair to examine, to what degree this struggle may have left her sufficient reflection, or even the full possession of her senses.*

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* To prevent infanticide, it has in many countries been made the duty of girls, when pregnant, to disclose their situation to an accoucheur or a midwife; and if they do not comply with this form, the law suspects the intention of committing infanticide. In other places, the proprietor of the house where the girl dwells, is made responsible. Unhappily, the legislator often finds himself in the same position as the medical man when he treats incurable diseases. No means are successful, but still he prefers to try doubtful ones, rather than employ none. The temper of the law, which enjoins the avowal of pregnancy, is too much at variance with the character of a timid and bashful woman; it is evident that we do not here speak of prostitutes. The whole education of women tends to confirm this natural modesty. This sentiment is regarded as the best safeguard of their virtue; and yet when a woman yields to temptation, we expect her to reveal her shame! We have seen men of mature age, who could not resolve to make confidants even of their most intimate friends, in regard to certain diseases.

I have observed that both sexes experience every month, once or twice, a species of periodical derangement, which disturbs the harmony of their affections and their habits, and which assumes the character of an irritation and a melancholy, of which the individual affected can render no reason to himself. Persons of an irritable or enfeebled temperament, experience this derangement in a very sensible manner. I shall speak of it hereafter, more in detail. It will suffice here to remark, that this phenomenon takes place especially at the periods of regular evacuations. Now child-birth arrives at one of these periods; that is, at the time when the woman would have had her tenth menstrual evacuation; it follows, that all the circumstances which are capable of affecting and troubling a woman, then strike her mind with most force. It has generally been observed, that at this period women are more susceptible, more gloomy, more despondent, more easily excited. Is it then surprising, if they are more subject to estrangement, and more likely to adopt fatal resolutions? This same periodical derangement of the mind has sometimes, also, the most deplorable influence on men. We know an individual, who, once a month, is harassed for two or three days by the thought, and even the desire, of committing murder. This desire puts him in a state of anguish and despair; he then hastens to the house of a friend, and begs to be preserved from the misfortune which threatens him. The paroxysm passed, he returns home, delivered from all sort of temptation. It is during this period, that those who are visited with a propensity to suicide, generally put an end to their life.

If it be also considered that many girls believe, that, by making such a confession, they inflict disgrace on their family, and that this very obstinacy, in concealing their situation, is itself an evidence that their virtue is not wholly corrupted, it will be seen that it were better to have recourse to milder means, such as establishments where women can lie in privately, and to foundling hospitals, to which they might convey their infants, with the certainty of having their existence provided for.

I have treated at length of infanticide; but this is not the only example which shows, that prolonged passions and affections, even when they do not actually produce madness, may alter the dispositions of the soul, and so enfeeble moral liberty, that it is difficult, in such cases, to appreciate the culpability of actions. The following example furnishes a proof of this.

Other cases of Moral Liberty greatly weakened.

The wife of the honest Joseph Prohaska, soldier in garrison at Breslau, in Silesia, inspired a brutal passion in the first lieutenant of her husband's company. This virtuous wife rejected with perseverance the proposals and the importunities of the lieutenant, and said nothing on the subject to her husband. One day that she carried his dinner to the *corps-de-garde*, where she had been designedly sent, she found him sitting on the campbed, his face pale and wan, and his eyes fixed on vacancy. Take that away, said he, I have been sufficiently regaled at the exercise and parade ground, and have no appetite. He appointed her a meeting at seven in the evening, at the post. In the interim she learned, from one of the companions of her husband, that the lieutenant had accused him already, several times, at the exercise, of inattention to orders and neglect of his arms; that he had added some injurious expressions, and had repeatedly given him, with his own hands, blows with a cane; that when the battalion was formed, the colonel had, according to custom, ordered the officers to note the negligent soldiers, in order to give them twelve blows at the first pause. Prohaska had twice found himself among the soldiers noted for negligence, and had undergone the punishment prescribed; and, as the feeling of a man was roused within him, he complained with great gentleness, of the injustice done to him; he was treated as mutinous, and fifteen more blows forced him to silence.

The unhappy woman repeatedly interrupted this recital by exclaiming, "Jesus! it is I who am the cause of this; poor man, you must bear the consequence. He will then force me to this!" She returned home. To relieve her oppressed feelings, she related to her friends, and to the inhabitants of the same house, what had passed during this day, and her unfortunate connections with the ferocious tormentor of her husband. At seven, she went to the rampart where her husband awaited her. As soon as she was alone with him, she explained all that her natural goodness had till then induced her to keep secret, and begged him to go as soon as relieved from duty, and state his complaint to the colonel. Poor Prohaska heard her with apparent calmness. When she had finished, he silently took the supper she had brought him, and only opened his mouth to wish her good night, and entreat her to retire. The poor woman observing that her husband did not, as usual, give her the parting kiss, asked him if he was angry with her, or had any suspicion of her innocence. "No," replied he, "I do not complain of you. Yet you would have done better to have told me earlier the views of the lieutenant; we might now have been beyond the frontiers. At present this is not possible without running great risk as a deserter; for, I doubt not that, between this and to-morrow my pass will be taken from me." "It is taken already," said his wife, bursting into tears; "at half past three, the sergeant came to ask for it, saying, that they were going to change them all for new passes to prevent counterfeiting." "God help us, then," said Prohaska. He seized his wife, embraced her with transport, and let her depart. The poor woman repeated all these particulars to her friends, who made deposition of them at the time of the trial, of which Prohaska verified the accuracy.

The next day, it was a Friday, Prohaska returned from guard duty. He found the table laid, sat down with pretended tranquillity, and ate. A soldier who lodged with him, declared at the trial that this man had

always been a kind husband and attentive father, but that these two qualities had never more strongly shown themselves, than from this Friday to the fatal moment, when, abandoned by his good angel, deceived by mistaken piety, and greatly weakened in mind and body, he yielded. Saturday, Prohaska worked all the morning.

After dinner, during which they said nothing on the subject of their troubles, he said in a low voice to his wife, it is useless to complain. A soldier of Major N's company, carried up some complaint, to-day, against an officer; he was right, but that did not prevent their giving him eighty blows on the back, simply covered with his shirt. I see it well; the life of a soldier is dreadful; henceforth I shall suffer in honor of God; he has himself suffered, and this may be imputed to me as a merit: I shall so manage as to have intercessors in heaven, who will pray for me, that my soul may not remain too long in purgatory. I wish to pardon him who has injured me: do you do the same. To-morrow we will confess, and receive the communion, that the heavenly bread may give more force to our resolution, and that I may not curse the wretch. He meant no doubt to speak of the first lieutenant, and he said nothing more on the subject. Both confessed themselves, and received the communion. To all appearances tranquillity was again established. Prohaska, at dinner, had wine brought him, in order, as he said, to regale himself a little. When he rose from table, there remained a little wine; he gave it to the other soldier and said, "Drink, comrade, and if I have ever injured you, pardon me." His wife asked him if he would take coffee. He thanked her, and proposed a walk. The unhappy wife consented, with pleasure, not suspecting that she was walking to her grave. They took the youngest of their children, and left the eldest in charge of their friends. The two crossed the town together, the wife carrying the child in her arms.

Prohaska, under pretext of avoiding the heat of the sun, led his wife under a grove of willows, planted along

the glacis of the citadel. Having seated himself near a place called the mouse pond, Prohaska reminded his wife of nursing her child, who immediately fell asleep. She placed it on the grass, and covered it with a handkerchief. Then, Prohaska, wholly occupied with the idea of killing his wife, embraced her, hugged her with transport, kissed her, and asked if in truth she had that day made confession of all her sins without exception, experienced true repentance and absolution. She answered yes to all these questions. He pressed her again with his left hand: and while they interchanged the tenderest endearments, he gave her a stab with his right hand, which pierced her to the heart. He then let his wife fall gently on the grass, having thus sacrificed her to his religious delirium, and, as some convulsive movements seemed still to betray some remains of life, fearing that she might still be suffering pain, he, to shorten its duration, cut her throat. He contented himself with taking from the pocket of his wife, the key of the house; and, having washed his hands in the pond, and thrown away his knife, he took his infant, who was still sleeping, and returned home by another way. By his own confession, he ran very quickly, because he feared that if his wife's body were discovered, he should be suspected and arrested; which would have prevented him from snatching his two dear children from a perverse and wretched world, and sending them to heaven to serve as intercessors for him.

On returning home, he placed the infant in the cradle, still asleep. He then went in pursuit of his neighbors, begged the wife of the old messenger of the regency, to go out of the gate of Schweidnitz, and pointed out to her the place where she would find his wife; adding that he had left her well, but very weak, having been taken ill during the walk; that she had sat down to rest herself, and had begged him to return with the child. He ended by saying that he was too tired to go back himself. The good woman hastened to comply with his request, and would have taken the infant. This

Prohaska opposed, alleging that it would hinder her in her walk. No sooner is he left alone, than he runs with the infant to his house, where he had left the other asleep; splits the skull of both with a small hatchet; places them on the bed in each other's arms; and, having carefully shut the chamber, goes to the guard-room, and, with a certain satisfaction in his looks and gestures, says that he has killed his wife and children. "Now," added he, "let lieutenant de V. make love to her. She and my children are beyond seduction and dishonor; they will thank me for the happiness they enjoy, and will pray for me in heaven."

The counsel of war that tried him, paid no attention to the extenuating motives, and did not take them into consideration to determine the degree of culpability, with reference to moral freedom. It treated Prohaska, not as a deranged man, but as a man in health, as a man who had acted with perfectly free will, consequently, as an assassin with premeditation: it condemned him to be beheaded; and, to aggravate the punishment, refused him in prison, and even when he went to execution, the privilege of being accompanied and exhorted by a clergyman.*

This fact proves to what degree violent melancholy and superstition may obscure the mind, and extenuate the conduct of those unfortunate men, who, in this condition, commit crimes. But, how many other circumstances, hitherto little remarked, contribute to affect our reason, and, consequently, to impair our freedom!

Certain aliments, and especially spirituous liquors, produce on many persons peculiar irritations, which are the effect of a species of ebriety, though not accompanied with the ordinary symptoms of that state. We know that wine and brandy render a man courageous,

* This fact was communicated to us by Major Grambkowski, who terminates his narrative in these words: "I abstain from any comment, but I warrant the truth of what I relate."

quarrelsome, eloquent, sincere, amorous, sad, or gay. When the robber Peter Petri was sober, he seemed plunged in a state of dulness and apathy. They could then do what they would with him. But, after drinking a few glasses of brandy, he was a very tiger, who threw himself without distinction upon friends and enemies. A woman at Bamberg, whenever she had drank brandy, felt a strong desire to set fire to some house; but no sooner had the excitement passed, than this woman was filled with horror at her own previous state. As, however, she was not always on her guard against the enticements of her favorite beverage, she actually committed arson in fourteen instances.

The most embarrassing case in regard to culpability, without reference to the laws, is that in which a peculiar quality acquires by itself, and in consequence of the organization, so great a degree of energy, that it forms the ruling passion of an individual. I have already shown, that all the faculties, and all the propensities, may arrive at this degree of energy. If this takes place in regard to a matter, which is indifferent or laudable, we may felicitate the individual, without making it a subject of commendation. Many persons are naturally inclined to devotion; others would be forced to do great violence to their nature, if they dismissed, without aid, an abandoned child, or a friendless old man. Many men have an especial inclination for building, travelling, disputing; one is inflamed with an insatiable desire of glory; another cannot spare his best friends, when a brilliant sarcasm rises in his mind. We found in a house of correction a young nobleman extremely proud, who was confined there, because he was ashamed of every kind of work. Even there he would only condescend to speak to persons of distinction, and his questions discovered uncommon penetration. The nervous systems of certain external senses may also acquire such an extraordinary degree of activity and energy, that they determine, as it were, the principal character of an individual. This kind of energy is even sometimes he-

reditary. In a certain Russian family, the father and the grandfather early became victims of their propensity to drunkenness; the son, though he foresaw the consequences of this perverse habit, continued to abandon himself to it, in spite of his exertions; and the grandson, a boy of five years, at the time of the publication of the first edition of this work, already manifested a decided propensity for spirituous liquors.

Why should not this imperious activity sometimes take place, also, in other organs, which, by the excess of their action, lead to evil? The reality of such exaltation is proved by so many examples, that any objection dictated by prejudice or superstition, would be absurd. The individual who experiences this exalted energy, is governed by a single sensation or idea, in which his whole soul is centered. If this violent action is not controlled by some superior force, the man becomes its slave. If faculties of a superior order act at the same time in a contrary direction, there hence results an obstinate struggle between the unhappy propensities of the individual and the painful opposition of his reason. Is it, then, surprising, that evil propensities often gain the mastery over the good; the flesh, over the spirit? This state, it is true, is not a real alienation of the mind; it is rather a partial exaltation, a subjection of the soul, and it offers an incomprehensible contrast between man and the animal in man.* If the exaltation takes place in a quality, whose too energetic activity leads to criminal acts, a state can hardly be imagined more unhappy for the individual, and more perplexing to the judge; for this state produces effects in appearance so contrary, that, on the one hand, it is scarcely possible to distinguish it from the state of reason; and, on the other, it seems to confound itself with madness. Let us examine some

* "The flesh lusteth against the spirit, and the spirit against the flesh and these two are contrary the one to the other, so that ye cannot do the things that ye would." St. Paul to Gal. ch. v. ver. 17.

of these inclinations, beginning with the propensity to theft.

Violent Propensity to the commission of Theft, destroying the Moral Freedom.

Victor Amadeus I., King of Sardinia, was in the constant habit of stealing trifles. Saurin, pastor at Geneva, though possessing the strongest principles of reason and religion, frequently yielded to the propensity to steal. Another individual was, from early youth, a victim to this inclination. He entered the military service, on purpose that he might be restrained by the severity of the discipline; but, having continued his practices, he was on the point of being condemned to be hanged. Ever seeking to combat his ruling passion, he studied theology, and became a capuchin. But his propensity followed him even to the cloister. Here, however, as he found only trifles to tempt him, he indulged himself in his strange fancy with less scruple. He seized scissors, candlesticks, snuffers, cups, goblets, and conveyed them to his cell. An agent of the government at Vienna had the singular mania for stealing nothing but kitchen utensils. He hired two rooms as a place of deposit; he did not sell, and made no use of them. The wife of the famous physician Gaubius had such a propensity to rob, that when she made a purchase, she always sought to to take something. Countesses M., at Wesel, and P., at Frankfort, also had this propensity. Madame de W. had been educated with peculiar care. Her wit and talents secured her a distinguished place in society. But neither her education nor her fortune saved her from the most decided propensity to theft. Lavater* speaks of a physician, who never left the room of his patients without robbing them of something, and who

* Physiognomie, Edit. de la Haye. t. ii. p. 169.

never thought of the matter afterward. In the evening his wife used to examine his pockets; she there found keys, scissors, thimbles, knives, spoons, buckles, cases, and sent them to their respective owners. Moritz, in his experimental treatise on the soul, relates with the greatest minuteness the history of a robber, who had the propensity to theft in such a degree, that, being "in articulo mortis," at the point of death, he stole the snuff-box of his confessor. Doctor Bernard, physician of his majesty the king of Bavaria, speaks of an Alsatian of his acquaintance, who was always committing thefts, though he had every thing in abundance, and was not avaricious. He had been educated with care, and his vicious propensity had repeatedly exposed him to punishment. His father had him enlisted as a soldier, but even this measure failed to correct him. He committed some considerable thefts, and was condemned to be hanged. The son of a distinguished literary man offers us a similar example. He was distinguished among all his comrades for his talents; but, from his early infancy, he robbed his parents, sister, domestics, comrades, and professors. He stole the most valuable books from his father's library. Every kind of means was tried to correct him: he was sent into the service, and underwent several times the most rigorous punishments; but all was useless. The conduct of this unhappy young man was regular in all other respects; he did not justify his thefts; but, if they addressed to him on this subject the most earnest and the most amicable representations, he remained indifferent; he seemed not to understand them. The almoner of a regiment of Prussian cuirassiers, a man otherwise well educated and endowed with moral qualities, had so decided a propensity to theft, that frequently on the parade he robbed the officers of their handkerchiefs. His general esteemed him highly; but as soon as he appeared, they shut every thing up with the greatest care, for he had often carried away handkerchiefs, shirts, and even stockings belonging to the women. When he was asked for what he had

taken, he always returned it cheerfully. M. Kneisler, director of the prison at Prague, once spoke to us of the wife of a rich shopkeeper, who continually robbed her husband in the most ingenious manner. It was found necessary to confine her in gaol; but she had no sooner escaped than she robbed again, and was shut up for the second time. Being set at liberty, new thefts caused her to be condemned to a third detention longer than the preceding. She even robbed in the prison. She had contrived, with great skill, an opening in a stove which warmed the room where the money-box of the establishment was placed. The repeated depredations she committed on it were observed. They attached bells to the doors and windows to discover her, but in vain; at length, by the discharge of pistols which went off the moment she touched the box, she was so much terrified, that she had not time to escape by the stove. We have seen in a prison at Copenhagen an incorrigible thief, who sometimes distributed his gains to the poor. In another place a thief, shut up for the seventh time, assured us with sorrow, that it did not seem possible to him to conduct otherwise. He eagerly begged to be retained in prison, and to be furnished with the means of gaining his living.

I might cite thousands of similar facts, which prove, at the same time, that the propensity to theft is not always the consequence of a bad education, of idleness, of poverty, of the want of certain good qualities, nor even of the want of morality and religion; and this is so true, that every one shuts his eyes on trifling larcenies when committed by rich people, who are otherwise of good character. These thefts are imputed to absence of mind. But may not the same propensity be found in the poor? and does it then change its character? Is its nature altered by the value of the thing stolen? It follows, from these cases, that it requires great prudence and experience to fix, with exactness, the degree of criminality.

Let us now consider, under the same point of view, another mischievous propensity.

Excessive Propensity to kill, enfeebling Moral Liberty.

There is in man an inclination, which varies in degree, from simple indifference at seeing animals suffer, and from simple pleasure at witnessing the destruction of life, to the most imperious desire of killing. Our sensibility revolts at this doctrine, but it is, nevertheless, only too true. Whoever would judge justly the phenomena of nature, must have the courage to acknowledge things as they are, and, in general, not to make man better than he is.

We observe that, among children as among adults, among coarse people as well as those who have received education, some are sensitive and others indifferent to the sufferings of their fellows. Some even find pleasure in tormenting animals, in seeing them tortured, and in killing them, without our being able to charge it either to habit, or to defect of education. I could cite several instances, in which this inclination, when very energetic, has decided individuals in their choice of employment. A student used to shock his companions by the particular pleasure he took in tormenting insects, birds, and other animals. It was to satisfy this propensity, as he himself said, that he made himself a surgeon. An apothecary's boy experienced such a violent propensity to kill, that he took up the trade of a hangman. The son of a shopkeeper, whose mind took the same turn, embraced that of a butcher. A rich Dutchman used to pay the butchers, who made large contracts for supplying vessels with beef, to let him kill the cattle.

We may also judge of the existence of this propensity and of its diversity, by the impression produced on spectators by the punishment to which criminals are subjected. Some cannot support the spectacle; others seek it as an amusement. The Chevalier Selwyn made par-

ticular exertions to be placed near the criminal who was undergoing punishment. They relate an anecdote of La Condamine, that, one day, making efforts to penetrate the crowd assembled at the place of execution, and being repulsed by the soldiers, the executioner exclaimed, "Let the gentleman pass, he is an amateur." M. Bruggmanns, professor at Leyden, mentioned to us a Dutch clergyman, who had so decided a desire for killing, and for witnessing death, that he took the place of almoner of a regiment, solely to have an opportunity of seeing a great number of men destroyed. This same individual raised, at his house, the females of various domestic animals, and when they brought forth young, his favorite occupation was to cut their throats. He used to take charge of killing all the animals that were to be cooked. He corresponded with the executioners throughout the country, and would travel several miles on foot, to be present at executions; so that the executioners always secured to him the distinction of a place near them. On the field of battle we find striking examples of the different degree in which this disposition exists. One soldier, at the view of the blood which he causes to flow, feels the intoxication of carnage; another, moved by pity, inflicts feeble blows, or at least spares the conquered; turns away at the sight of a child, of a woman, and of an old man, and checks himself after a victory.

The man enslaved by the cruel propensity of which I here speak, still preserves the power of subduing, or of giving it a direction which is not injurious. But the power of subduing a vicious propensity is weakened in such an individual, in proportion as he has received less education, or the organs of the qualities of a superior order are less developed. If it happens that this propensity is carried to the highest degree, the man experiences but little opposition between his pernicious propensities and his external duties; and though even in this case he is not deprived of moral liberty, or the faculty of being determined by motives, he still finds pleasure in homi-

cide. I shall include in this case all the robbers, who, not content with plunder, have shown the sanguinary inclination to torment and kill without necessity. John Rosbeck was not satisfied, like his companions, with ill treating his victims to make them confess the place where their treasures were concealed; he invented and exercised the most atrocious cruelties, for the sole pleasure of seeing the sufferings and the blood of children, women, and old men. His first imprisonment continued nineteen months; he was shut up in a subterranean dungeon so narrow, that he could hardly breathe. His feet were loaded with chains; he was up to the ankles in dirty water; and when he was taken from this sink, it was to undergo cruel torture. Still he would confess nothing; he was set at liberty, and the first use he made of his freedom, was to commit a robbery in open day. He soon committed new murders, and was finally put to death. At the beginning of the last century, several murders were committed in Holland, on the frontiers of the country of Cleves. The author of these crimes was a long time unknown. Finally, an old minstrel, who used to go to play the violin at all the weddings in the neighborhood, was suspected from some conversation among his children. Carried before the magistrate, he confessed thirty-four distinct murders, and asserted that he had committed them without malice, and without any intention to rob, solely because he found extraordinary pleasure in them. This fact was communicated to us by M. Serrurier, magistrate at Amsterdam.

The well-known Sabatino, condemned at Palermo, for various crimes, at the moment he ascended the scaffold, confessed that he had killed a man with a musket-shot two years before. When asked what could have induced him to commit such an outrage, he coolly replied, that he had fired his musket on the man, to satisfy himself that the powder was good! Journal des Maires, Saturday, Sep. 19, 1818.

Louis XV., says M. Lacratelle,* had a well-founded aversion to the brother of the duke de Bourbon Condé, the Count de Charolais, a prince who would have revived all the crimes of Nero, if, to the misfortune of mankind, he had been permitted to occupy a throne. Even in the sports of his childhood, he manifested an instinct of cruelty which might make one shudder. He amused himself in torturing animals: his violence to his servants was absolutely ferocious. They pretend that he tried to mingle cruelty even with his debaucheries, and that he practised divers barbarities on the very courtezans who were brought to him. The popular tradition, confirmed by several records, accuses him of several homicides. He committed murder, as is said, without interest, resentment, anger. He used to fire at bricklayers, in order to enjoy the barbarous pleasure of seeing them fall from the top of the houses, on which they worked.

These last facts, fortunately very rare, show us that this detestable propensity is sometimes altogether independent of education, of examples of seduction or habit, and that it has its source solely in a bad organization. In fact, there are sometimes committed crimes so barbarous, with circumstances so revolting and disgusting, that it would be difficult to explain them in any other manner. Prochaska† relates that a woman of Milan used to lure children to her house by flatteries, kill them, salt their flesh, and devour them daily. He also cites the example of a man, who, in the indulgence of this atrocious propensity, killed a traveller and a young girl, to devour them. I have already mentioned the daughter of a cannibal, who, though educated at a distance from him, partook, from an early age, of this savage passion.

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* Historie de France, tom. ii. p. 59.
† Opera Minora, tom. ii. p. 98.

We cannot deny, then, that certain individuals have propensities to crimes, and even to those of the most atrocious character. Helvetius himself, the great antagonist of the innateness of the qualities of the mind and soul, is obliged to allow "that there are men so unfortunately constituted, as never to be happy but in doing deeds which will send them to the gallows." Cardinal Polignac,* also speaks of men "born vicious, for whom crime has actual charms, and who are borne along by a furious passion, which obstacles only irritate." †

Thus far, however, the propensities of which I speak are not of the number of those, which evince an actual alienation. These propensities render the most energetic measures necessary, and criminals of this description cannot be tolerated in society. The greater part, according to the expression of M. de Sonnenfels, "ought to be slain, as we slay wild beasts, to prevent their destroying the human race." ‡

It has been objected to me, that these persons ought not be judged by their organization. It is not pretended that they should be. But it is desirable to prove the reality of these facts, and to explain them by this perverse organization, that people may cease to accuse the voluntary perversity of these monsters.

Let us quit this painful subject, to notice those cases in which we may pronounce with confidence on the absence of moral liberty, and, consequently, the impossibility of admitting moral guilt, or any kind of responsibility. Such are those cases, in which illegal actions may be considered as done from imbecility of mind, mental alienation, or certain derangements of the natural state of health.

It will, perhaps be said, that the acts of imbecile or deranged persons are not subject to the operation of criminal laws. But my researches on this subject will throw

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* De l' Esprit, p. 578.
† Anti Lucrece, trad. par. M. de Bougainville, Louis, 1754, p. 184.
‡ Grundsætze der Policey, etc. t. I.

great light on the preceding discussion ; and, on the other hand, it appears to me essential to determine with the greatest precision, the circumstances in which one of the cases mentioned really occurs. I shall treat separately of each of these subjects.

Application of my Principles to illegal Acts which result from a peculiar weakness of the Mental Faculties.

I here make use of the expression, *peculiar weakness* of the mental faculties, because I am treating only of actions which are the consequence of a greater or less imbecility of mind. I shall not speak of acts which flow from complete and general stupidity of intellect. These last acts being purely involuntary or automatic, have not even the appearance of moral liberty, and can by no means, form the subject of my present researches.

Among the young boys who were brought to us in one of the prisons of Berlin, (Stadt-Vogtey,) there was one who particularly attracted our attention. We advised that he should not be set at liberty, because he would not be restrained from a continuance of his robberies. We added that the best thing which could be done, was to keep him always in a place of security. We communicated our reasons to those who accompanied us. They consulted the register, and found, to their great surprise, that this young boy had, from his earliest infancy, shown the most obstinate propensity to theft. Our adversaries availed themselves of this opportunity to place in the strongest light, what they were pleased to find frightful and dangerous in my doctrine. "To condemn," said they, "a young boy to perpetual imprisonment, because he has committed a theft, what can be more cruel or more revolting to humanity?"

What reason had we, then, to give this advice? I have already made evident that we ought to consider man in two points of view ; first, as having qualities

common with animals; that is to say, those of an inferior order; then as being endowed with the character of humanity, or with qualities of a superior order. I have also shown that man, by means of his superior qualities, is capable of subduing and directing his propensities of an inferior order. But, if the qualities of a superior order are controlled in an extraordinary manner, to such a degree that their free action is prevented, while those of the inferior order, on the contrary, are active, then the animal part of the man predominates exclusively, and the flesh, or the brutal desires, hold in subjection the spirit, or the dispositions of the superior qualities, which are hardly developed. With such an organization for those functions of the soul, which belong to a superior order, the same happens which takes place in regard to each organ whose development is defective; that is, there results a relative imbecility, and, in consequence, the incapacity of acting morally; while the propensities of an inferior order act with uncontrolled energy. Such an individual finds himself under an absolute necessity to act solely from the impulse of the passion which governs him; and his organization often places him in a worse state for self-government, than that of a well-organized animal. This imbecility does not always exclude other very active properties, which are common to animals, such as that of cunning; so that this same individual, even while abandoning himself to a guilty and irresistible inclination, seems, in this respect, to act with reflection and deliberation. It is thus, that the most stupid idiots, often find means the most ingenious to satisfy their brutal wantonness or their mischievous desires.

Such was the condition of the young robber of whom I have just spoken. The superior organs had but a defective development; that organ, on the contrary, whose too great activity leads to theft, had acquired a great degree of development and energy, and this mischievous quality was likewise seconded by the activity of cunning. This man was short and thick set; his fore-

head was very low, depressed back immediately above the eyebrows, very sloping laterally above the eyes, but broad and saliant towards the temples. His physiognomy announced no attention for reasonable subjects; nothing could be there discovered but cunning and malice. Was it, then, very difficult to conclude from the organization of this simpleton, that he must be incorrigible?

To make evident this species of imbecility, which excludes all moral liberty, I exhibit in my lectures the skull of an individual organized in the same manner. It was a young man of fifteen years, who died in the prisons at Vienna. From his infancy, he had constantly stolen, notwithstanding the severest punishments. His skull is ill formed, and announces a constitution originally rickety; one of the sides of the cranium projects before, the other behind. The forehead is low and depressed; the anterior lateral parts of the temples are large, but the total cranium is small. The reader may compare it in my large work, Pl. xxvi. with that of a man endowed with faculties of an elevated order, Pl. xxx. What benefit can be expected from punishments and houses of correction in regard to half-human beings like this? We saw in the prison of Berne, a boy of twelve years, ill organized and rickety, who could never prevent himself from stealing; with his own pockets full of bread, he still took that of others. At Haina, the overseers gave us a long account of an obstinate robber, named Fesselmayer, whom no corporal punishment could correct. In the prison he stole every thing he saw, and they had put on his arm a card which served as a mark of disgrace, warning others not to trust him. Before seeing him, we anticipated what his organization must be, and our expectation was confirmed at the very first glance. He appeared about sixteen years of age, though in fact he was twenty-six. His head was round, and about the size of a child of one year. This individual was also deaf and dumb, which often happens in cases of mental imbecility.

Thus, although we have nothing to hope from these imperfect beings, it does not follow that we have nothing to fear. On the contrary, it often happens that they are very dangerous, especially if they have the propensity to the sex, or that of killing in a high degree, so that the slightest cause will set these propensities in action. I have quoted, in the first volume of my large work, the example of a young man of fifteen years, who, in a brutal paroxysm of lasciviousness, so ill treated his sister, that she died in consequence. I also spoke of another idiot, who, after killing the two children of his brother, came laughing to tell him; of a third, who killed his brother, and wished to burn him for a funeral ceremony; finally, of a fourth, who, as Herder relates, having seen a hog killed, thought he might try it on a man, and actually cut his throat. We saw in prison a young man, whom no one regarded as simple, but who, without apparent motive, killed a child. They plied him in vain with questions, and with threats, to find what had led him to commit this act. He merely answered, and repeated without ceasing, that he had seen nothing but black: "Whoever," said he, with a lamentable voice, "was not there, cannot believe me, but God will pardon me." The forehead of this individual is very narrow and depressed, that is to say, low and flat; the top of his head, as in most epileptic idiots, is very high, and the occiput flat and compressed. There was in the prison of Friburg, in Brisgau, a young man of fifteen, half-simple, who had set fire to nine houses in succession. He used to assist in extinguishing the fire, and once saved a child, who was on the point of perishing in the flames. When the fire was over, he thought no more of it, which proves, that he acted only from animal instinct.

What happens to individuals with respect to theft, murder, and incendiarism, likewise takes place in other individuals, with respect to any other organ endowed with an extraordinary degree of activity. The quality dependent on this organ, then, acts in them mechanically at each

impulse, without any reflection, and with very little consciousness. We have seen that the savage simpleton of Aveyron, had the singular propensity of putting every thing exactly in its place. Since we saw this savage, we have known a young man whom his parents were very unwilling to regard as simple, because, besides some intellectual faculties which he manifests, he has order remarkably developed. He is, however, simple in many respects. M. Pinel* speaks of an idiot woman, who had a decided irresistible propensity to imitate all that she saw done in her presence: she repeats, instinctively, whatever she hears, and imitates the gestures and actions of others, with the greatest fidelity, and without troubling herself with any regard to propriety. "We remark," says Fodéré† "that by an inexplicable singularity, several of this class of individuals possessed of such feeble intellect, are born with a peculiar talent for copying, drawing, for finding rhymes, and for music. I have known several, who have learned, by themselves, to play tolerably on the organ and the harpsichord; and others who understand, without having been taught, how to repair clocks, and to make some pieces of mechanism. This, probably, depends on the more perfect organization of the organ with which such an act is connected, and not on the understanding; for these individuals not only could not read the books which treated of the principles of their art, but they were confounded if spoken to on the subject, and never improved themselves." We knew a young girl, idiotic to a great degree, who sings with great propriety, and always follows the tone and the measure.

These examples prove that the talents in question may exist separately; that a particular propensity or talent, results from the peculiar activity of an organ, and that there may exist great activity in one organ, while, in regard to other organs, there is actual imbecility.

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* Sur l'alienation mentale, 2d edit. Paris, 1809, p. 99.
† Traité du gôitre et du cretinisme, Paris, 1800, p. 133.

For the rest, this state having various degrees, we cannot affirm that, for beings so badly organized, all means of correction will always be fruitless. Lavater, however, regards these individuals as incorrigible, and it is in the front that he places the signs of their incorrigibleness. "The short foreheads," says he, "wrinkled, knotty, irregular, deep on one side, slanting, or that always incline different ways, will never be a recommendation to me, and will never gain my friendship. While your brother, your friend, or your enemy, while man, though that man were a malefactor, presents you a well-proportioned and open forehead, do not despair of him, he is still susceptible of amendment." It will be seen that Lavater had noticed the phenomena which I have described, and of which I have cited numerous examples. My doctrine alone gives their true solutions. It would be impossible to explain partial and incomplete imbecility, did we not recognize the fact, that the different properties of the soul and mind have each their different organs, and that the manifestation of these properties depends on the organization.

Though these partially imbecile individuals are not moral beings, nor consequently, punishable, the care of watching them no less pertains to the police, and it is indispensable to separate from social commerce, all kinds of weak-minded persons, in whom strong indications of evil dispositions are perceived.

Application of my Principles to illegal Actions, which are the consequence of Mental Alienation.

Mental alienation is either general, when the functions of all the faculties of the soul and mind are disturbed,—or partial, when this derangement takes place only in one or several of the organs. Mental alienation, whether general or partial, may be either continued or intermittent.

General alienation, when continued or permanent, manifests itself in a manner so evident, that there is no room for mistake as to its existence. We thus run no risk of regarding the actions committed in this state, as done with moral liberty, and, consequently, of rendering their authors responsible.

It is only to this species of alienation that the definition given by Locke belongs, who says that madness consists in a derangement of the judgment and the reason. Other writers call mental alienation, the state, in which one is not conscious of his own actions. But this definition is evidently false; for, this absence of self-consciousness cannot be proved in any species of mental alienation. If it be said that the individual, when restored to sanity, has no recollection of his late madness, I answer, first, that this failure of memory is not uniform; and, secondly, that this want of recollection does not prove that consciousness does not exist at the moment of alienation. I make it a point to rectify these defective or erroneous notions, because they lead us to pass false judgments on several actions. They suppose the culpability of actions, which, when examined with more attention, ought only to be regarded as the consequences of real alienation.

But if I say that there is mental alienation, when the ideas or sensations, either generally or partially, are at variance with the laws of the functions of a regular organization, and with the actual state of external things, this definition applies to all species of alienation; and while it indicates that the individual imagines things which are not, or represents things to himself differently from what they are, it justifies the use of the expressions, *mental aberration and alienation.*

I have already said that general permanent alienation cannot be mistaken. But the case is very different when general alienation is periodical, and when the paroxysms, after having ceased entirely, recur, either at irregular periods, or after a fixed interval, or when it is limited to certain qualities in particular, especially when

this partial alienation completely disappears from time to time, and recurs, sometimes periodically, sometimes irregularly. Several moral qualities or intellectual faculties experience no derangement during the paroxysm of partial alienation; and in this, as well as in the general intermittent alienation, the lucid intervals manifest no trace of aberration. Neither is partial alienation always a consequence of the derangement of the intellectual faculties: oftentimes the propensities or the moral sentiments alone suffer, and the mind or intellectual faculties remain perfectly sane. These various considerations render it very difficult to pass judgment correctly on the innocence or the guilt of equivocal actions. I shall, consequently, add some new views on the natural history of mental alienation, considered in its relation to medicine, to jurisprudence, and to legislation.

To enable my readers the better to understand the nature of mental alienation, I shall compare it with other known maladies. Every one knows, that, in intermittent fevers, in attacks of epilepsy, and in many other maladies, the health seems to be perfect as soon as the paroxysm has passed. It is also known, that, if the disease has a regular course, the paroxysms manifest themselves under their true form. But, frequently, the primitive and ordinary symptoms of the same disease change so much, that it declares itself under a form altogether different. Thus an intermittent fever shows itself sometimes under the guise of a simple stitch in the side, or of a simple tooth-ache. The mask which the disease then assumes, does not change its nature; it demands the same treatment which we employ to cure it, when it appears under its habitual form.

On the other hand, each viscus in particular may be diseased, while the others remain sound. Each sense in particular may be deranged in function, while the functions of the remainder continue to be exercised without difficulty.

Mental alienation is likewise subjected to the laws of organization. Sometimes its attack is intermittent, and in this case, the paroxysm having terminated, it might be thought that the health of the subject was not at all impaired; at other times the intermittent alienations present themselves under appearances wholly different. Certain periods of development, the approach of certain accidental or periodical evacuations, the difference of ages, the influence of seasons, of temperature, of food, of the place of residence, of the state of the mind; all the causes, in fact, which determine the crisis, may produce the most considerable differences in the form and in the symptoms of the paroxysms, according as these causes are variously modified. The individual, who, in preceding paroxysms, seemed a fury let loose, may, in the following one, devote all his time to the exercises of the most fervent piety; and he, who, to-day, gives himself to the excesses of the most noisy enjoyment, may, to-morrow, be plunged in the deepest melancholy.

Each organ of the qualities of the mind, and, consequently, each faculty of the mind and soul, may also experience derangement, while the rest continue to act in their natural order. In this case, such or such a sensation or idea, alone varies from the natural laws; and, according as this state, is permanent or intermittent, we may say that the man has a fixed permanent or intermittent idea, or a fixed permanent or intermittent sensation or inclination. We easily conceive, then, why in a state of real alienation, the intellectual faculties of a superior order, such as memory, judgment, imagination, often remain untouched, and why the definition, which Locke has given of alienation, is suited only to general derangement and not to partial.

In order to enable my readers to judge of the cases in which a man, in relation to his illegal actions, ought to be regarded as really insane, I shall take into consideration first, intermittent alienations, during the paroxysms of which certain faculties manifest themselves with great

energy; second, partial alienations; third, the alienations called reasoning ones; fourth, the alienations accompanied with visions; fifth, the alienations which lead their subjects to attempt the lives of their friends, of their children, or of other persons who have not offended them.

Of intermittent Alienations, during the access of which certain Faculties, or certain Propensities manifest themselves with great energy.

Some madmen, whose malady is intermittent, manifest, during their paroxysms, a peculiar energy in certain moral or intellectual faculties. This is proved by the following examples. M. Pinel* speaks of a madman, who, at all other periods, and in his long intervals of tranquillity, was only an ordinary man; but who, in his paroxysms, discoursed on the events of the revolution with all the force, dignity, and purity of language which could have been expected from the most accomplished scholar, and from the soundest judgment. The same author repeats† from Perfect, that a young person of very delicate constitution, and subject to nervous affections, had become insane; and that, in her ravings, she expressed herself with facility in very harmonious English verses, though she had never before shown any sort of disposition for poetry. Van Swieten relates that a woman, during her paroxysms of mania, showed a rare facility of versification, though, till then, she had been solely occupied in manual labor, and her understanding had never been improved by cultivation.

The facts given, thus far, exhibit only a more energetic manifestation of certain faculties for things, in themselves indifferent; but other examples show, that madmen may also experience a great degree of irritation in their mischievous qualities. M. Pinel‡ repeatedly ob-

* L. c. p. 110. † L. c. p. 112. ‡ L. c. p. 120.

served that men, who were very sober in the calm intervals of their periodical mania, gave themselves up to an irresistible propensity to drunkenness on a return of the paroxysms; that others, in the same circumstances, could not abstain from stealing and committing all sorts of roguery, whereas, in their lucid intervals, they were cited as models of probity; that mild and benevolent characters were changed, in consequence of insanity, into turbulent spirits, quarrelsome, and sometimes wholly unsocial. He speaks* of a man affected with very inveterate periodical mania. His paroxysms ordinarily continued from six to eight days of each month, and offered the most striking contrast to the natural state of the same individual. During his lucid intervals, his physiognomy is calm, his air mild and reserved, his answers modest, and full of propriety; he shows urbanity in his manners, a severe probity, the desire of obliging others, and expresses an ardent desire of being cured of his malady; but at the return of the paroxysm, which is especially marked with a certain redness of the face, by an intense heat in the head, and by burning thirst, his gait is hasty, the tone of his voice bold and arrogant, his looks full of menace, and he experiences the most violent propensity to provoke all who approach him, to irritate them, and to contend with them to the last. Another madman, says M. Pinel, of a mild and peaceful character, seemed, during his paroxysms, to be inspired with the demon of malice. His mischievous activity had no rest; he shut up his companions in their cells, provoked and struck them, and, on all occasions, raised subjects for quarrels.

Of Partial Alienations.

Nothing is more common in insane hospitals, than to see individuals insane with respect to a single idea, or a

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* L. c. p. 101.

single propensity, and sensible in all other respects. One of these madmen so imposed on a magistrate who was visiting the hospital at Bicêtre, and succeeded so well in persuading him that he was a victim of the cupidity and cruelty of his relations, that the magistrate had serious thoughts of examining his complaints and of setting the injured man at liberty. But, just as he was bidding the madman farewell, promising to return shortly with good tidings, "Your excellency," said he, "will always be welcome, except on Saturday; for, on that day, the Holy Virgin makes me a visit." A commissary came to Bicêtre to set at liberty those who were considered as cured. He questioned an old vine-dresser, who allowed no incoherent expression to escape him in his answers. The statement of his condition is prepared, and, according to custom, given him to sign. What was the surprise of the magistrate to find the madman give himself the title of Christ, and indulge all the fancies suggested by this idea.* A goldsmith imagined that his head had been changed. He also thought he had discovered the perpetual motion. Tools were given him, and he went to work with the greatest activity. He did not discover the perpetual motion, but he made the most ingenious machines, implying profound reflection, and the most just combinations. We often see individuals, sensible in other respects, who believe themselves, one to be a general, another a minister or monarch, another God himself. All works on alienation contain a number of these examples. It is sufficient for me to remind my readers, that there are partial alienations, with respect to malevolent propensities, which lead to illegal actions, as there are with respect to the other faculties. The evidence of this may be found in several of the examples which I have cited, and in others, which I shall relate hereafter.

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* Pinel sur la alien. v. ed. p. 164.

Of the Reasoning Alienations.

We give the name to those cases, in which the insane individuals are really reasonable in all which does not concern their disease, and in which, even in regard to the alienation, they act in the most consistent manner, and with consciousness. A person whose intellectual faculties were generally sane, believed herself possessed of a demon; she yielded, however, to the urgency of her father, who entreated her to consult me as to her disease. She declared that she had consented to this only from filial duty, and added, wish a smiling and confident air, that it was useless for me to give myself the trouble to ask her so many questions; that her disease could not be natural, since so many physicians who had promised to relieve her, could not succeed. As she answered very pertinently to whatever was said to her, I tried by all sorts of reasoning to make her change her opinion. But she persisted in her mode of answering with the same consistency which she would have shown, had her state not been imaginary. She expected, absolutely, nothing from the aid of men, and had recourse only to prayer.

In this *reasoning* madness it is likewise possible, that the propensities may become injurious by too great a degree of energy. Madmen of this species answer questions with precision and accuracy; we observe no disorder in their ideas; they employ themselves in reading and writing, and engage in conversation, as if their moral and intellectual faculties were perfectly sound. Yet, at the same time, they will tear in pieces their clothes and bed-linen, and they have their fixed ideas and desires. But, although such madmen act in as consistent a manner as if they were sane, and, in all other respects, are reasonable, they are not the less mad as respects the illegal act. Some examples will set this matter beyond doubt.

At Berlin, M. Mayer, surgeon of a regiment, showed us, in presence of M. M. Heim, Finney, Hufeland, Goergue, and others, a soldier in whom sorrow for the loss of a wife whom he tenderly loved, had greatly enfeebled the physical powers, and induced excessive irritability. At length, he had every month an attack of violent convulsions. He was sensible of their approach, and as he felt, by degrees, a violent propensity to kill, in proportion as the paroxysm was on the point of commencing, he was earnest in his entreaties to be loaded with chains. At the end of some days the paroxysm and the fatal propensity diminished, and he himself fixed the period, at which they might without danger set him at liberty. At Haina, we saw a man, who, at certain periods, felt an irresistible desire to injure others. He knew this unhappy propensity, and had himself kept in chains till he perceived that it was safe to liberate him. An individual of melancholic temperament was present at the execution of a criminal. The sight caused him such violent emotion, that he at once felt himself seized with an irresistible desire to kill, while at the same time he entertained the utmost horror at the commission of the crime. He depicted his deplorable state, weeping bitterly, and in extreme perplexity. He beat his head, wrung his hands, remonstrated with himself, begged his friends to save themselves, and thanked them for the resistance they made to him. M. Pinel has also observed, that in furious madmen there is often no disorder of the mental faculties. Hence he likewise declares himself against the definition which Locke has given of mental alienation. He speaks of an individual whose mania was periodical, and whose paroxysms were regularly renewed after an interval of several months. "Their attack was announced," says he, "by the sense of a burning heat in the interior of the abdomen, then in the chest, and finally in the face; then redness of the cheeks, an inflamed aspect, a strong distension of the veins and arteries of the head; then fury, which led him, with irresistible propensity, to seize some weapon,

and kill the first person who came in his way, while, as he said, he constantly experienced an internal contest between the ferocious impulse of his destructive instinct, and the deep horror inspired by the fear of crime.—There was no evidence of wildness in the memory, imagination, or judgment. He avowed to me, during his close confinement, that his propensity to commit murder was absolutely forced and involuntary; that his wife, notwithstanding his affection for her, had been on the point of becoming its victim, and that he had only had time to warn her to take to flight. All his lucid intervals brought back the same melancholy reflections, the same expression of remorse; and he had conceived such a disgust for life, that he had several times sought, by a final act, to terminate its course. What reason, said he, should I have to murder the superintendent of the hospital, who treats us with so much humanity? Yet, in my moments of fury, I think only of rushing on him, as well as the rest, and burying my dagger in his bosom. It is this unhappy and irresistible propensity which reduces me to despair, and which has made me attempt the destruction of my own life.* Another madman experienced paroxysms of rage, which were periodically renewed for six months of the year. The patient himself felt the decline of the symptoms toward the end of the paroxysms, and the precise period when they could without danger restore him his liberty, in the interior of the hospital. He himself requested to have his deliverance deferred, if he felt that he could not yet govern the blind impulse which led him to acts of the greatest violence. He confessed, in his calm intervals, that, while the paroxysm continued, it was impossible for him to repress his fury; and then, if any one appeared before him, he imagined that he saw the blood flowing from that man's veins, and experienced an irresistible desire to taste it, and to tear his limbs with his teeth, to render

* L. c. p. 102.

the suction easier.* We see that these examples refer themselves at once to what I have said of reasoning madness, of excitement, and of the manifestation of malevolent propensities. and of partial alienation.

In reasoning madness, the subjects know their situation, and judge with accuracy of the disorder which reigns in their propensities, sensations, and ideas; they even experience remorse, immediately after the malevolent action. "A young mad woman," says M. Pinel,† "experiences every morning the access of maniacal delirium, which leads her to tear every thing she lays her hands on, and to exercise acts of violence on all those who approach her, so that they are forced to confine her with the straight jacket. This kind of control soon calms her violence; but she preserves so painful a recollection of her past extravagance, that she testifies the greatest repentance, and believes herself to have merited the severest punishment."

In a species of periodical madness, in which the subjects are drawn irresistibly to murder, M. Pinel remarks, as diagnostic signs, that these subjects have the consciousness of the atrocity of their actions, that they answer correctly the questions put to them, and show no derangement in their ideas or in their imagination. Thus a consistent manner of acting, a capacity of maintaining correct conversation, just answers, whether in the lucid periods, or at the moment of the illegal act, do not prove the absence of all insanity.

The most embarrassing cases, are those in which the alienation manifests itself without the symptoms, which usually accompany it, such as convulsion, heat, thirst, redness, fury; for then the faculties of the mind and soul do not appear at all deranged. A young man, having received a considerable wound near the temporal bone, was trepanned by Acrell. When the wound was cured, he could not abstain from theft, though before he

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* L. c. p. 283. † L. c. p. 88.

had no such propensity. Acrell knew that it was only to be attributed to the lesion of the head, and had him released from prison. This phenomenon is not rare in pregnancy. We know four examples of women, who, in their ordinary state, have not the least propensity to theft, but who, during pregnancy, are impelled to it by violent inclination. We know that women subject to *leucorhœa*, and pregnant women, experience singular fancies: now, if they have this disordered appetite for eating charcoal, chalk, and dung; if a virtuous woman, during pregnancy, cannot bear the sight of a beloved husband, or experience the visiting of a gross passion, why find it incredible, that irresistible propensities to illegal actions should also be developed at these periods? Prochaska * relates from Schenk, that a pregnant woman observing the naked arm of a butcher, was seized with an irresistible desire to bite a piece. She forced her husband to hire the butcher to submit to the operation. Another woman, in the same condition, satisfied a horrible longing for eating the flesh of her husband. She killed him, salted the flesh and fed on it several months.

As the nature of reasoning madness is not very generally known, it happens that malefactors, who belong to this class, and who are seen to act and reason in a consistent manner, are, in some countries, condemned to imprisonment or death; while, in others, they are consigned to insane hospitals.

Of Madness, accompanied with Visions and Inspirations.

Mental alienation, sometimes, is accompanied with visions and inspirations; and this peculiar symptom shows, that the malady has acquired its greatest degree of exaltation. The unfortunate subjects conduct them-

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* Op. minora. tom. ii. p. 98.

selves in the most consistent manner in the pursuit of the project they have formed; they act, as M. Pinel remarks, with a firm determination, and in the most uncontrollable manner. Such a madman, conscious of the support of a higher power, despises all the efforts made to dissuade him from his purpose, and places himself above all human considerations. His conduct is often calm: he hardly judges other men worthy of being the confidants of his secret motives. He hopes nothing from their assistance; he fears not their threats. He who has experienced, were it only for a moment, the effect of visions and inspirations, and who is not very familiar with the knowledge of nature, can hardly be persuaded, when he returns to a regular state, that all he has experienced is unreal. Do these visions continue? Does the madman hear incessantly, or at different times and places, this imagined voice of authority which addresses him? How shall we, then, find means to restrain him, except by relieving the irritation and the derangement within? The most furious madmen often allow themselves to be turned from their purpose by menaces, by the sight of the superintendent or physician, by mild and reasonable treatment; but what effect will all human efforts produce on a man, whom heaven and hell command, or who has them under his orders? M. Pinel* cites the example of an old monk, whose reason had been impaired by devotion. He thought, one night, that he had seen, in a dream, the Virgin surrounded by a choir of happy spirits, and that he had received an express order to put to death a man whom he viewed as incredulous. This murderous project would have been executed, had not the madman betrayed his intentions, and been prevented by severe confinement. The same author† also speaks of a credulous vine-dresser, whose imagination was so strongly shaken by the sermon of a missionary, that he believed himself condemned to eternal

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* L. c. p. 165. † L. c. p. 109.

fires, and that he could only save his family, from the same fate, by what is called the baptism of blood, or martyrdom. He first tried to commit murder on his wife, who, with great difficulty, succeeded in escaping his hands; soon after, his furious hand was turned upon his two young children, and he had the barbarity to murder them in cold blood, in order to obtain immortal life for them. When surrendered into the hands of justice, he cut the throat of his fellow-prisoner, still with the intention of making an expiatory sacrifice. His madness being ascertained, he was condemned to be shut up for the rest of his life in the cells of the Bicêtre. The solitude of a long imprisonment, always fitted to exalt the imagination, and the idea of having escaped death, notwithstanding the sentence, which he supposed to have been passed by the judges, still aggravate his delirium, and make him believe that he is clothed with almighty power, or, to use his expression, that he is the fourth person in the Trinity; that his special mission is to save the world by the baptism of blood, and that all the potentates of the world, united, could not touch his life. His madness is, however, partial, and limited to this religious phrenzy; he appeared, on every other subject, to enjoy the soundest reason. This subject had passed more than six years in close confinement, and, from the uniform appearance he presented of a calm and tranquil state, it had been determined to grant him the liberty of entering the courts of the hospital with the other convalescents. Four more years of trial had served to establish a confidence in his cure, when, on a sudden, he again manifested his superstitious and sanguinary ideas. On a Christmas eve, he formed a project of making an expiatory sacrifice of whatever should fall into his hands. He obtained a shoe-maker's knife, seized the moment when the overseer was making his rounds, made a thrust at him from behind, which fortunately only grazed his ribs, cut the throats of two patients who were near him, and would have continued his carnage, had not the attendants secured his person, and thus put a stop to his fury.

We were shown, at Berne, the fanatics, who, a few years before, had wished to establish a new religious sect. As we remarked in the leader a great development of the organs of visions, we asked this man if he had ever seen any spirits. The prisoner, named Kœper, answered, No. We begged him then to relate to us those events of his life, which had made the strongest impression on him. He told us, and his calm and confident countenance assured us of his candor, that, from his childhood, religion had occupied all his thoughts, and that he had read the Holy Scripture, and all the commentators thereon, with the greatest attention; but that the extreme diversity of opinions had convinced him, that he should not find the true religion in this manner; that he had therefore renounced reading and research, and had earnestly supplicated the Deity, that, if not contrary to his eternal decrees, he would make him an immediate revelation of the truth. After having prayed a long time, he one night saw the room filled with as brilliant a light as could be produced by many suns. In the midst of this splendor, our Lord Jesus Christ appeared to him, and revealed the true religion. Kœper had sought to spread it with indefatigable zeal, which was with him a matter of duty. It was impossible to make this man believe, that he had been led astray by illusions.

Of Alienations which lead their subjects to attempt the lives of their relations, of their children, or of other persons, innocent in respect to them.

It remains to speak of one of the most melancholy cases; one which is strongly connected with the propensity to simple suicide. This peculiar case is when the individual, who wishes to terminate his own life, begins by destroying those beings who are dearest to him. A cordwainer at Strasbourg, killed his wife and three of his children, and would have killed the fourth, if it had not been withdrawn from his fury. Having

committed this shocking action, he ripped open his own belly; but the wound not being mortal, he drew back the knife, and pierced his heart through and through. This man had the reputation of being mild and faithful, a good father, and a good husband. No one could discover what tempted him to this horrible action. At Leopold in Gallacia, one K. killed his wife, the object of his warmest affection, and would then have shot himself with a pistol, but missed. While people were forcing his door, he fired a second pistol and killed himself. His previous conduct had always been blameless, and all that could be learned was, that he was discontented with his condition, and thought he deserved a better. At Hamburg, R—, a respected instructor, killed his wife and two small children, sparing two others who had been confided to him. A similar circumstance happened at Amsterdam, and several other facts of this kind have come to our knowledge.

What will my readers think on reading these atrocities? The greater part will say to themselves, that the torment of an insupportable existence, and the most cutting remorse could alone have produced so frightful an action, and they will regard, as infernal selfishness, the crime of an individual, who takes the life of his family, because he is tired of life. The judgment of the philosophic physician will be very different. He perceives, in these deplorable acts, only the symptoms of the most frightful and the most pitiable disease. Whatever is contrary to nature, in the conduct of these unhappy beings, should fix the attention of whoever occupies himself with the nature of man. I doubt its being conceived that the husband who loves his wife, the father who loves his children, can, while possessing reason, become their murderers. Add to this, what always is the case, that these murderers have no private end in view; that, directly after the act, they destroy themselves, or surrender their persons, and ask for death. Why have not these actions, until now, been attributed to insanity? Let the reader examine a faithful picture of what passes in this malady till its fatal crisis, and then judge.

In the commencement of this malady, the greatest disorder is manifested in the head, and in the viscera of the abdomen. We observe eructation, flatulence, disordered appetite, irregular evacuations, derangements of the menstrual and hemorrhoidal fluxes. The complexion changes, becomes of a greenish, yellow, and earthy color, especially about the nose and mouth, so that the face loses all its brightness. The eyes are half closed, sunken, troubled, and the white assumes a leaden hue. In other individuals, on the contrary, the face becomes more highly colored, more animated, and more lively, and the eyes are inflamed: some of these subjects preserve their strength and their flesh; others grow thin, and daily find themselves more depressed and more feeble. Sometimes the whole surface of the skin is deprived of feeling; and the sufferers complain that their hands and feet are swollen, and feel like cotton: but much more frequently the sensibility of the skin is increased; they feel over the whole body, or only in certain places, especially the thighs and feet, a heat like that produced by burning coals. When the evil is at its height, this heat produces on the patients, the effects of a hot blast, and disappears in like manner; it is felt in the intestines, or it passes from one place to another. Most of the subjects are then depressed, pusillanimous, cowardly, fearful; so that, frequently, strong men tremble before children. Some refuse or are not disposed to communicate their condition to others. This apparent indifference, this apathy, this perfidious silence, ordinarily marks the most dangerous cases. Some annoy all those around them, by trifling bickerings; they see, every where, nothing but misfortune and wickedness; and even when their affairs present a picture of prosperity, they are in despair, lest their children be plunged in famine and misery. Some imagine that every body despises or persecutes them; they complain unceasingly, that they are neglected, that justice is not done them. Sometimes, all the symptoms suddenly disappear, and again show themselves as suddenly. The

melancholy and pusillanimity increase daily: most of these subjects feel a sharp and permanent pain above the root of the nose, and in the middle of the lower part of the forehead: sometimes this pain has its seat at the top of the head; often, too, some complain of an insupportable tension in the region of the forehead, and a painful constriction in the region of the belly, which is, as it were, compressed by a hoop. To these symptoms, are frequently added paroxysms of suffocating convulsions, of frightful anxiety, of despair, of an involuntary propensity and secret impulse to commit suicide. In a word, this malady, besides the symptoms we have indicated, presents all those which ordinarily accompany the propensity to self destruction. I shall, hereafter, treat in detail of this propensity, and shall prove that it arises from real disease. That of which I now speak, is only a frightful variety of the same malady.

A baker of Manheim, who, from his youth, had shown in all his enterprises a very timid character, and who had for ten years experienced attacks of deep melancholy, also experienced from this last epoch a general weakness of nerves. He imagined that the purchase he had made of a house, caused his unhappiness, and that of his wife, whom he greatly loved. He complains incessantly, and laments his situation, which he regards as most desolate. He has sometimes had paroxysms of insupportable agony: he continually wishes for death, and would long since have inflicted it on himself, if, to use his expression, it were not a sin. He often speaks of a French blacksmith, who killed himself after destroying his wife: "You are to be pitied," he will sometimes say to his wife, in the most moving tone; "I must do as the French blacksmith did." We advised him to separate himself from his wife, but we know not whether he has adopted our precaution.

I know a woman twenty-six years of age, now well, who was attacked with the same disease: she has had successively all the symptoms of this disease: she experienced, especially at the times of the periodical evacua-

tions, inexpressible torture, and the fearful temptation to destroy herself, and to kill her husband and children, who were exceedingly dear to her. She shuddered with fear, as she pictured the combat which took place within her, between her duty, her principles of religion, and the impulse which urged her to this atrocious act. For a long time she dared not bathe the youngest of her children, because an internal voice constantly said to her, "Let him slip, let him slip." Frequently, she had hardly the strength and the time necessary to throw away a knife which she was tempted to plunge in her own bosom, and that of her children. Did she enter the chamber of her children or husband, and find them asleep? the desire of killing them at once assailed her. Sometimes she shut precipitately after her, the door of their chamber, and threw away the key to remove the possibility of returning to them during the night, if she happened not to be able to resist this infernal temptation.

It is thus that these unfortunate beings often pass whole years in a fearful struggle. Many keep a regular journal, in which, though touching on every other subject, they return without ceasing, to their own unhappy condition. They often exclaim, in the accent of despair, *I am mad, I am insane!* Often the purpose towards which they feel themselves drawn, excites in them the most poignant anguish, and yet the idea is continually renewed. They say, and they write, still thinking of self-destruction, "I shall do it, notwithstanding." Who would believe that these expressions, and these writings, which so well depict the trouble of these unhappy beings, have often contributed to cause their actions to be regarded as premeditated and done deliberately. Their madness, it is said, is only feigned: a madman does not say I am mad, and madness does not reason. This false and barbarous mode of argument has sent to the scaffold, beings, to whom there was nothing to reproach, except the derangement of their reason, or, more properly speaking, a disease of the brain.

Some of these subjects carry about them, for several months, and even several years, instruments of murder, uncertain and irresolute, as to the manner, the place, the time of putting an end to their life, and that of those who belong to them. Their nervous system is daily more agitated; their pusillanimity and weakness of mind augments unceasingly; they harass themselves, despair of the safety of their souls, consider themselves the children of eternal reprobation, or regard the world as a valley of tears and perdition, and form but a single wish, that of delivering themselves and their children from it. Thenceforth, they make continual efforts to break the chains which bind them. Though their measures are commonly well taken, the execution does not always succeed. It often happens, that the blow they give themselves, is not mortal, or that, in throwing themselves from the precipice, their destruction is not completed, or that they are drawn from the water too soon. It is, however, very rare, that such adventures cure them. The greater part remain melancholy or depressed. At the end of some days they seem to repent of what they have done; they are ashamed of it, and for some time take a part in the business of life. But the paroxysms soon return with new violence, till, at length, the most perfidious symptoms, such as visions, apparitions, the sound, and the orders of strange voices are joined to them. These are the prognostics of the most terrible paroxysms. If, during one of these, the madman kills the persons who are dear to him, he generally hastens to destroy himself; or, if it happens that his paroxysm is in some sort quieted by the blood he has spilled, or the blows he has given himself have been too weak, or he has been interrupted in his proceedings, he delivers himself up to justice, and begs for death, which alone affords him the hope of a period to his suffering.

Sometimes this same malady is concealed under a mask, in appearance altogether different. Life is equally a burden to these subjects; but they have not the energy to inflict death on themselves; they seek, by a kind

of confusion and contradiction in their ideas, the means of having it inflicted by others. For this purpose, they ordinarily commit a murder on persons who have never offended them, and often even upon children. They then go and accuse themselves, and even carry to the judges the victims of their fury, eagerly demanding death; and if the judge, recognizing the acts as the effects of insanity, condemns them only to confinement in an insane hospital, they are plunged in despair.

Those physicians, who regard the kind of melancholy which leads to self-destruction, as well as to that of others, as incurable, are in error. I have cured, radically, several subjects, who had experienced all the symptoms, and who had even attempted to destroy themselves. These subjects, after medical treatment, continued several weeks, usually passed, by stool, a large quantity of thready mucus, fishy, colored, and acrid, and likewise freed themselves from all sorts of impurities, as well by urine as by the menstrual and hemorrhoidal fluxes. These critical evacuations which continue a long time, are more abundant at certain periodical times; and as, at their approach, the symptoms of the malady augment, their apparent relapses serve to announce an approaching evacuation. By degrees the complexion grows clear and bright, the eyes are animated, the mind becomes more serene, and the patients resume their interest in objects around, and feel a confidence in the remedies to which at the outset it was necessary to force them. It is not till after several artificial critical evacuations, that a complete cure is obtained, and the treatment is of greater or less duration, according as the evil has been of longer or shorter standing, and more or less firmly rooted. Even after a long interval, great changes in the atmosphere, severe and continued heat, strongly excited passions and affections, still give rise to the fear of relapse. The cure is much less easy, less complete, and durable, when the disease is hereditary, or when the patients have experienced symptoms from early childhood; as, for example, from the age of seven to twelve years.

Such is the true history, drawn from nature, of this deplorable malady, which, unhappily, may assume, to a certain degree, the appearance of criminal premeditation. None better merit our compassion than these unfortunate subjects, and yet this terrible malady is almost entirely misunderstood. In general, very few physicians comprehend the different forms of disease of the soul and mind; and it may excite surprise, that this part of the natural history of man should not have attracted more profound attention. This description of persons are commonly regarded as unquiet subjects, turbulent, excited. They are ridiculed, treated ill, and reproached with their ill humor and their odious chimeras. Those about them even charge them with impiety, in place of treating them with mildness, humoring them during their paroxysm, and confiding them to the care of the philosophic physician. Above all, no one is persuaded that this malady almost always terminates in involuntary and murderous paroxysms; and there is the greatest difficulty in inducing the superior authorities to adopt the necessary measures of security. These subjects are accused of having a depraved imagination, and it is supposed, that it only depends on themselves to think and reason like other men. The catastrophe arrives, and is charged to a thousand accidental circumstances of no importance. The unfortunate man, it is said, was in debt, he has been ill treated, and refused a place which was due to him, &c.; while it is forgotten, that similar causes take place every day with other individuals without producing similar effects.

In treating of the moral qualities and intellectual faculties, and of their peculiar organs, I shall embrace every opportunity, as I have promised, to make the most interesting applications to education, morals, medicine, legislation, &c.

ON THE

ORGAN OF THE MORAL QUALITIES

AND

INTELLECTUAL FACULTIES,

AND

THE PLURALITY

OF THE

CEREBRAL ORGANS.

By FRANÇOIS JOSEPH GALL, M. D.

TRANSLATED FROM THE FRENCH

By WINSLOW LEWIS, Jr., M. D., M. M. S. S.

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CONTENTS.

SECTION II.

SECTION III.

PHYSIOLOGICAL PROOFS.

PATHOLOGICAL PROOFS.

INTRODUCTION.

HISTORICAL VIEW, AND IMPORTANCE OF THE STUDY OF THE STRUCTURE AND FUNCTIONS OF THE BRAIN.

To render the importance of the anatomical and physiological study of the brain more evident, I shall now, in a rapid sketch, compare the state in which these sciences were a short time since, with that in which they exist at present.

As man had no knowledge of the laws of organization, in order to obtain an explanation of the phenomena of life, of causes out of himself, of external principles, he was obliged to seek for a being, living, active, intelligent, existing by itself alone, whose presence diffuses life and activity over all the parts of the body, and whose separation abandons them to death and destruction. Aristotle, Galen, and their successors, down to the seventeenth century, attributed all the operations of life to a spiritual being, independent of all matter—to the soul. This agent so completely satisfied the wants of the philosophers, that they contented themselves with modifying it, from time to time, in conformity with the philosophy of the day. Borelli, Robinson, Cheyne, Mead, Potersfield, like Lavater, saw, in the soul, the efficient cause of the organization. Swammerdam, Perrault, Stahl, Sauvages, made it the guardian of health, the cause of all the incidents of disease and cure. Thomas Aquinas gave to it unlimited power over the body, and Lippert, denying all mechanism, all organization, attributed immediately to the soul the excretions and the secretions, motion and sight; the muscles and

nerves were not allowed the smallest share of agency in the matter.

Many philosophers even furnished the brutes with a soul; the pious and benevolent Bonnet promised them immortality.

But, in proportion as certain observers arrived at the knowledge of the properties of bodies, they abandoned these external agents. Already Empedocles, Leucippus, Democritus, the school of Hippocrates, the Stoics, Heraclides, Epicurus, Asclepiades, Archigenes, Lucretius, Aretæus, regarded life and all its operations as an effect of organization.

Naturalists observed the laws of the crystallization of earths and metals, the properties of plants, their fructification, their development, their secretions and excretions, their irritability, their sleep, their sympathies and antipathies, and found themselves forced to regard all these proofs of interior life and action, as properties of the vegetable kingdom. They should thence have inferred, that the same phenomena, or analogous phenomena in the animal kingdom, ought not to be derived from a different principle.

They remarked in the polypi, in the molusca, in insects, functions which announced a more complicated life, enjoying certain mechanical aptitudes, certain instincts; but they also saw in them sets of organs of a more perfect nature. In fishes, in amphibia, in birds, in the mammalia, instincts, propensities, faculties, multiplied and improved with the gradually increasing number and perfection of their organs. These forces assumed more and more the appearance of spontaneity, and ended in man, by being ennobled into moral qualities and intellectual faculties, into reason and will. The nervous apparatuses, the brains successively more and more perfect, pointed to the conclusion, that the functions corresponded with the perfection of the organization.

If learned men had never been led astray from this road, their progress would soon have been crowned with entire success.

But men are more disposed to give themselves to speculation, than to the painful study of nature. At each step the metaphysicians come in, to retard the progress of the naturalists; and, in general, it is to the metaphysicians, that we must attribute the ignorance in which we are still involved, respecting the true nature of man; and this shameful slavery will continue so long as we refuse to acquire the details of an organization, capable of explaining all the phenomena of sensibility, all the various instincts, propensities, and intellectual faculties.

Unhappily, the nervous system has been investigated with a slowness, which can only be explained by the numerous difficulties which have always opposed themselves to researches of this kind. It was especially the knowledge of the brain, which remained longest enveloped in darkness. Hippocrates took the brain for a sponge, which attracted to itself the humidity of the body. Aristotle judged it to be a mass, deprived of blood, humid, and destined to temper the heat of the heart. Praxagoras, Plistonicus, Philotinus, and the greater part of the anatomists of that period, maintained that the brain was but an excrescence of the spinal marrow, which contributed in nothing to the sensations. Misticelli named it an irregular and inorganic mass; Astruc, a spongy substance. Several persons, both ancient and modern, take it for a prolongation of the blood-vessels. Willis, Leuwenhoek, Vieussens, Stenon, Santorini, were better informed of its structure; and the greater part of the moderns place the brain in the nervous system. Yet Malpighi saw nothing in it but a collection of shapeless and confused intestines: there are those, who, even now, take it for a gland secreting an impure fluid. Sabatier and M. Boyer ranged it among the secretory and excretory viscera. Bichat saw in it only an envelope, destined to secure the parts situated on the internal base of the brain. Many are still faithful to the doctrine of Galen, and make the brain secrete in its ventricles the vital spirits, and distribute them, by means of the arte-

ries, to the other parts of the body, according to the example of Beranger, of Spigelius, of Vesting, of Willis, of Vieussens, &c.

It was no less difficult to gain a just notion of the internal structure of the brain. The brain is composed entirely of a gelatinous substance, more or less colored, and of a white substance, composed every where of fibres so delicate, and so closely connected, that, when cut, it appears to form only a uniform and pulpy mass. Anatomists made use of a particular knife, very sharp, very fine, very long, and double edged: they experienced the greater satisfaction, in proportion as they could make neater and closer cuts; and whatever the incisions were, vertical, horizontal, oblique, from below upwards, or from above downwards, they thought so little of observing the connection of the parts, that they expected, with Vicq d' Azyr, to be able to examine them the better, as they were the more insulated by cutting. Ordinarily they began by cutting away the two hemispheres, down to the corpus callosum, so called, by forming artificially, the centrum ovale of Vieussens, never suspecting that, by destroying the two hemispheres, they also destroyed the complement of the cerebral organization, the expansion of the greater part of the nervous bundles, which form the convolutions of the hemispheres, the final parts of the organs of the moral and intellectual forces.

After these mutilations, which permitted no physiological view, nor any systematic examination, it only remained to seek hollows, ventricles, corpora striata, the cornu Ammonis, the *accessorius pes hippocampi*, the fornix, the pons varolii, the *lyra*, hippocampus minor, the nates and testes, &c. As for the nerves, they all took their rise in the brain; the nervous system of the vertebral column was a prolongation of it.

It is in this way, that the various parts of the brain have come to be represented only as lacerated, and insulated; nothing but false ideas have been entertained on the direction of the fibres and the nervous bundles,

on the interior tissue of the annular protuberance, of the thalami nervorum opticorum, of the corpora striata; anatomists have never observed the relation, or the proportion of some parts to others, or to the whole; nor have they ever seen the slightest trace of any use of them, or any law. All has been conceived and reported in the most arbitrary disorder; and this makes it so difficult, to satisfy ourselves of what some authors have committed to writing, however imperfect.

Still, men were generally so well satisfied with these discoveries, that they generally thought there remained nothing to discover in the brain. Meckel thought that all the discoveries which remained to be made, could have no other object than the origin of the nerves. Accordingly, it was to this point, principally, that Soemmering directed his researches. After the works of Vicq d' Azyr, of Prochaska, of the brothers Wenzel, every body said, and Peter Frank said to me in private, that it was a ridiculous presumption, to think of finding any thing new; still more so, to think of finding an organization wholly different from that which had till then been admitted.

In fact, had men continued to confine themselves to the usual methods, it would have been impossible to obtain any clearer results. There were wanting physiological principles, proper to lead anatomists, by degrees, to a knowledge of the laws of the cerebral organization. Men had neglected to observe the mode of the gradual perfection of animals, and, consequently, could not form to themselves any idea of the order in which the different cerebral parts, the new organs of the new faculties, had been successively added to the pre-existing parts. This prevented their making any anatomical research into the brain, in an order conformable to the process of nature.

It was the same with the labors of those, who cultivated comparative anatomy. At first, their comparisons were almost always limited to the grosser parts. What benefit will accrue to us, from knowing all the muscles

of the snail and camel, of the elephant's trunk—all the forms of the bones and intestines of animals, from the shrew-mouse to the whale? If I have made comparative anatomy enter into my researches, it was only so far as it could aid me, in arriving at the discovery of the laws of organization. The comparative anatomy of the brain, applied to the different faculties of animals and of men, may be useful, to establish the physiological discoveries made by other means. But this is an application, which has been rendered impossible by the generally received philosophy. Besides the fault committed, in comprehending all the particular faculties of species, and of individuals, under the general expression of instinct, too little attention was paid to their intellectual and domestic conduct, in a state of freedom. Nature constantly follows a general type in all the modifications of analogous organs; and he who knows how to investigate,—to discover this general type by comparing analogous systems in different animals, has discovered, by comparative anatomy, a law, which he will meet in man, as well as in other animals. Those who have followed the counsels of Haller and of Stenon, have sometimes succeeded in adding to our anatomical knowledge of the structure of the brain. But, with the purely mechanical views which they brought to the subject, they could furnish no result for the physiology of this organ.

The structure of the brain has, therefore, been so little known till our discoveries, and this knowledge has been so vacillating, so contradictory, that it has only been possible to a few individuals, of penetrating genius, to conjecture rather than determine its functions in a general manner. As for the others, what connections could there be, what relation, between instincts, propensities, intellectual faculties, and a spongy, inorganized, pulpy substance?

As the soul was thought to be the source of the instincts, propensities, faculties, it was made a great and very serious occupation to find their seat. Sometimes it

was spread through all the body, sometimes lodged in the brain; and, keeping in view the simple essence of the soul, the metaphysicians, and with them the physiologists, have been obliged to compress it to a single point, the most simple possible point. It was from this point that the soul directed all the remainder of the body, that it made all its moral and intellectual forces to radiate, without the intervention of any other cerebral part.

In place of seeking simply for phenomena, men confined themselves, as is yet the custom, to philosophic subtilties; exhausted themselves in speculations on the intimate nature of the soul; and tried to discover how souls and bodies were united, whether immediately, or by means of an intermediate substance. They attempted to penetrate the essence of this substance of union, which must be half body, half soul; they sought to discover how mind and body, how the brain and nerves act reciprocally on each other; if sensations and ideas are the results of impressions made in the brain; if any traces of them remain, and how they are renewed. While men amused themselves with such revreies, it was scarcely possible to conceive a sound idea on the true office of the brain.

Leaving the epoch when the brain was generally regarded as the organ of the soul, we find that the ideas entertained on this subject, always remained indeterminate, vague, and inconstant. Men had, indeed, collected facts which led to the suspicion of the plurality of the organs of the functions of the soul; but this proposition always revolted, and still revolts, the partizans of the unity of self. In vain were opposed to them the multiplicity of the organs of automatic life, the multiplied systems of voluntary motion, the plurality of the five senses, which do not at all infringe on the unity of life, and of individual consciousness.

Men were still much more unwilling to make the superior faculties of the soul, thought, understanding, judgment, imagination, reason, depend on the cerebral parts. The examples of idiots, cretins, hydrocephalous per-

sons, of the insane, the consequences of lesions and maladies of the brain, could not dissipate their illusion. In animals they branded as mechanical faculties, intelligence and memory, which they could not refuse to allow them.

The affections, passions, instincts and propensities, long before the time of Cabanis, had been well placed in the organization. But, with the exception of two or three physiologists, such as Bourkard, Van Swieten, they placed them, and still place them, with great predilection, in the blood, in the temperament, in the viscera of the abdomen and the chest, in the ganglions, and ganglionic nerves.

Even now, men are obstinately bent on deriving the qualities and the faculties of men and of animals, that is, their instincts, propensities, talents, from education, sensation, attention; since they regard them all as simple modifications of one same sensibility, how could they have arrived at the notion of suspecting one or more organs of all these forces in the brain?

Did they not admit, and are there not still anatomists who admit, that the brain is nothing but the concentration of all the nerves, the source of all the nerves, and a compound of all their extremities? In this case, how can we attribute to it other functions than those, which belong to the nerves of the senses, to the nerves of the voluntary motion, and to the nerves of the organs of nutrition?

The gentlemen of the committee who drew up the report on our memoir, presented to the institute and their partizans, still say, with complacency, that we do not know to what part of the encephalon, nor to what circumstance of its organization, the intellectual faculties are attached. Yet, comparative anatomy teaches us with certainty, that the organ of the faculties of the soul is not limited to any portion of the cerebral substance; it teaches us, that it is only the hemispheres which establish the most essential difference between man and the different species of animals, and between

the different individuals of the same species, in relation to the moral and intellectual forces: we also know that the functions, proper to each system of nerves, are realized in their peripheric expansion. Now I have demonstrated, that the convolutions of the brain are nothing but the peripheric expansion of the bundles of which it is composed; consequently, the convolutions of the brain must be recognized, as the parts in which the instincts, sentiments, propensities are exercised; and, in general, the moral and intellectual forces.

For several years before my tour, my discoveries were spread into all parts of Europe, by the hearers of my lectures at Vienna. Thus the world was no longer ignorant of my doctrine. I have, however, every where met the same erroneous opinions and prejudices. It is true, the multiplied and material proofs with which I surrounded my propositions, struck the greater number of my auditors so forcibly, that I soon had thousands of partizans, as well among my brother physicians, as in all classes of society. It is well known, with what enthusiasm Reil and Loder received my discoveries. It was not so with professors Walther, at Berlin, and Ackermann, at Heidelberg: it is well known with what animosity they combated, indiscriminately, my anatomical and physiological discoveries.

Arrived at Paris, we obtained, at first, the most brilliant success by our anatomical demonstrations. The first men in the art were filled with admiration of them. A short time after, the emperor arrived from his campaign in Germany. I know not with what terror he inspired the members of the Institute of France; but, as if by a charm, every thing suddenly changed its appearance. All that I said, all that I demonstrated, was now regarded as senility, as charlatanism, juggling, as they were pleased to report it to their monarch. Hence resulted that famous diplomatic report on our memoir, presented to that learned society the 14th March, 1808. This same report will serve to prove to my readers what were then the views and intentions of the com-

mittee, respecting my anatomical discoveries, and respecting a part of my physiology of the brain.

They attributed to the ancients our method of dissection, and four other points. For reasons already given, it was not possible for the ancients to know either of these points, especially our method of dissection, founded not only on the direction of the fibres, but also on the principles of comparative physiology. In my answer to this report, I have proved, that our method was not followed even in its mechanical details, much less according to the same principles of comparative anatomy and physiology. It is absolutely the same in respect to the four other points.

Were it even proved, that our predecessors had known any insulated fact without any connection, this kind of charge would be rather the expression of jealousy than of justice; for, all the truth, that has been published on the brain, is confounded with so great a number of errors, and bears so little the impress of truth, that the reading of it cannot possibly furnish any just principles on this part of anatomy. "What the ancients and the moderns have taught, touching the brain," says Steno, "is so full of disputes, that the books of the anatomy of this part, are not more numerous than the quicksands of doubt and controversy occasioned by them." It is certain that this great diversity of views and opinions on the same subject, far from facilitating its study, serves to embroil it and render it more difficult; and that we should have needed many more researches, more cares, and more sagacity, to arrive at the same end by following the track of our predecessors, than by making a new road for ourselves.

The authors of the report in question, have passed silently over eleven points; as, for example, the formation of the convolutions of the hemispheres on the different bundles of nerves, which pass out at several points from the optic thalami, and the corpora striata, a very important object for the progressive organization of the hemispheres, in the different species of animals; since, by losing sight of it, the comparative anatomy of

the cerebral parts becomes impossible in their respective relations with the faculties of animals.

They have left in doubt the non-existence of a sole centre for all the nerves, the natural and artificial unfolding of the hemispheres, and the plurality of the organs of the moral qualities and the intellectual faculties, besides eight other points, all equally acknowledged at the present time.

They have allowed us eighteen essential points of our discoveries.

After all these misrepresentations, denials, concealments, doubts, and concessions, the gentlemen of the committee terminate their report by saying,—"We conclude with almost as much doubt and uncertainty as we commenced," and "new methods of dissection of the brain, new connections and directions, perceived between the different masses and the organic elements which compose it; new peculiarities remarked in some of its parts, constitute all the real discoveries which we have been able to make."

My adversaries have seized, with avidity, all the equivocal passages of this strange report, to promulgate them in the public papers and in the literary journals, under the title of extracts from the Report of the Committee of the Institute; in regard to some, carefully suppressing our anatomical discoveries; in regard to others, presenting them as already old; and, finally, by bestowing on the reporters, at our expense, all that our memoir contained, which was new or useful. Agreeing only in a single point, that of discrediting my doctrine, they differed from each other in their statements, according to their previous notions and accessory views. "The principal merit of Messrs. Gall and Spurzheim," said these critics, "is that of having forced Cuvier to occupy himself with the anatomy of the brain. This illustrious philosopher has made numerous researches on this viscus in man and in animals; he has discovered numerous very important facts, which he has collected in his report, together with those which he had long

since observed; he has given extremely ingenious views on the functions of the brain," &c. What are these important facts? What are these ingenious views? Cuvier has certainly too much real merit to have need of these false adulations. And besides, at the very time when he was struck with my dissections, he informed me, that he had never devoted himself to the particular study of the nervous system and the brain.

If it be a merit to have attracted attention to an object, it is a yet greater one to have opened the road, and to have given a right direction to it. Let any one compare the works of Reil, who has published his researches on the brain, after having assisted at Halle, at our dissections; let him compare the successive improvements both in the lectures and the works of Richerand,* Beclard, Blainville, Sene, Georget, Lallemand, Tiedemann, Carus, &c., and he will be astonished at the accessions, which have been made since the appearance of my doctrine.

In what, then, does the mode of my researches differ from that of my predecessors?

It was only, I repeat, after having familiarized myself with the gradual march of improvement of the animal organization, as well as with the multiplication and the proportionate elevation of the faculties which result from it; it was, in fine, only after having gathered a large number of physiological and pathological facts, that I was able to seize the principles, according to which researches should be directed, respecting the nerves and particularly respecting the brain. As soon as I found myself in the right path, it was sufficient for me to pursue it without unceasingly employing mechanical processes. It is thus I have succeeded in finding and placing in the rank of permanent science, the structure, the arrangement, the gradual perfection, the connection and the relations of the several parts of the brain.

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* And when Richerand shall have fulfilled his duty as professor, and have studied the physiology of the brain, all this part of his work will be found totally changed.

I have brought order, unity, and life, into a study over which, till now, there reigned only confusion. Where were only seen mechanical forms and fragments, I have shown arrangements for the manifestation of the moral and intellectual forces.

But, let us say, the gentlemen of the Committee have pretended that my doctrine on the structure of the brain, has no necessary and immediate connection with my doctrine on the functions of its different parts. In this way, they again separate physiology from anatomy, and destroy the relations of the organs with their functions.

Yet the authors of this assertion, Messieurs Sabatier, Portal, Cuvier, have themselves, according to the example of Willis, Haller, Prochaska, Vicq d' Azyr, and Soemmering, interspersed, in their anatomy of the brain and its nerves, a great number of physiological and pathological observations, such as they are. The same men acknowledge that the brain is the immediate instrument of the soul; that, consequently, its anatomical examination is very important; they believe that we can only explain the loss of some intellectual faculties in certain cases, by admitting that the brain is composed of several partial organs. They conjecture that the smallest parts of the brain, such as the infundibulum, the corpora, mammillaria, the pineal gland, &c., have their particular functions; they even fix the attention of physiologists on the relation of certain parts of the brain, with certain dominant faculties, and they hope that comparative anatomy will be able to inform us of the functions of each part of the brain: all this indicates certainly, without doubt, that they admit a necessary and immediate alliance between the structure of the organs and their functions, or between anatomy and physiology. Whence, then, these contradictions, when the question concerns *my* anatomy, and *my* physiology of the brain?

The case is different, when it is maintained, that the knowledge of the structure of a cerebral part has never, till the present time, led to the discovery of its functions. The knowledge of the functions has always preceded

that of the parts. It is, also, as I have said elsewhere, without the aid of the anatomy of the brain, that I have made all my physiological discoveries; and these discoveries might have existed for ages, without their agreement with the organization having been detected.

Anatomists, seeing the great diversity of the constituent parts of the brain, should have been the first to deduce from it the diversity, and, consequently, the plurality of the organs of the moral qualities and intellectual faculties. But, when we see that Vicq d' Azyr, after having synthetically constructed the human brain, by ascending from the insect to man, and then analyzed it, by descending from man to the insect, did not dare to declare his disbelief of the residence of the soul in one single organ, we learn how little the mere knowledge of anatomical arrangement can enlighten the physiologist. Let man confine himself to the phenomena of nature, regardless of any of the dogmas of metaphysical subtlety; let him utterly abandon speculative suppositions for positive facts, and he will then be able to apprehend the mysteries of organization. Herder, struck with the phenomena of the understanding in different animals, and in different individual men, conceived the idea of the plurality of the intellectual organs, and even indulged the hope that he might, by an attentive comparison of the different brains, discover in them, those organs, and their peculiar qualities. Bonnet imagined that the brain was composed of fibres, each one of which would have its particular function; and he saw, though imperfectly, the possibility of a physiology of the brain. "Hence it follows," says he, "that an intelligent being, who should thoroughly comprehend the mechanism of the brain, and should see, in its minutest detail, all that is going on within it, would read, as it were, in a book. This prodigious number of organs, infinitely small, appropriated to sentiment and to thought, would be to such a being, what printing types are to us. We turn over the leaves of a book, we study them; this intelligent being would contemplate nothing but brains." If

I have arrived at an anatomy of the brain, which time shall never overthrow, and which exhibits, throughout, a perfect concordance between the moral and intellectual phenomena, and the material conditions, I owe it almost entirely to that immense number of physiological and pathological facts, which I have been so unceasingly accumulating.

Every doctrine of the functions of the brain must be false, if such doctrine be found contradictory to its structure. Admitting, for instance, that there is a central point, from which all the nerves radiate, and regarding this central point as the only, the exclusive organ of the soul, how shall we explain the successive development, the separate action, and the partial diminution of the different intellectual faculties? If other mammalia really have all the parts of the human brain, how is it possible that man should be endowed with more numerous and more sublime faculties? If all parts of the human brain are found to be equal in all individuals, and always have the same relation to each other, how can we conceive of the different degrees of each faculty, or of each propensity, in different individuals, or even in the same individual? If a single case of hydrocephalus can ever be found where most of the intellectual faculties remain unaffected, while the brain is entirely disorganized; if it can be proved that the brain is a mere medullary mass—this, by exhibiting my physiological doctrine, as directly contradictory to the actual organization of the brain, would sap the foundation of the doctrine, and annihilate it, with all its consequences.

But, if it be a constant fact, (truth,) that animals devoid of every thing like intellect, are also destitute of brain, and are only provided with inferior nervous systems; that these systems are multiplied as their vegetative life becomes more complicated; that a faculty of the animal life, as instinct, talent, &c., cannot be perceived, except conjointly with a brain; that the constituent parts of the brain, from the worm up to man, are found to be multiplied and varied in the same proportion as the faculties

are so; that all facts coincide in proving that an extraordinary energy of a faculty always corresponds to an excitement, and, above all, to an extraordinary development of some part of the brain; that the derangement of a faculty is connected with lesion, loss or disease of its nervous apparatus; if, in fine, it be an immutable truth, that the brain is composed of a nervous system, different from all others, and divided into several departments, (departitions,) distinct from each other; that the diversity of their origins, their fasciculi, their directions, their supplements, (complements,) their points of union can all be demonstrated to the eye;—then, I say, it is beyond all doubt, that the anatomy of the brain is in perfect accordance with my physiology of the brain; and the metaphysician will in vain pretend, that the intellectual operations are so obscure, that it would be impossible to discover their organs or their material conditions.

The gentlemen of the Committee, not satisfied with being constantly at variance with their own principles; not content with subtle, shuffling subterfuges, have otherwise disclosed their policy, and the inconstancy of their views. (aveus.) Who would have believed that they were disposed to doubt even the possibility of a physiology of the brain? "The functions of the brain," say they, "suppose a mutual influence, incapable of being comprehended, between divisible matter and indivisible identity, (moi,) an insuperable hiatus in the system of our ideas, and the perpetual stumbling-block of all philosophers. Not only do we not comprehend, and never shall comprehend, how delineations, impressed upon the brain, may be perceived by the mind and produce images there; but, however delicate our researches may be, these delineations never exhibit themselves to our eyes in any shape, and we are entirely ignorant what their nature is, although the effect of age and diseases upon the memory leave us no doubt of their existence or of their seat."

"In a word," they go on to say, "no one who has

labored upon the brain has been able to establish, rationally, a positive relation between the structure of this viscus and its functions, even those which are the most evidently physical. The discoveries in anatomy, hitherto announced, are limited to some circumstances in the forms, connections, or tissue of its parts, which had escaped older anatomists; and whenever any one has attempted to go beyond this, he has merely inserted between the structure discovered and known effects, some hypothesis which is scarcely capable of satisfying, for an instant, even superficial minds."

M. Delpit has again advanced the same passage, *Dict. des Sc. Méd.*, vol. xxxviii. p. 258, adding, that it is impossible to say, whether there are really as many separate seats as there are different operations; and, *a fortiori*, to determine precisely, these different seats in the brain.

M. Delpit, after extolling the advantages to be gained by the facial line of Camper, says, p. 269,—"The principal part of man, that, at least, which constitutes his superiority over all created beings, has neither a determinate seat, nor determinate local points; it carries with it no character, no sign accessible to our senses; the mode, as well as the seat of its operations, conceals itself from the scalpel, from the touch, from the eye, and from every other means of research, physical or material."

M. Reydellet, vol. xli. p. 580, says, also,—"It will always be impossible to detect the essence and nature of thought, as well as to determine, even by approximation, the parts of the brain which contribute to it; because its intimate organization will always be a secret to the anatomist, as the comprehension of it will be to the physiologist."

But let us not be dismayed at these alarming sentences. M. Reydellet vacillates, as well as his prototype, and, throughout two thirds of his discourse, he ranges himself, in every respect, on the side of *organoscopy*. M. Delpit, also fearing that cranioscopy might be proved, consoles himself with the reflection, that it will only be

proved by an empirical method; that is to say, as the ear is proved, empirically, to be the organ of hearing, although it is absolutely impossible to conceive of the relation of the auditory nerve to sound.

Those who have not thoroughly studied the physiology of the brain, can have no consistent ideas about it. They are always balancing between two altars; sometimes they courteously incline to the left, to worship false gods; sometimes the force of truth draws them to the right, and extorts from them involuntary homage.

Let us revert to the passages. I am there accredited with the presumption of hoping to explain the essence and *modus operandi* of the nervous system, particularly that of the brain. On the contrary, I have always maintained, that we must not attempt to explain the first causes of a phenomenon, whether of organic life, or of animal life. I attempt to determine, not by mere reasoning, as it is insinuated, but by the constant and repeated comparison of a great multitude of facts, the conditions necessary for the production of such or such a phenomenon in the living organization. Is it, therefore, so difficult to comprehend the difference there is between *explaining* the cause of a phenomenon, and *indicating* the conditions necessary for its taking place?

If the physiology of the brain supposes a knowledge of the influence of the soul and of the body, its nature would not manifest itself to us in any respect; for we know not a single essential principle of it. For instance, we should not know that motion is the product of muscular action, since the nature of irritability, which is its primitive cause, is unknown to us: we should not know that food nourishes the body, since we do not comprehend the primitive forces of assimilation: all the functions of the senses would be still unresolved enigmas, since we are yet to discover how we receive the consciousness of the sensations of sight, hearing, and taste. Need we more, to show, that neither the knowledge of an essential principle; such, for example,

as life; nor that of the relation of the soul, with the body, is necessary, to understand the conditions of the phenomena of a living body.

But if, perchance, the physiology of the brain should support itself, an expedient must be devised to eclipse the merit of its author. "So long," say the Committee, "so long as not even a conjecture can be advanced, founded on the functions of the pituitary gland, the infundibulum, the mammillary eminences, the portions (tractus) which go off from these eminences, into the midst of the thalami, of the pineal gland, and its peduncles,—it is to be feared, that any system whatever, of the functions of the brain, would be very incomplete; since it will not include those so numerous, so considerable, and so intimately connected parts of this noble viscus."

These parts, so numerous, so considerable, the pituitary gland, &c., when taken together, scarcely amount, in a man, to the weight of a dram, whilst his brain weighs from two to three pounds, and sometimes more. It is apparently to the public, only, that they would care to represent as so numerous, and so considerable, parts, which amount, at most, to not more than a three-hundredth part of the brain.

I do not deny that these parts may answer very important purposes, because they are generally met with in the mammalia, and because they are even greater, proportionally, in brutes than in man. But these two circumstances demonstrate, conclusively, that they are not to be considered as organs of the superior intellectual faculties. Moreover, I have rendered it very probable, that all these parts, far from being complete organs, are merely ganglions, apparatus of reinforcement for the true organs. It is thus, that the anterior tubercula quadrigemina, the corpus geniculatum internum, a part of the gray substance of the crura cerebri, and that also which is accumulated near the conjunction of the optic nerves, and lastly, the retina, form one single organ, the organ of sight, &c.

The passage which I have just cited, agrees very

well, as to its meaning and tenor, with the ideas of some of my German adversaries. Ackermann and Kessler, overcome by the evidence of facts, were obliged to close by saying, that all my discoveries must be regarded as amounting to nothing, since I had not been able to demonstrate the vital principle, or life itself, and to explain the functions of the soul.

I grant more than any of these gentlemen desire: not only am I ignorant of the functions of the mammillary eminences, &c., but also of many parts of the cerebral hemispheres, which are really considerable. How happens it, that the physiology of the brain, a science already so important, based on so great a number of most interesting facts, so fertile in results, relating to the knowledge of physical and moral man, falls at once into contempt, because it is not yet complete? On this ground, agriculture, chemistry, physics, natural history, anatomy, and physiology in general, would yet be objects little worthy of consideration, since they are yet susceptible of numerous improvements.

As I am very partial to the heroine of my story, the reader will be so kind as to allow me to entertain him a few moments more with her adventures, before indicating any new proofs of the importance of the study of the brain.

We may judge how much the new physiology of the brain crossed the path of the chiefs of the school of medicine, by the extreme circumspection which the students were obliged to assume in their conduct.—Some spake of my discoveries, at the same time pretending to blame me, and to arrogate the honor for their professors; others appropriated my ideas to themselves, without daring to indicate the source from whence they derived their riches; others published extracts from my course, but took good care that my name should not appear; and others, finally, were expelled from the learned societies, because they declared themselves partizans of the extravagances of the German doctor.

Gradually, however, their minds became calm, but they were not able to repress, entirely, their illiberal rancor. It is well known that throughout our writings, we announce my doctrine as the *anatomy and physiology of the nervous system in general, and of the brain in particular.* I have uniformly declared that the examination of crania and heads was necessary for attaining, by means of observation, a knowledge of the functions of the different cerebral parts. This part of my doctrine is to be designated under the name of cranioscopy. Yet the claim to physiology and physiologists is not allowed us, and ourselves and our labors are viewed merely in the light of cranioscopy and cranioscopists. M. L. B. Cuvier,* says,—"Dr. Gall pretends that each sentiment, each propensity, each particular modification of our faculties has its seat in some circumscribed region of the brain; that the size of these various particular organs necessarily involves the degree of predominance of their correspondent dispositions; and that their prominence, exhibiting itself at a certain point on the exterior of the cranium, may afford a pretty accurate means of estimating individual character. He pretends to have collected facts enough, by observing the crania of individuals remarkably distinguished for certain faculties, or who have unreservedly abandoned themselves to certain vices, to deduce from them general rules, and to form therefrom a science, which he has called *Cranioscopy.*"

In my doctrine I prove, by the way, that there are as many different organs as there are propensities and faculties *essentially* distinct. That there are as many organs, as there are *modifications* of the propensities or the faculties, I have never supposed. Are there as many stomachs, as many different organs of sight, as there are modifications of digestion and vision? And why does M. Cuvier still adopt the language of the ancient contributors to the *Journal de l' Empire*? Have

* Dictionaire des Sciences Naturelles, viii. p. 16.

I not, both in my writings and in my public lectures, sufficiently refuted the absurd idea of the *irresistibility* of our propensities and inclinations?

M. Broussais* in the *Annales de la Medicine Physiologique*, has given an account of the real service which the *cranioscopic* school has rendered to medicine.

Some there are, who, like the vulgar, speak with a jeering satisfaction of *bumps*, &c., such as M. M. Richerand, Virez, &c.

Is this because these gentlemen still obstinately disallow of a physiology of the brain? or is it because *cranioscopy*, *cranioscopic school*, and *cranioscopists*, seem to them terms well calculated to mislead the public as to the true nature of my researches? And yet it is to this cranioscopy, to those researches so laborious, so numerous and so costly, that they are indebted for a physiology, and, consequently, for the most essential part of the pathology of the brain! There is no other possible means of discovering the functions of the cerebral parts; all others, at best, only serve to confirm what has been ascertained by the inspection of crania and heads.

There is still such an aversion to the physiology of the brain, that certain learned bodies regard it as criminal in me, to have taught it during my travels. This procedure, say they, is contrary to the custom of our times; it is unworthy of a scientific man. These reasons seem to me like mere pretexts. It was, in like manner, an outrage upon good manners when Democritus sought for the cause of insanity in the dead body: it was contrary, also, to good manners, when I began to make a collection of heads: it is but a short time since a minister prohibited me to mention the dissection of the brain of a poet, because, as he said, it was not agreeable to French customs. Naturalists ought to have none of these customs; they should disregard the

* Examen des Doctrines Medicales, ii. 584.

prejudices of ignorance and superstition. Moreover, it is impossible, that these men should not understand what immense advantages we must have derived from my travels, without which, my doctrine would never have been thoroughly known out of Vienna.

The anatomy and physiology of the brain, are, from beginning to end, experimental sciences. Teach your pupils any part of anatomy whatever, from the very best drawings, if you can: teach them to know a metal, a plant, an insect, a fish, a disease, without placing these objects before their eyes. Reading may enable them to comprehend the principles and general results of my doctrine very well; but the facts, from which these principles and results have been deduced, must absolutely be demonstrated.

Hitherto, no one ever dreamt of making a collection of busts, of the heads and crania of men and animals, with a view to the study of their particular forms, from an observation of the prominent traits in their qualities, and in their faculties, in their instincts, propensities and passions. Even at the present moment, so indistinct a view of the utility of such a collection, have academies and governments, that they would sooner furnish means for making a collection of Chinese butterflies. Private individuals shrink from the expense and the difficult and innumerable researches, which a well chosen collection would require.

No organ is more easily demonstrated than the organ of the propensity for propagation, and that of the love of offspring, (progeniture.) It is easy to see, that the inferior occipital fossæ are sometimes larger, and sometimes smaller; that the superior protuberance of the occipital bone is sometimes more, and sometimes less ample, (bombée.) Nevertheless, there is no anatomist nor physiologist, who, without having been instructed, without having exercised both his eyes, and his touch, and his mind, would be capable of judging with confidence of differences so wide. Books will suffice, when the practice of the doctrines has passed through the hands of many ob-

servers, and the art of examining the forms of heads, crania, and busts, has been propagated by tradition. My travels have, in fact, advanced this science in a few years, more than the best written books would have done in as many centuries.

Let us take an example. Frequent pathological phenomena led to the suspicion and consequent discovery of the decussation of the nervous fasciæ, whose successive accumulations form a great part of the hemispheres of the brain. This interlacing was described by Areteus, and by Cassius. Francis Pourfour, du Petit, and Santorini, described it more accurately. Nevertheless, most modern authors either persist in denying this interlacing, or have a totally false idea of it. Vicq d'Azyr, never knew of the true decussation of the corpora pyramidalia. Dumas and Boyer maintained that it could not be demonstrated, by any method. Sabatier denied it, and Chaussier attributed it to the tension which was employed upon the part, which, before tearing, became stretched, and assumed a fibrous appearance. Nothing but our demonstrations have brought the opinions of anatomists on this point to a close.

What difficulties have we not encountered; how many times have we been obliged to go over the demonstration, to make the formation and unfolding of the hemispheres understood? The fibrous structure of the white substance of the brain and of the spinal cord, is proved beyond a doubt; and yet, in the work of M. M. Martinet, and Jarent, on the inflammation of the arachnoid, the expressions *cerebral pulp*, *spinal marrow*, &c., are retained, both by the authors and by M. M. Duméril, Pelletan, and Hallé, the gentlemen who reported upon it. We find the same in the *Dictionnaire des Sciences Medicales.*

Listen, also, to Vicq d'Azyr, in his discourse on general anatomy. "Let those," says he, "who would persuade themselves, that in order to get an exact knowledge of the body, it is enough to read the best descriptions, be good enough to consider with me, how deceptive their

hope is, and of how much gratification they deprive themselves, by declining the pleasure of seeing and observing for themselves. I had studied a long time over the writings of Harvey, Malpighi, and Haller; and I flattered myself that I had learnt from them the structure of the chick, and its connection with the different substances of which the egg is composed. How surprised was I, when comparing the object itself with the picture I had imagined of it. I found the most of my ideas were inaccurate; and that the images suggested by different books, differed in *many important* points from nature! Another thing I remarked; that from the details given by authors, I could not satisfy my curiosity, till after long and severe efforts to comprehend the sense of their works, whereas the first glance of the palpitating embryo in the cicatricula (or treadle) of the yolk, produced in me the most lively emotion, and at once inspired me with great interest in this astonishing spectacle."

For this reason, I have little confidence in societies, formed in any country, to verify or to refute my discoveries; unless there be within them men who have assisted at our anatomical dissections and our physiological demonstrations, and who have carefully trained themselves there by long exercise.

If those gentlemen could have ascended to the idea of a physiology of the brain; if they could have conquered their self-love, and if they had followed our dissections, and especially our physiological demonstrations, their ideas would have been enlightened; and instead of disdainfully censuring our proceeding, they would have admired our courage and our perseverance, and the multitude would no longer say with M. le B. Cuvier, "it would be well, if these different views furnished sufficient data on the usages of the different parts of the brain;" "pretensions founded merely on a few ill-observed facts," &c.

I have spent more than thirty years in collecting facts, either physiological, or pathological, in regard to man and animals. Every body who has followed our course

and read our works, is astonished at their immense number. There is no physiological proposition, which is fortified by so many proofs; and yet people presume to use this language, as imprudent as it is self-conceited! Let any one attempt to overthrow my proofs for the organ of the propensity for propagation, of the love of offspring, of the carnivorous instinct, of the sentiment of property, of the relations of space, of music, of numbers, &c.

It is easy to understand, why all the fundamental forces and their organs, are not susceptible of an equal number of proofs, and proofs of the same kind. The faculties peculiar to man alone, are, in this respect, enclosed in a much narrower circle than those common to man and animals. I should produce volumes on each organ, were I to bring forward all the individual experiments which I have made in discovering it, and which daily furnish me proofs of it. Observers, who have learnt how to separate the accidental from the essential, who know the uniformity and constancy of the laws of nature, know also how far it is desirable and indispensable to accumulate experiments. But let one of these sceptics meet with a fact, which goes *to support* one of my discoveries—with what ardor does he seize upon it! How much greater is this enthusiasm! how much more lively is this conviction, than the thousands of facts observed by me, have been able to effect!

The following passage closes in a manner so amusing, that I cannot forbear citing it entire.

"It is believed that one cannot study too minutely, the action of each muscle. Numerous hypotheses have been invented to explain digestion; whole volumes treat of respiration, reparation, the secretions and nutrition. But the more important subject of the cerebral functions has been left to philosophers unacquainted with physiological knowledge. Is not the brain, then, one of the organs of the human body? Why is not the history of all the relations which exist between it and the senses, between it and the other viscera indispensable

to the maintenance of life, thoroughly investigated by physicians? If so much obscurity still prevails in regard to the action of the organs upon the brain, and of the brain upon the organs; if a host of physical or moral phenomena which depend on this reciprocal influence, are not yet understood, is it not to be attributed to this separation of the branches of the same science? Cabanis has cleared up a part of this fertile field. Professor Pinel has shown how fruitful the physiological study of the intellectual faculties is, in precious results. What physician will hereafter associate himself with these two celebrated professors, and will add to their labors, what is necessary to supply their deficiency?" *

Here is an example of the lethargy in which M. M. Begin and Fournier have been immersed, from the time of my arrival in Paris, in 1807, to the year 1819!

For some time past I have remarked with pleasure, that the idea of the plurality of the organs of the moral and intellectual forces, is becoming familiar. The greatest obstacle which now remains unsurmounted, is, the philosophy which has been received for so many centuries, on the nature of these qualities and faculties. There is less objection to organs for the instinct, the affections, the passions, attention, memory, judgment, imagination, will, &c., than to organs for a propensity to propagate, for the love of offspring, for music, and even for poetry, &c. Let any one read my treatises on the fundamental faculties, the history of their discovery, their natural history, the proofs drawn from man and animals, their modes of action in the different states of health and disease; in short, let him read my philosophy of man, &c., and then let him be a disciple of Aristotle, of Plato, Descartes, Locke, Condillac, &c.!

Let us now return to our principal object, the importance of the anatomical and physiological study of the brain.

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* Dictionnaire des Sciences Med. xxxix. p. 347.

In the more complicated animals of the higher orders, all the functions are more or less subordinate to the brain. A fluid effused within the brain, and all kinds of pressure upon this part, paralyzes, more or less, the whole body, and, in different degrees, extinguishes consciousness and the power of thought. The striking difference between the wounds of some animals, and those of man, is well known. Snails, lobsters, and lizards, not only endure the most severe wounds, but reproduce, even several times, parts that they have lost, such as the feet, eyes, and head. Tenacity of life diminishes in proportion as the brain becomes more complex. In animals, wounds are accompanied by such accidents only as are inseparable; in men, on the contrary, especially in persons whose brains are irritable, how often are the most trifling wounds followed by tetanus and trismus?

It may be assumed, that this irritability is strong in different individuals, in proportion as their brain is voluminous and active. In idiots, in paralytics, and generally in diseases where the cerebral sensations are blunted from any cause, this irritability frequently cannot be excited by the most powerful internal and external stimulants.

Reflect on the tumult which the affections and passions, whose immediate seat and original source is in the brain, excite in the whole man. Do we not behold chagrin, jealousy, envy, languor, home-sickness, misplaced affection, &c., devouring the principle of life? How often has not a too sudden transport of joy, violent fright, or anger, destroyed life as suddenly as a thunderbolt. Who does not know the power of imagination, of attention, and of confidence, in the production and cure of diseases, especially nervous diseases, such as epilepsy in many instances, and intermittent fevers? Those most grievous afflictions, melancholy, hypochondriasis, despair, a tendency to suicide, hysteria, nymphomania, all the mental alienations, with their influences on so many other parts of the body, have their principal and immediate causes

in derangement of the brain. What an index, consequently, is it, to the treatment of these sad maladies.

Volumes have been written on the reciprocal influence of the brain, and the viscera of the abdomen and chest. And in general, how great must be the utility of the pathological study of the brain, in diseases of infancy, in cerebral, atonic, adynamic fevers, in apoplexy, in inflammations of the brain, frequently so deceptive, and which, by the tremor, spontaneous vomiting, and depression of strength, simulate diseases of a totally opposite nature.

The instincts, the propensities, the sentiments, the intellectual faculties, the distinctive character of humanity, owe their existence and their modifications solely to the brain. Without a brain, there would be no perception, no sensation, no ideas, no enjoyment, no suffering, no individual consciousness. It must, therefore, be allowed, that without a brain, there could be neither psychology, nor any species of philosophy.

This study brings under our eyes the gradual scale of sensible beings. The sensible substance, quite pulpy in the polypi, is gradually gathered into nervous filaments, and into common trunks, in beings somewhat more elevated. To establish a more extended intercourse with the external world, nature has superadded apparatus just as complicated as the relations of the species demand. In this way, by the successive addition of new organs, always in proportion to the faculties, nature proceeds step by step, and, by superadded cerebral productions, at last arrives at man, the most complicated and the most noble of beings. By additions of cerebral substance alone, could the brain of any animal become that of a more perfect animal? and by mere subtracting from the same substance, could the intelligence of man be degraded to the simple faculties of the brute? Is there any more excellent method to analyze the complicated character of man, and to arrive, step by step, at a complete knowledge of him?

The physiology of the brain makes us acquainted with our entire dependence on the primitive laws of the creation; the source of moral good and evil; the cause of the diversity and of the opposition of our propensities; of the strength or weakness of our understanding; the internal motives of our will and of our actions. Instructors, moralists, legislators, and judges, cannot, with impunity, neglect the influence of the organization over our propensities, passions, and talents. It proves to them, that there is no certain quantum, either of the power of doing good, or of avoiding evil, or of the degree of moral liberty with which each individual is endowed. It therefore possesses a general interest for all intelligent classes of society.

It explains to us the modifications of our propensities and faculties at different ages, their successive and gradual development, their stationary state, their gradual decline down to the imbecility of old age; and thus it shows us to what degree, and under what conditions, we are capable of apprehending the lessons of education and experience.

It explains to us not only the diversity of the moral and intellectual character of individuals, but it also gives us a reason for these differences in the two sexes, and in different nations: it indicates the source of their customs, of their manners, of their legislation, their mode of judging of what is virtuous and what is vicious or criminal, of their religion, of their barbarism or their civilization, of their institutions: thus it shows us how a uniform system of education, rewards, punishments, laws, &c., would be little in conformity with nature, whether as it regards different individuals, or different nations; finally, it fixes our ideas, irrevocably, as to the unity of the human species.

Study the different developments of our cerebral parts, and you will no longer be deceived as to the prime motives which determine your tastes, and your actions; you will judge exactly of your merit and your demerit; you will know the reason, why it does not depend on

yourself, that you have such and such a predominant propensity or talent, to become a mathematician, a mechanic, a musician, a poet, or an orator; you will comprehend why you excel, without effort, so to speak, in one thing, whilst in another you are inevitably doomed to mediocrity; you will see, why he who is brilliant in a particular station, must necessarily be eclipsed in another. Finally, you will explain the double man within you, and the reason why your propensities and your intellect, or your propensities and your reason, are so often opposed to each other.

While you search out, in history, the lofty deeds of great men, if you would not be the dupe of their biographers, consult the organization of their head; then will you be able to judge what belongs to them, and what to exterior influences and suggestions; what they owe to chance and what to their own determinations; how far we are to ascribe honor to their enterprises, or to their concerted intellectual plans, or to the energy of certain propensities.

The study of the physiology of the brain shows us the limits and the extent of the moral and intellectual kingdom of man. It shows us an immense disproportion between the elevated faculties, and the faculties of mediocrity; and impels us to the result, that whenever man is governed by the multitude, whenever rules, decision and laws are made by a plurality of votes, there mediocrity domineers over genius. Propter peccata terræ, multi principes ejus.

Finally, the study of the functions of the brain overthrows an infinity of physiological and philosophical error, and terminates those endless and tedious discussions. It assigns to each organ, whether of automatic or animal life, its proper function. We no longer regard the external senses as the origin of our faculties. It is the brain, which receives their impressions and operates upon them, according to the nature and the degree of its inherent force. It is no longer the *signs* so much talked of by modern philosophers, which de-

velop our understanding. Signs have no value in regard to infants, to idiots, or to worn-out organs.—Signs, the language of speech, writing, the language of gesture or action, are creations of the brain, and are only understood, in proportion as they are addressed to pre-existing faculties. This is the reason why language changes from one individual to another, from nation to nation, from time to time, according as the internal conceptions change. Sooner or later there will be established an unbroken harmony between the internal man and his external products, between things and their expressions. Ere long it will no more be the physical which acts upon the moral, nor the moral which acts upon the physical; the result will be that certain affections will act either on the brain itself, or on other parts. Your understanding, your volition, your free will, your affection, your judgment, instinct, &c., will be no longer personified beings: they will be cerebral functions. You will no longer demand, what is the origin of the arts, sciences, war, civil institutions, religion, morality: God has revealed it all to you by means of your cerebral organization; and, finally, you will abandon to another tribunal, all questions in regard to the nature and seat of the soul, its reunion with the body, the mutual influence of spirit and matter, the unity of self, &c. &c. In a word, the philosophical physician and the physiologist, instead of sounding his course amid the straits of speculation, will march confidently along the route of observation.

We may, therefore, henceforth consider, under a much more eligible point of view, the whole nervous system, that part of the animal organization surpassing all others in importance. The laws of their origin, their successive reinforcements, their expansion, the supply of apparatus for the most varied functions, are discovered and reduced to a general principle. The nerves which preside over sensation, motion, the functions of the senses, originate and are developed according to the same laws as the organ of volition and thought.

How interesting and important is the study of the brain to become,—now that it is no longer condemned to be merely sliced, as a brute or unmeaning mass! This organ will henceforth present something more than simple ruins: we shall see it disposed throughout, for some grand purpose: every where will be discovered the means of reciprocal influence, notwithstanding the most astonishing diversity of function. All those ancient forms and those mechanical connections, are now transformed into a marvellous collection of apparatus for the moral and intellectual forces, in the same way that the action of different viscera, and the sensation of different senses are found to be subordinate to a particular nervous apparatus; in the same way also, each instinct, each propensity, each faculty in man and animals, is found to be subordinate to some part of the nervous substance of the brain. If, therefore, the mind cannot be apprehended by us, we may detect it in those organs, which mark the measure of the intelligence of each individual and each species. The organs establish, not only the line of demarcation, between man and the brute, by indicating the degree of their faculties by the degree of their development; they teach us also how nature prepares a man to make of him, a sage or a fool, an artizan or a poet, a despot or a slave.

The time will soon come, when, convinced by evidence, all will agree with Bonnet, Herder, Cabanis, Prochaska, Sœmmering, Reil, &c., that all the phenomena of nature are based upon the organization in general, and that all the moral and intellectual phenomena are based upon the brain. A few drops of blood extravasated in the cavities of the brain, a few grains of opium, are enough to demonstrate to us, that, in this life, volition and thought are inseparable from cerebral organization. Whoever would not remain in complete ignorance of the resources which cause him to act; whoever would seize, at a single philosophical glance, the nature of man and animals, and their relations to external objects; whoever would establish, on the intellectual and moral

functions, a solid doctrine of mental diseases, of the general and governing influence of the brain in the states of health and disease, should know, that it is indispensable, that the study of the organization of the brain should march side by side with that of its functions.

Thus the naturalist, the teacher, the moralist, the legislator, always fluctuating and undecided as to the true causes of the propensities and passions of man, of his talents and their difference, may rectify his ideas, and become satisfied, by sensible and evident proof, that the human organization is adapted to a superior order of the moral and intellectual forces; that the degree of moral liberty, of merit and of demerit, is as different in individuals as their cerebral organization is different; and, consequently, that education, morals, religion, legislation, rewards and punishments, are essentially allied to the nature of man.

OF THE FUNCTIONS OF THE BRAIN,

AND OF ITS PARTS.

SECTION I.

OF THE FUNCTIONS OF THE BRAIN IN GENERAL, OR, OF THE ORGAN OF THE SOUL.

In my first volume, I have proved, that the intellectual and moral dispositions are innate, and that their manifestation, in this life, is impossible, without the intervention of material instruments. This being laid down, every one will inquire, Do these materials, considered collectively, constitute the organization, or is it some particular portion which serves as the organ of the soul? and in this latter case, what is that portion?

The reader will remember, that he is not to confound the expression, *organ of the soul*, with the expression, *seat of the soul*; and he is not to expect, that I shall engage in the examination of the question, In what manner do the soul and body reciprocally act on each other? I shall rest contented with stating the opinions of some ancient and modern authors on this point.

View of the most noted opinions on the seat of the soul, and on the reciprocal action of the soul on the body, and the body on the soul.

Physiologists and philosophers, according to the idea they form of the soul, represent it as acting in this or that manner, upon this or that point of the animal organization. Those who, with Stahl and his school, understood the soul to be the motive force of growth, of irritability, and of life, were necessarily obliged to admit that it was expanded, or in a manner diffused throughout all parts of the body. Those, also, who supposed there was an immediate sensitive faculty in other parts than the brain, were obliged to admit a seat for the soul somewhat extended.

From the earliest periods down to our own time, the sensual faculty has been pretty generally placed in the chest and abdomen. Pythagoras, Plato, Galen, and many others, sought for the seat of the sensitive soul in the brain: the Stoics and Aristotle sought for it in the heart; Erasistratus in the meninges; Herophilus in the large ventricles of the brain; Servetto in the *aqueduct of Sylvius;* Auranti, in the third ventricle of the brain; Van Helmont in the stomach; Descartes in the pineal gland; Varthon and Schellhammer at the origin of the spinal marrow; Drelincourt and others, in the cerebellum; Bontekoe, Lancisi and Lapeyronie in the corpus callosum; or in the great commissure of the brain; Willis in the corpora striata; Vieussens in the centrum ovale of the medullary substance which bears his name; Ackermann in the part which that anatomist calls *Sinneshügel.** Other physiologists speak sometimes of the

* *Sinneshügel*, is a German word, which signifies *tubercle of the senses.* Ackermann includes, under this denomination, the optic thalami, and the corpora striata; because, according to the received opinion, the optic nerves arise from the optic thalami, and the olfactory nerves from the corpora striata.

seat of the soul, and sometimes of the *organ of the soul;* and think that it is absurd to seek for its seat in any one of the parts just named, because there is no one of them that has not been found vitiated or destroyed, without a loss of the faculties of the soul ensuing upon such injury. Unzer, Jacobi, Dumas, and others, think that the arguments, brought against those who pretend that the brain is the seat of the soul, are absolutely unanswerable. They appeal particularly to the observations of Bartholini, Duverney, and others, who pretend to have dissected subjects, in whom the brain had been entirely destroyed, or even of children without a brain, while the faculties of the brain did not fail to manifest themselves. Dumas cites especially the observations of Meri, Weffer, and others, who saw infants, born absolutely without any brain, live for some length of time ; Dumas adds, that the encephalon being insensible itself, cannot be the seat of the soul.

Most authors denounce the hypothesis that the seat of the soul is endowed with extent. A seat of the soul which should not be a point, would appear to them incompatible with its simplicity. This point, it seems to them, should be that from whence all the nerves of the body originate, or towards which they all tend. But, unfortunately, they are obliged to admit that there exists nowhere, any point from whence all the nerves spring, and none in which they all come together. Moreover, even if such a point did exist, it must always be a physical point, that is to say, it must have extent, and in this case there would be nothing gained by the idea that the soul is simple.

The opinions relative to the action of the soul upon the body, and *vice versâ*, are quite as much at variance, and quite as absurd. Some think they elude all difficulties, by confining themselves to the spiritual world, and constituting God himself as intermediate between the soul and the body, according to Malebranche. The soul, say they, having no parts, can never be found in contact with any body. Others think, we may conceive

of the influence of the soul upon the body, in the same manner as we conceive of the influence of God upon the universe. They admit that God has communicated to spirits, to angels, and to other animated beings, a part of the faculty which he himself possesses, of acting upon bodies, and of being affected by bodies.

Some philosophers treated these ideas as chimerical, and attempted to give a more natural explanation. They confine themselves entirely to the physical world, deny the existence of two substances essentially distinct, and regard it as superfluous, to look for any thing intermediate between the body and the soul. They declare, that what are called faculties of the soul, are merely properties of the corporeal, constituent parts, a result of the mode of aggregation of these parts. In the same way as the future properties of the tree are latent in the germ, and do not appear till after the development of the germ, so, say they, all the primitive forces lie dormant, in the semen of living beings, and their action is only rendered possible by the increase and development of the animal.

A third class of philosophers took a middle route; they thought the problem would be solved, if they could find something intermediate which should effectuate the union of soul and body, and cause their reciprocal influence. They exercised all their sagacity to find a substance, as little material as possible, which should approach to the nature of spirit, and which should occupy a middle place between the soul and body. They imagined a very subtile soul, susceptible of sensation, susceptible of impressing motion, but still material, capable of communicating immediately to the spiritual soul the impressions it had received, and which the spiritual soul might charge with transmitting to the body its will. Hence all those subtile vapors, those attenuated substances, such as the pneuma, caloric, light, animal spirits, electric, magnetic and galvanic fluids, a current of animal magnetism, &c. were successively considered as the uniting bond between soul and body.

But, however subtile we may imagine these fluids, they are still material, and the difficulty of conceiving how two substances, of a nature essentially different, can act on each other, is not removed.

Kant despaired of ever seeing this knot untied by philosophers. He referred the question to the tribunal of the physicians and physiologists; but what can physicians and physiologists explain of the organization of the living body? Let the question be respecting the body alone, or respecting the soul alone, it will explain, at most, but the phenomena produced by the laws of motion and by chemical proportions. They never will explain life: they will never ascend back to primitive forces. It is a fact, that men of the greatest sagacity have failed, whenever they have attempted to go beyond phenomena and the conditions of those phenomena. We have no positive idea of any thing that it is not matter; consequently we can say nothing, either of the soul, or of its peculiar forces, or of its seat, or of the action of the soul on the body, or of the body on the soul. I shall, therefore, as I have hitherto done, confine myself exclusively to the investigation of the material conditions, with which the manifestation of the qualities and faculties of the soul becomes possible, or, what amounts to the same thing, determine what part of the body it is proper to consider as the organ of the moral and intellectual faculties.

Is it expedient, in the present state of our knowledge in physiology, to continue to make researches as to the organ of the soul?

Philosophers, physiologists and physicians have for a long time maintained, that the brain is the organ of the soul. It might, therefore, appear superfluous to continue researches on this subject. It is one thing to recount opinions which have been ventured and adopted for the moment, and another to develop a truth in all its ex-

tent, and to attach it to science in all its relations. Hippocrates, in his day, thought that the brain is the organ of the soul, but he was so little sure of the truth of his assertion, that he sometimes attributed the functions of the soul to the diaphragm, and sometimes to the heart. The same uncertainty has always obtained. In modern times theorists agree with the ancient philosophers in establishing the seat of the intellectual faculties in the brain; and the appetites and moral affections, they, with MM. Cabanis, Broussais, Begin, and Delpit, place in the viscera of the chest and abdomen. It is said, that, in truth, we have the consciousness of our passions, propensities, and affections in the brain, but that they originate in other viscera. They seek, with Reil and others, for the seat of the affections and passions in the nervous plexuses, and in the ganglia of the chest and abdomen. According to Dumas and MM. Richerand and Sprengel, and according to all physiologists and philosophers, without exception, the difference of the intellectual faculties and the moral qualities, depends on the difference of temperaments. It is maintained, that the brain participates no more in the functions of the soul, than the rest of the body does. MM. Pinel, Esquirol, and Fodéré did not presume to seek in the brain for the cause of mania, insanity and imbecility. Astruc, M. Rudolphi, and a hundred others, with them, regard the brain as an inorganic mass. Bichat regarded it as a simple envelop, destined to protect from injury the parts which are found beneath it. MM. Sabatier, Boyer, and Darwin regarded the brain as a purely secretory organ. All anatomists, hitherto, have considered it as the common origin of the nerves. It is very generally maintained, that our sensations and our ideas have no other sources than the external senses. The attempt has been made by Buffon, George Le Roi, Vicq d' Azyr, M. Cuvier, and others, to deduce instinct, or mechanical aptitude, from the tail of a beaver, the trunk of the elephant, the eye, the ear, the hand. Some also, with Stahl, Kessler, and others, teach that the soul

is expanded throughout all the nerves, not only as to its action, but as to its substance, and that thus the whole body becomes the organ of the soul. So great is the credulity on this subject, that experiments in animal magnetism have been undertaken, with the intention of proving that all the nerves are endowed with the same force ; so much so, that not only may each one replace another, but that each one may supply the place of the brain. In artificial somnambulism the soul is disengaged from the trammels of the body, so as to cause it to exercise its faculties with a greater freedom. A universal soul of the world is also dreamt of, which acts in our organization, without being dependent on any thing in the corporeal world. Metaphysicians make it their pride, that the two superior faculties, reason and volition at least, act independently of all matter. It is in fact advanced, that the intellectual and moral faculties subsist, even after the brain is dissolved, reduced to pus, or ossified ; were not MM. Berard, de Montegrè,* Richerand, Hallé, Sprengel, Tupper, &c. &c., assured "that all the functions of animal life, continue to subsist for a time, after all the parts of the brain have been successfully destroyed," &c. &c., can it be said after this, that the question, as to the organ of the soul, has been decided by physicians and physiologists ? In the course of this work, we shall see, that there is scarcely an author, who has not fallen into some of the contradictions which I have mentioned. Those even who have formed the most clear ideas on the subjects which they treat, have rarely supposed that our propensities, physical love, pride, &c., had each their proper organ in the brain. The intellectual faculties alone appeared to depend on the encephalon. It is, therefore, necessary to examine again the doctrine of the *organ of the soul*, in all its aspects, and to assign to the brain its true sphere of activity.

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* *Dictionnaire des Sciences Medicales*, vol. vii. p. 318.

Of the functions which are usually attributed to the brain.

In order to prepare the reader for the examination of the question, *In what sense is the brain the organ of the soul*, I should commence by enumerating the functions which are usually attributed to the soul, and by distinguishing them from such as are maintained without its participation.

All phenomena which take place either in plants or animals, and are unattended by sensation, perception, consciousness, or the feeling of their own existence, are phenomena of organic, automatic, vegetative life. Fructification, development, growth, nutrition, the secretions, &c., are functions of life purely organic, automatic, vegetative.*

The first phenomenon of animal life, is the perception of impressions which come either from without or from within. The faculty of perceiving irritability is the least elevated of all. It is common to all the nervous system, at least, inasmuch as the nerves perform the office of conductors for the brain ; and in each one of these systems, it is differently modified.

The faculty of voluntary motion with reaction, with consciousness, occupies the second place in the order of the functions of animal life. Physiologists have been wrong in giving the name of voluntary motions to movements of the automatic life, such as the peristaltic motion, the systole and diastole.

The functions of the five senses occupy the third rank in the functions of animal life.

The most elevated rank belongs to the appetites, the instincts, the mechanical aptitude, the propensities, the affections, the passions, the desires, the will, to the in-

* Vide vol. i. section 3. Difference of automatic and animal life.

tellectual and all other faculties; in short, to all that pertains to the intellectual faculties and to the moral qualities.

All the functions, therefore, which are accompanied by consciousness, and by perception, the most simple sensation as well as the most complicated operation of the understanding, come within the sphere of action of animal life, and should be considered as phenomena in which the soul or the brain more or less participates.*

May the brain be considered as the organ of all the operations of animal life?

Under the denomination of the brain, or encephalon, I do not include either the spinal marrow, or the nerves of the senses: taking the expression brain or encephalon in this restricted sense, I would ask whether we are authorized to maintain, with M. Sœmmering, that the brain is the part of the body where is produced the consciousness, or the sensation, as well of the objects which exist within the body itself, as of external objects; that is to say, the part where all the sensations arrive, are retained and compared, and where all voluntary motion originates; or rather, whether the brain is the exclusive instrument of all sensation, all thought, and all volition? Very good reasons may be alleged in favor of this opinion; and it may be combated by reasons perhaps equally good. As our knowledge is yet too limited to pronounce final judgment, I shall rest satisfied with presenting the arguments for and against, and leave to the reader the task of deciding.

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* Difference between automatic life, and animal life, vol. i.

Reasons which seem to prove, that the brain is the organ of all the sensations and all the voluntary motions.

Haller* and M. Sœmmering† prove, by the following arguments, that consciousness does not take place at the point where an object touches the nerve, that is to say, where the impression is made; but that sensation takes place in the brain.

1. A nerve, when pressed upon, enclosed in a ligature, or divided, loses the faculty of exciting sensations; that is to say, the impression made by the object is not transmitted by a nerve thus modified: we may irritate the nerve below the injury or the ligature, without producing any sensation, without the subject on whom we make our experiment feeling any pain. But why is the nerve insensible below the ligature, if sensation may be produced without communication with the brain?

2. The same phenomenon occurs, when the nerve is injured or compressed at its origin. Compression of the origin of the olfactory nerve produces loss of power of smelling; compression of the optic nerve produces blindness; compression of the auditory nerve, deafness; compression of the digital nerve, insensibility of the finger. This paralysis ceases the moment the pressure is removed. A person received a wound which penetrated to the corpus callosum, and whenever pus accumulated, he lost the use of the eye of the side opposite; and this blindness disappeared the moment the pus was discharged; therefore, the sensation of sight takes place in the brain.

3. Compression of the encephalon by an effusion of blood, lymph, pus, by an exostosis, by the simple turges-

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* Physiologie, vol. iv. § 16.
† *Sœmmering*, Lehre vom Gehirn, und von den Nerven, p. 373, § 308.

cence of the blood-vessels, and even a mere concussion, may bring on a loss of the exercise of the senses; therefore, the nerves take their origin in the brain, though the nerves of these senses may be in a state of perfect integrity. The moment the pressure on the brain ceases, the senses resume their activity.

4. Sometimes pain is distinctly felt to proceed along the nerves up to the brain.

5. The pains, which thus pass up from the wound of a limb, may sometimes be intercepted by a ligature.

6. Persons who have lost a limb, think, even after they are healed, that they can still feel the pain in the limb, at the spot where it was diseased. This pain can have no other seat than the brain.

7. It frequently happens, that certain impressions remain permanent in the brain during life; yet, when the encephalon suffers a sudden pressure, or some other lesion, they seem to disappear suddenly, and this pressure having ceased, they reappear with equal promptness; but since they have been preserved in the brain, they must, of course, have come there.

The voluntary motions of the muscles, produced with consciousness, commence in the brain, or are produced by means of the nerves as they depart from the brain. The following are the proofs.

We find ourselves unable to move a certain muscle when the functions of the brain are checked by pressure, effusions, &c.

When the brain is irritated by a splinter, convulsions are produced, which cease as soon as it is withdrawn.

As the brain alone is the seat of thought, the motions produced by thought must be derived from it. If the cause of voluntary motion existed in the same parts which execute it, each motion should exist after the destruction of the brain; they need not be augmented when this organ is irritated, nor be suppressed by its compression.

These arguments of Haller and Sœmmering have

induced me to advance the following propositions:* *That the perceptions and consciousness exist only in the brain; that without the brain no impression from external objects and no impression originating within, can produce sensation; that the brain is exclusively the organ of the functions of animal life; that all the phenomena which are presented to us by Zoophytes, all those which we observe in the different nervous systems of the brain, are not to be regarded as phenomena derived from the sensitive faculty, and from animal spontaneity, but must be ascribed solely to irritability.*

To appreciate the assertion, that all the sensations and all the voluntary motions have their seat and point of departure in the brain, it has been hitherto alleged, that the nerves are *merely a continuation* or a prolongation of the encephalon, that they all spring from the brain, or all converge towards the brain, as to a common centre. But this argument comes to nought, since I have proved, that the nerves of the organs of the senses, and the medulla oblongata are not a prolongation of the encephalon; that each particular nervous system is an independent system; and that the communicating branches, which unite these systems to each other, are sufficient to explain the reciprocal influence which they exercise upon each other.†

Objections, and answers to those objections.

Dumas maintains, as I have already said, that the brain is to be as little regarded the organ of the sensations, as the seat of the soul; since it is itself insensible. It is true that, by mutilating the brain, we do not excite pain nearly so acute, as when we pull or pinch the nerves, or exercise any violence upon them. But there is a state

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* Vol. i. † See volume first of my large work.

of disease when the brain becomes very painful, and in this it is analogous to many other parts, which never are subject to pain except in a state of disease. Moreover, we must not lose sight of the fact, that each part, each viscus, each sense, is capable of exciting a peculiar sensation in us. To have the sensation of hunger, by means of the stomach, is a different thing from feeling hope or pity. We indisputably are conscious of our wishes and of our thoughts. But no one disputes, that volition and thought have their seat in the brain; it cannot therefore be denied, that the brain causes us to have sensations peculiar to itself.

Dumas and Richerand reject, also, the argument above,* drawn from the fact, that pain is felt in amputated limbs. According to them, these pains are merely the remembrance of the pains which have been formerly endured in that part. But I have heretofore, in another place, proposed the questions,—*How is it that, by all the powers of volition, one cannot recall these pains? How happens it, on the contrary, that by a mere lapse of time, one finds himself assailed, as it were, unawares?* That there are monsters born without brain, who nevertheless live a considerable time after birth, and make different movements, proves nothing at all against the assertion, that the brain is the seat of all the sensations, and of all the voluntary movements. In adducing these, the phenomena of life purely automatic, are manifestly confounded with those of animal life.

The same may be said of the argument of Gautier † that a cock, when beheaded, darts forward and flaps his wings, to avenge himself of his enemy; and also of that of Gallois, who pretends that the fluttering of the feet of decapitated Guinea pigs and rabbits, are movements which these animals make to scratch themselves.

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* Nouveau Elemens de Physiologie de *Richerand*, 7 ed. t. ii. p. 181, 182.
† *Haller*, Physiol. vol. iv. p. 353.

Insects and the amphibia lay eggs after they have been beheaded: similar phenomena are observed in the muscles and viscera of more perfect animals, when the body is operated upon immediately after their death, and irritability is reanimated by artificial means, after the natural movements have entirely ceased. The intestines continue their movements for a long time after death, and it is not uncommon that the uterus, by means of automatic contractions, expels the fœtus.

All these movements seem not to be accompanied by sensation or volition, except in consequence of the mechanism which executes them. They take place very much in the same way, as when feeling accompanies them, and volition commands them. They prove but one thing, which is, that automatic movements and automatic spontaneity do not require the existence of the brain. It is for this reason, also, that neither the intensity nor the duration of life is in proportion with the mass of the brain.

Although Haller and Sœmmering have endeavored, by the arguments above, to establish that the brain is exclusively the organ of the sensations, of consciousness, and of voluntary motions, they regarded it as possible that children born without brain, properly so called, and having only the nerves of the senses and parts of the face developed, had cried and had taken the breast. But, as Haller and Sœmmering teach that the olfactory nerves arise from the corpora striata, and the optic nerves from the optic thalami, these physiologists supposed the existence of a very considerable cerebral mass, in the children of which they spoke, and under this aspect their observations prove nothing against the necessity of the presence of the brain.* In

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* Denckschriften der K. Acad. d'Wissensch, zu Munchen, für das Jahr, 1808, *S. Th. Sœmmering*. Academicæ Annotationes, de Cerebri administrationibus anatomicis, vasorumque ejus habitu, p. 73, § 17.

Ad functiones cerebri ulterius cognoscendas monstrorum, tam mortuorum quam viventium consideratiouem nullo modo neglexisse physi-

general, I would not credit any similar observation, so long as I was not sure, that its author decided upon it, after a full and entire investigation of the case. I have had occasion to examine an acephalous child, born dead. The parietal bones were so much flattened down upon the sphenoid and the petrous portions of the temporal bones, that it was impossible for me to discover the least trace of brain within the cranium. I found, however, the olfactory nerves, the optic nerves, and the auditory nerves, which were much elongated and very distinct. These nerves communicated with a sac of a fleshy appearance, two and a half inches in length, attached to the nape of the neck. When I opened the skin of this sac, I found most distinct convolutions; consequently, I had before my eyes the brain.†

But others go much farther than Haller and Sœmmering. They pretend that tortoises, after the brain has been all taken out, will continue to eat, and even to copulate. They cite Duverney, who says that the whole brain of a pigeon being removed, the pigeon still continued all its functions, the same as if nothing had happened.

"It is very certain," says Le Gallois, "that birds continue to live for a considerable time, and even to walk and run after their head has been cut off. The practice of the emperor Commodus has been frequently cited in illustration of this, who, while the ostriches

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ologos, satis inter alia demonstrant descriptiones innumeræ exemplorum illorum, frequentissimorum, quibus constat, etiam toto cerebro et medulla spinali deficiente fœtus non modo vegetos et pingues nasci, sed etiam natos vivere, vociferare et sugere, per aliquot horarum spatium, *manifesto argumento; cerebrum et medullam spinalem ne ad nervorum incrementum et nutrimentum quidem, nedum ad vitam alendam necessaria esse.

* Confer egregiam monographiam *Ed. Sandifort*; Descriptio infantis cerebro destituti, L. B. 784. Exemplis a viro clarissimo allegatis recentiora addidi in Abbildungen und Beschreibungen einiger Missgeburten, Frankfort, 1791.

† This brain weighed an ounce and three and a half drams.

were running round the circus, amused himself by shooting off their heads with crescent-shaped arrows: these animals, after their heads were off, continued their course as before, and did not stop till they had arrived at the end of the course."

Many physiologists have obtained the same result of decapitating turkeys, cocks, ducks, pigeons, &c.* Authors assure us, that after decapitation a calf has continued to walk a long distance: that a woman has proceeded several steps: that a man has been able to hold his sabre and brandish it three times: that another struck his chest with both hands."†

Now let us see what Le Gallois has learnt from all these miracles.

He says, in his preface, "But I am far from pretending, that it has not an influence equally great and necessary, over the other parts of the body. I grant, on the contrary, that it is this which *determines* and which *regulates* all the acts of the animal functions. For example, when I move my arm, *the principle of this movement emanates from the spinal marrow*, and not from the brain; but it is the brain which has willed the movement, and it is that, which directs it in a proper manner to effect the object which I designed. Cold-blooded animals furnish an evident proof of what I here advance. When a salamander is decapitated at the first vertebra, it may continue to live several days, and although it moves the body with force sufficient to transport it from place to place, yet it remains stationary, and we may leave it upon a plate, with a little water, without any fear that it will escape. If we examine the motions which it makes, we shall see that they are all irregular and without design. It moves its feet in contrary directions, in such a way that it cannot advance, or, if it makes one step forward, it soon makes another

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* *Experiences sur les principes de la Vie*, p. 7, 8 and 9.
† Avant-propos de l' ouvrage ci-dessus, p. 3 and 4.

backwards. The same thing is observed in decapitated frogs; they can no longer leap, or, if they make a few leaps, it is only when their hinder legs meet with some point of resistance. If they be placed upon the back, they now and then attempt to change their position, but there they remain, because they no longer know how to execute the motions necessary to replace them upon the belly."* How shall we reconcile these observations of Le Gallois and the facts which he, with so much complacency, before cites?

In another place, this physiologist says,—"It may happen that reptiles are able to govern their movements after being decapitated; but, if we take notice, we shall find that in all such cases the decapitation has been only partial; that it has been made through the cranium, and that the posterior part of the brain remains united to the body."† But immediately after, he affirms, "that sensation and voluntary motion may subsist and be kept up by artificial respiration in a decapitated (cold-blooded) animal;‡ that it is not merely the internal functions that subsist (in acephalous fœtuses,) but a part of the animal functions subsist there also, since voluntary motions take place."§ The whole work on the principle of life, then, notwithstanding the eulogium the gentlemen of the committee of the first class of the Institute bestow upon it, is merely a tissue of vague and contradictory ideas, in which the author is perpetually confounding phenomena due simply to vegetative life with those of animal life; where he constantly errs by attributing to sensibility, that which is merely in the effect of irritability, &c. How can we expect that experiments of this kind, which, repeated by other hands, uniformly furnish different results, should ever lead to truth?‖

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* Avant-propos, p. 3, 4. † Avant-propos, p. 6.
‡ Avant-propos, p. 7. § Body of the work, p. 16.

‖ These experiments of Le Gallois, which might most easily confound the effects of irritability with those of sensibility, have only succeeded on animals brought into the world in so imperfect a state, as to enjoy scarcely any thing but a vegetative life. Le Gallois acknowledges, that the same experiments would not succeed on animals born into the world more perfect.

The observations of Darwin have the same defect, and are, consequently, as little decisive. This physiologist maintains, that the fœtuses of animals have sensations, and are capable of voluntary motions; that they undergo hunger, and open and close the mouth or bill; that they swallow a part of the fluid which surrounds them; that they lick themselves and swallow many hairs; that they even attempt to walk and jump.*

But, supposing the existence of all these phenomena were demonstrated, it by no means follows that they are not produced by means of the brain; for, although the brain, even for some time after birth, may not be capable of exercising the superior functions, those parts of it which are destined to the exercise of the inferior functions, may yet be sufficiently developed, even before birth. Do we not see that some animals, for instance, colts, calves, chickens, &c., have, at the moment of birth, the brain and organs of the senses so developed, that they are capable of functions much more exalted than deglutition and voluntary motions?

As the experiments I have cited presented so many contradictions, M. Spurzheim determined to perform similar mutilations in my presence.

If we remove the greater part of both hemispheres of the brain, in pigeons and hens, and make a noise, these animals manifest distinctly, that they still see and hear. In our experiments, no one of these mutilated animals would eat without aid; but when bread or any other food was introduced into the bill, they swallowed it very well. Rabbits, which we have mutilated in the same manner, also saw and heard; they ran hither and thither, and even took food without assistance. But in these cases neither the cerebellum nor the whole of the brain was extracted. Whenever the lesion penetrates to the base of the brain, or whenever the attempt is

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* Zoonomie; ou les Lois de la Vie organique, par *Erasme Darwin*, traduit de l' Anglais par J. F. Kluskens, t. i. sect. xvi. ii. p. 231—33.

made to extract the cerebellum, the animal dies upon the spot, and the destruction of the nerves of sense is inevitable.

From these experiments we cannot avoid the conclusion, that the whole brain is not requisite in order that voluntary motions should take place, and that the organs of the senses should perform their functions. But we cannot decide, by experiments instituted for the purpose, whether any particular portion of the brain, properly so called, is necessary for the production of voluntary motions, or in order for the organs of the senses to act, nor what part of the brain is indispensable for such purposes.

We may, therefore, take for granted, that all those pretended experiments on decapitated animals, which continued to manifest sensibility and which still made some voluntary motions, were suggested by a puerile propensity for singular results; that they did not actually take place, but were built by the imagination on false premises.

I have, however, strong reasons for suspecting that nervous systems which do not belong to the brain, and without its intervention, may perceive impressions, that is to say, have consciousness, may retain the remembrance of impressions received, and that they are capable of animal spontaneity.

Reasons which seem to prove that other nervous systems, entirely independent of the brain, may also produce sensation and voluntary motion.

1. There are animals in whom we cannot, without closing our eyes to evidence, deny the existence of voluntary motion, the sense of touch and that of taste, although we can discover in them nothing which can be compared to a brain; for, it is only because of a distant resemblance, that some anatomists have called the scattered ganglions of these species, little brains.

But these animals feel hunger, seize upon their prey, and eat; and, since they have no brain, it follows, that in them the sensations have their seat in other nerves.

2. Every nerve destined for any particular function, as well as the brain itself, has its peculiar origin, its particular apparatus for reinforcement, its final expansion; and forms, of itself, a peculiar whole. Why should not such a nerve form a whole also, in respect to its destination? Why should it not embrace a sphere of activity peculiar to itself? It is pretended, that a complete division of continuity of the spinal marrow has been seen, without the parts below the lesion being paralyzed in consequence. This would seem to afford proof in favor of my assertion. Dessault reports one such case, and I have somewhere read of another.

3. Supposing that the functions of the nerves of the organs of sense were exercised only in the brain, and that these nerves do nothing but receive impressions from without, this would be to assign to an organ, which has already its functions to perform, another office still, for which nature would have formed peculiar apparatus to no purpose. Under such an hypothesis, it would have been sufficient that the external organs of the senses, the eye, for example, should have been placed in communication with the brain in the simplest possible manner. In this case, it would only have been necessary to conduct external impressions to the mass of the brain, in order to determine, in it, the operation from which results the sensation of taste, colors, sounds, &c.

4. The perfect manner in which nervous systems, different from the encephalon, perform their functions, depends in no wise on the greater or less mass of the brain, but on the more or less perfect structure of their own organization. Do we not see some insects endowed with a touch, a hearing, a taste, extremely delicate, although their brain is very simple and very small? How indefatigable is the activity of these organs of sense in insects and in some fishes! Is not the eye of the eagle, which has a small brain, but a large optic

nerve, more piercing than that of the dog, whose brain is much larger, but whose optic nerve is much smaller? Has not the dog a more acute smell than man, whose cerebral mass is at least ten times as great? Idiots and deranged persons often enjoy voluntary motion and the functions of the sense, in the highest degree. May we not be permitted to conclude from these facts, that the mode of action of each sense, of each nerve, destined for voluntary motion, is circumscribed within that nerve, in that sense, and that the brain has no other part in this action than to receive the impressions and to elaborate them for other purposes? or must we infer that in the more perfect animals, certain parts of the brain are destined to receive external impressions and to react upon them, and that other parts are destined for more elevated functions?

5. Some physiologists have observed that, when a sense is entirely destroyed, for example, by atrophy, that is to say, when not only the external organ has ceased to exist, but its whole nervous apparatus is annihilated,—they pretend to have observed, I say, that, in this case, all the ideas which depend on that sense are also lost, and that their reproduction becomes impossible. May we not conclude from this observation, that the impressions received by this sense, are retained by it alone, and that the remembrance of these impressions is produced by it alone?

The course of this phenomenon seems to justify my supposition. Persons who accidentally lose their sight, are at first inconsolable; the remembrance of ideas transmitted to them by sight is still recent, but by degrees they become reconciled, in part, undoubtedly, because they become accustomed to their misfortune; but, probably also, partly because the organ of sight becoming more and more feeble, the ideas which are gained by it, become enfeebled in the same proportion. When, at length, the organ is entirely destroyed, the impressions which depend upon it are equally annihilated, and

even the remembrance of these impressions becomes impossible.*

Darwin quotes the following examples: "A man nearly sixty years old, became deaf at about thirty. He appeared to be very intelligent, and amused himself with reading and conversation, by writing or by making signs with his fingers to represent letters. I observed that he had forgotten the pronunciation of his language so far, that when he attempted to speak, he articulated no word distinctly. His relatives, however, could sometimes understand what he would say. He told me, that in his dreams, he always imagined that people conversed with him by writing or by signs, and no one ever appeared to speak to him. Hence it would seem that with the perception of sounds, he had also lost the idea of the sounds themselves, although the organs of speech had still preserved a feeble remainder of their ordinary habit of articulating."

"This observation may cast some light on the medical treatment of the deaf; for we may assure ourselves by their dreams, whether the auditory nerves is paralyzed or not, or whether their deafness arises from some fault in the external organ."

"The most frequent causes of blindness are occasioned by defects of the external organ, as in cases of cataract and opacity of the cornea. I had occasion to converse with two men who had been blind for some years. One was affected with complete amaurosis; the other had lost the whole substance of his eyes. Both told me, that they never remembered having dreamed of visible objects, after they became totally blind."† I myself am knowing to similar facts.

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* M. Sœmmering had already advanced this opinion in 1784, in the eleventh number des Hessische Beytræge zur Gelehrsamkeit und Kunst; and he again brought it up (in 1800,) in his work entitled Hirn und Nerven-lehre, § 316.

† Zoonomie de *Darwin*, § iv. p. 33 and 34.

These are new reasons why I have always maintained in my public lectures, although these ideas were in opposition to the received ideas of philosophers, that each organ of the senses has, at least in the inferior animals, its peculiar faculty of receiving, and even of perceiving impressions, its own consciousness, and its own peculiar faculty of reminiscence. This same opinion, contested by others, is also found in the works of Cabanis. The solution of this problem demands more exact and more multiplied experiments.

But how shall we explain it, that in the perfect animals, a nerve accidentally pressed upon, compressed by a ligature, or divided, loses all sensibility in the part which is insulated from the brain? And how is it that a pressure which operates on the whole brain, suddenly interrupts the functions of all the senses?

Do the functions of the nervous systems in the perfect animals, demand a simultaneous action, at least, of those parts of the brain situated near its base, as the circulation of the blood demands the action of the heart; whilst in the imperfect animals, the sensations, voluntary motions, and the action of the organs of the senses, take place without the concurrence of a brain, precisely, as in these same animals, and in plants, there exists a kind of circulation without the concurrence of a heart?

Vegetables and zoophytes live without a nervous system, and are produced by buds. Other animals live with nerves, but without a brain. In general, in proportion as the organization becomes more complicated, and the organs more developed, and more adapted to more extended functions, the simultaneous concourse of each organ becomes more important to the preservation of life. In proportion as the brain becomes more compound, it also acquires a more extended influence over the rest of the organization, until, in the most perfect animals, all the other organs live under its influence, and it becomes indispensable to the existence of the individual.

So long as we cannot fix with exactness, as well in plants as in animals, the limits between the phenomena

of irritability, and those of sensibility, the explanation of their phenomena will always remain more or less conjectural. When we see, on the one hand, the greatest men considering the brain as the only organ of sensation and volition, in a word, of the whole animal life, whilst others believe themselves authorized to ascribe to plants sensation, the recognition of heat, cold and light, the passion of love, volition, a *sensorium commune*, the faculty of memory, dreams, the idea in short, as well of external objects, as of their own existence,* how can we hope to reconcile opinions so diverse?

Happily, it is of no consequence to the object I have in view, whether these difficulties are solved or not. I therefore abandon the subject, and pass to a more important question, and one which presents no insoluble difficulties.

Can the brain be considered exclusively as the organ of the intellectual and moral qualities?

The better to investigate this question, I shall begin by proving, that it is impossible to attribute the intellectual faculties and moral qualities to particular parts of the brain. This deduction will lead me to establish, that we must recognize the brain as in fact exclusively the organ of the intellectual faculties and moral qualities.

Negative Proofs.

We cannot look for the material condition of the intellectual faculties and moral qualities in any other part of the body than the brain.

If we except, for a moment, the different nervous systems, there is no part of the body which is organized in

* Zoonomie de *Darwin*, t. i. § 13.

such a manner, that we can believe it proper for discharging the superior functions, or for producing instincts, mechanical aptitudes, passions, faculties, volition, reason. Who would ever attribute such functions to the bones, ligaments, membranes, muscles, cellular tissue, blood-vessels, glands, &c.?

In accordance with the received opinion, one might be tempted to regard the heart as the seat of the moral qualities or vices, such as gentleness, generosity, courage, cruelty, &c. But, as soon as it is known that the heart is merely a muscle constructed with admirable art, composed of cavities, valves, an affinity of small muscles and small tendons, which cross each other in a thousand different ways, so soon as we are not ignorant that the heart is the principal instrument of the circulation of the blood, this idea falls of itself.*

Some physiologists would attribute to the diaphragm, the honor of the superior function; but the diaphragm, also, is nothing but a tendinous muscle, whose functions are appropriated to the chest and abdomen.

A poetical physiologist has dreamed, that the liver was composed of two substances, similar to those which compose the brain. In consequence of this idea, he found the liver, in its healthy state, very proper to be the organ of reason, and, in a diseased state, the organ of insanity. The principal function of the liver is manifestly the secretion of bile; and it is difficult to imagine that this fluid should be intermediate between the soul and the body.

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* M. Richerand considers courage as the moral function of the heart. He thus expresses himself on the subject: "The heart is larger, stronger, and more robust in courageous animals, than in the weak and timid species." "It will be objected, perhaps, that certain animals, such as the turkey and the ostrich, are less courageous than the smallest bird of prey; that the ox is less so than the lion and many other carnivora. We do not speak here of the absolute volume of the heart, but of its relative magnitude. Now, although the heart of the sparrow-hawk is absolutely smaller than that of the turkey, it is much larger in proportion to the other parts of the animal." *Nouveaux Elemens de Physiologie*, 7 ed. t. i. p. 322.

Many of the qualities which are attributed to the viscera, do not manifest themselves until a long time after the development of these viscera. The liver, the glands, &c., are developed in young animals, and in infants, a long time before the qualities or the faculties, which are attributed to them, manifest themselves; and these qualities and faculties do not necessarily undergo modifications, when the liver, glands, &c., become irritated, inflamed, ulcerated, &c.

Several passages in the Bible seem to favor the idea, that the kidneys and the heart are the source of the deepest thoughts and of the most secret designs. But *God trieth the reins*, may very well be supposed to signify only, that his omniscience penetrates into the interior of man. Besides, we have as little reason to look into sacred writ for dissertations on the functions of the parts of the human body, as for explanations of the motions of the heavenly bodies. As the kidneys are charged with the secretion of urine, it would be an ignoble idea to search there for the origin of the conceptions and passions.

Certain mutilations, for example, that of the sexual organs, manifestly have an influence on the intellectual and moral character of the man or animal mutilated, should we not be authorized, in consequence, to seek in these parts for the cause of certain qualities? By no means; for the loss of the sexual organs, causes not the loss, but merely the modification of the qualities in question. I shall prove in another place that lesions, or the destruction of the several parts bring on modifications, not only of the whole constitution, but also of the brain; they must, therefore, necessarily modify the manner in which the brain executes its functions.

Are the fluids the material condition for the exercise of the functions of the soul? But can a fluid, where every thing is mingled, in which the constituent parts are momentarily changing, be the seat of determinate and fixed functions? Finally, acephalous persons affected with cretinism, and idiots from birth, have the same fluids and the same solids as those who are well

constituted, without our remarking in them any of the qualities we might be inclined to attribute to the blood, or to the viscera.

Comparative anatomy contradicts all these reveries. The swine, the bull, &c., have the parts in question constituted very nearly in the same manner as man, without having all his qualities. Many of the viscera in question are larger in animals than in man, and yet how inferior are they to us, even in those qualities which they possess in common with us? The wolf, the tiger, the hare, the beaver, have the same viscera; yet their inclinations, their appetites, their mechanical aptitudes are different, and even contradictory. Again; would any one maintain that the heart in the tiger is the organ of cruelty in the sheep the organ of gentleness, in the lion that of courage? Many animals have the liver very large, although we do not remark in them any of the qualities which it has been attempted to palm upon the liver. Others want certain viscera, and yet we remark in them the qualities which are ascribed to those viscera. Insects, for instance, have neither liver nor bile, and yet they are exceedingly irascible. Birds have no diaphragm. Moreover, all the viscera bear the character of the functions with which they are charged, or rather, every thing is there arranged to effect a secretion, or to fulfil a purpose, which has nothing in common with the intellectual or moral functions. None of the parts which we named can, therefore, be the organ of the intellectual faculties, or the moral qualities.

The nervous plexuses, the ganglions, the ganglionic nervous system, cannot be admitted as the seat of an affection, an instinct, a moral quality, or any intellectual faculty whatever.

What I have said above of the viscera, is equally applicable to the nervous plexuses and to the ganglions of the chest and abdomen, which some physiologists would

elevate to the rank of organs of the affections and passions, and which they have made the seat of the soul, or of the affective qualities. The functions of their parts are equally well known; they concur in the functions of the viscera to which they pertain, and, by means of branches, which communicate with the spinal marrow and with the brain, they establish relations between the animal life and the automatic life. It would be as absurd to attribute to them other functions also, as it would be to attribute to the auditory nerve not only hearing, but also sight. We find ganglions and plexuses in other animals: the oyster, for instance, which certainly is not susceptible of any of the affections, or any of the passions, the seat of which some have attempted to fix upon these parts. In animals capable of affections and passions, the energy of these last is no way in proportion to the volume and number of the ganglia and plexuses. Many animals have ganglions and nervous plexuses larger than man, and yet man has affections and passions much more vivid than these animals. These ganglions and plexuses are found developed in infants and young animals, long before the period when the affections and passions acquire in them a fixed and determinate character. All the mammalia have nearly the same nervous plexuses and the same ganglions. Their intellectual faculties and their moral qualities are, nevertheless, very different. It would be necessary, therefore, to attribute to the same plexuses or the same ganglions a particular function in one animal, and a totally different one in another animal. Each plexus, and each ganglion would be, at the same time, the organ of affections and passions the most diverse. Thus, for example, the solar plexus would be, in a dog, the organ of attachment, love, courage, &c. Would any one attempt to assign to each ganglion, and each plexus, its particular function? How would he prove such an assertion?

The advocates of this opinion maintain, at the same time, that the nervous plexuses and ganglia are destined to diminish the impressions which take place in the

viscera, and to obstruct their communication with the brain. But how does it happen, that those very passions and affections, which have been located in these plexuses and ganglions, should manifest themselves with so much violence, and in a manner so irresistible?

These remarks are sufficient to prove, that we cannot seek for the cause of any affection, any passion, any intellectual faculty or moral quality, either in any viscus whatever, or in the nervous plexuses, or in the ganglions.

But it will be objected, that when we become a prey to any violent affection, or an impetuous passion, as disappointment, anger, jealousy, joy, love, &c., we manifestly feel this affection, or this passion, in certain viscera, and in certain parts which have nothing in common with the brain. The common usage of language among all people, it is said, goes in support of this: a man does not hate or love with all his brain, but with all his heart, &c. Therefore, it is in perfect conformity to nature, to regard, as the seat of the affections, the parts which are really affected.

It is nearly a century since Thomasius made this objection, and it was refuted soon after by Burchard.* "Such expressions," says this author, "have not been invented by philosophers, but by the people. Although the sun does not rise or sink as the day appears, or the night falls, it would be an affectation to say that the earth is lifted or is laid down, that the earth has made its revolution; and so it is said, I love you with all my heart, I am glad with all my heart, this tears my heart, &c.; not because these sentiments are produced in the heart, but because, in every violent affection, either the heart or other parts, by the movements of which we describe the affections, in our language, act sympathetically."

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* *Christ. Martini Burchardi* Meditationes de anima humana, Rostochii, 1726. cap. vii. p. 198.

In making this objection, the organ which produces an affection or a passion, is in fact confounded with the viscera, on which this affection or this passion acts. The nervous system of the chest, the abdomen, the spinal marrow, of the senses, of the brain, are, as I have just now repeated, put in communication by nervous branches, in order that they may act reciprocally upon each other. Without this reciprocity of action, all the phenomena of the moral and intellectual faculties would be restricted to the brain. The brain could not re-act in any way on the other parts, and could not influence the organs of voluntary motion to produce actions conformable to the affection or passion. The animal and the man would be nothing but brain; the remainder of the body would be merely an inert mass; impressions could never be perceived; the desires, affections, and will, could never cause it to act in their service. If, therefore, as some physiologists think, each of the particular nervous systems were an isolated centre of sensation, independent of the brain, each of these systems would be a special living being, and the unity of one would be impossible.

But this reciprocal influence of which I have just spoken, by no means proves that terror, anguish, disappointment, envy, hatred, love, jealousy, &c., have their seat where their affections are felt. Every body allows that thought exists in the brain, and thought must necessarily precede all the affections. The affections, moreover, act on certain parts, which no one presumes to take with confidence, for the seat of any one of them, and they act with as much more force upon these parts, as such parts are more irritable and more feeble.

Who, in reality, would maintain, with Van Helmont, that the stomach is the seat of the soul, because it is this viscus which suffers most in violent affections? The knees and the lips tremble in anger: will any one therefore say that anger resides in the knees and lips? Intestinal worms sometimes occasion blindness: will any one say that blindness has its seat in the intestines?

Finally, the same affection, the same passion acts upon different parts in different individuals; in one, it acts on the intestines; in another, on the throat; in a person with pulmonic affection, on the chest; in a nervous female, on the uterus, &c. Will any one, therefore, say, that the same affection, the same passion, has for its seat in one individual, the intestines; in another, the throat, &c. If Bichat had weighed this matter well, he certainly would not have regarded organic life as the immediate source of all the passions and all the affections; more especially too, as he had maintained that organic life has attained a high degree of perfection in animals and infants just born.

Instead of placing the soul in the stomach, as Van Helmont did, those of our own day regard it as the grand focus of nearly all diseases. Since this doctrine has obtained, physiologists have been less disposed to place the affections, passions, and instincts in the viscera of the chest and abdomen, in the ganglions and ganglionic nerves.

Let us once more examine their opinions, the reasons on which they are founded, the sources of their errors, and let us claim for the brain its proper domain.

First, let us hear M. Broussais, in his *Examen des Doctrines Medicales*, t. ii. p. 388, &c.—"Cabanis," says he, a philosopher and idealist, "with Locke, Condillac, Destutt, Tracey, &c., attributing all our ideas to impressions made on the organs, all our determinations to pleasure or pain, has observed, that the sources of either do not reside in what are called the senses. He maintains that in the interior of the body, in the viscera, *without including the brain among them*, changes are going on, of which this organ takes cognizance by means of the nerves which it sends to the different tissues. These are what he calls internal impressions, resulting from the play of the different organs. This opinion is a beam of light which nothing can eclipse; a fertile mine of truths, of the first order, and which, in time, cannot fail to be wrought to great advantage.

"Already had Bichat hinted at it, by teaching that the passions resided in the viscera: but he did not live long enough to develop this idea, which was, in fact, that of the ancient philosophers; and we should not now see it contested by physicians, who ascribe every thing to the brain, had this author produced it accompanied by all the reasons which he might have brought in its support.

"Professor Richerand sides with Cabanis, in referring the instinctive determinations to the viscera; and the truth of this fact seems to be no longer contested by any one, except Dr. Gall. This is a step which we owe to the author of *Rapports du Physique and du Moral.* The same professor attributes also to the viscera, the giving birth to the appetites, from whence spring certain passions; but he refers these passions to the intellectual faculties, so that the passions would be composed of determinations issuing from the viscera, and consequently instinctive, and intellectual operations. I had already discussed this question in 1803, in my inaugural dissertation, where I maintained, that the intellectual faculties are never exercised without being combined with passions, and that, *vice versâ*, the passions cannot be in exercise, nor be maintained except by the phenomena of the intellect. At some convenient time I shall extract from my *Cours de Physiologie appliquée à la Pathologie*, arguments, which will show that the idea of Dr. Cabanis is in fact one of the keys of etiology and therapeutics."

I am very curious to know how M. Broussais will succeed in illuminating this philosophy!

Let me add to this, that all Cabanis maintains, tom. i. p. 66, that even in a state of health, the state of the abdominal viscera contributes to the formation of thought.

M. Broussais also adopts the axiom, *Nihil est in intellectu quod non prius fuerat in sensu;* and adheres to the school of Locke, Condillac, &c. &c.

"We may further consult," continues M. Broussais, "the thesis of Dr. Balenchana, a young Spanish physi-

cian, educated at the Paris school, which he sustained in August, 1820, on the distinction between instinct and intelligence. We shall find, in this thesis, that the school has adopted some of those proofs, which he extracted from the unpublished course of which I just now spoke."

I have read the thesis of Dr. Balenchana, but I find there nothing but a part of the principles of M. de Blainville.

"I am obliged," says the author, "to consider instinct as it exists in those animals which have *the organs of relation well characterized ;* for those whose organization is more simple, are reduced almost to organic life, and finally become confounded with vegetables."

I shall follow exactly, the division of the nervous systems, as established by M. de Blainville, &c.

Afterwards he explains the gradation or perfecting of the instinct, according as animals are endowed with a brain, *properly so called,* more or less perfect.

"As a proof, that the brain controls the movements of the organs of relation, sometimes according to interior impulses, and sometimes independent of these, he cites the movements which we execute without the consciousness of it, either sleeping or waking. Thus in the first state we change our posture when it becomes tedious; we withdraw the hand which the weight of the trunk compresses; we carry the hand to the nose when the nostrils are irritated, &c., because a painful impression being felt in the brain, it decrees the motion."

He goes on to cite a long series of similar phenomena, which should be called automatic motions rather than instincts.

In the second part he treats, in the same spirit, of the perversion of instinct in some diseases; for instance, he speaks of the error of the eye, of the air passages, and of the gastric canals, &c. No where does he allude to innate industry, mechanical aptitude, real instinct, propensity, affection or passion.

In his *Annales de la Medecine Physiologique,* page 5, M. Broussais congratulates himself that M. Lobstein,

in his article on the trisplanchnic nerve, portrays this nerve in a manner that greatly approaches to the idea he had formed of it, *Dict. des Sciences Med.* t. lvi. p. 9, etc. I expected to find there new proofs in relation to the seat of the affections and passions. But, so far from it, this idea has never presented itself to the mind of M. Lobstein. Once only, he says, p. 37—"In the passions and movements of the soul, where these sensations are so strongly perceived, they are not, as Bichat thinks, the epigastric organs which receive the impressions: anger, terror, &c., do not act in the first instance on the stomach, the liver and the spleen before affecting the solar plexus; but it is this, which is affected before the viscus, I have just named."

But we find nothing here, which tells us that the plexuses and the ganglions are the origin and seat of the affections and passions. As, according to my own ideas, the nerves derive their origin from the ganglions and the plexuses, it is natural, that the influence of the brain should arrive sooner at the plexuses and ganglions than it can be propagated to the viscera by the nerves. M. Lobstein proves, by excellent anatomical researches, that the trisplanchnic nerve belongs to automatic life, and as we have proved in our section on the intercostal or great sympathetic nerve, that, by means of the filaments of communication with the nervous system of the vertebral column and the brain, it establishes a reciprocal action and reaction of the vegetative or nutritive life with the life of relation, or animal life; that, consequently, the brain may be informed, particularly in cases of disease of the nerves, or exaltation of the viscera of the chest and abdomen, of what is passing in the internal system, &c. M. Lobstein gives to the trisplanchnic nerve its proper function, independent of the functions of the brain, and to the brain its proper functions equally independent of the trisplanchnic nerve; always admitting, as he should do, the reciprocal influence of one on the other.

In addition, M. Lobstein also considers the trisplan-

chnic nerve contrary to data from comparative anatomy, and contrary to the opinion of Winslow, Sœmmering, Bichat, and myself; as taking its course from above downwards, &c.; and he admits the erroneous idea of Johnson, Lecat, Metzger, and Reil, on the use of the ganglions.

Thus it is the same as proved, that M. Lobstein places the affections and the passions in the ganglions and in the plexuses of the trisplanchnic nerve.

The eloquent M. Virey avoided, for a moment, the error of confounding the involuntary motions with the affections and passions. He distinguishes the affections and passions from the propensities, from the bias which impels us to this or that occupation, to poetry, to the sciences, to the mechanical arts, or to war, &c. The affections and the passions, according to him, are joy, sorrow, disappointment, languor, fear, anger, attachment, modesty, distrust, audacity, despair, envy, jealousy, hatred, vexation, indignation, aversion, emulation, diffidence, fanaticism, hope, contempt, admiration, &c. &c. Among the number he also reckons voluptuousness, love, friendship, ambition, pride, which are, however, permanent propensities. *Dict. des Sciences Med. tom.* xxxix. *Passions.*

If I had been as erudite as M. Virey, I should have been able to dispense with searching for the seat of the organs. The ancients would have apprised me that *splene rident, felle irrascunt, pectore amant, pulmone jactantur, corde sapiunt.*

Where M. Virey proposes to speak of the seat of the principal centre of the passions, he says, "The nervous centre situated near the cardia or superior orifice of the stomach, which traverses the diaphragm, has been considered as one of the principal springs of the animal machine, and the seat of all the affections which are referred to the heart.

"We feel, in fact, about this precordial region, the recoil of the passions. Birds, reptiles, and fishes are always destitute of a diaphragm, and the nervous plexuses of the

ganglionic system are somewhat differently disposed from those in the mammalia; wherefore they should feel in a somewhat different manner *the influence of the affections*." A singular opinion. And is he speaking of the seat of the influence? Of the latter, every one will allow.

"It is very manifest," he continues, "that the region called the phrenic centre, exerts a great influence over the mind. This part being irritated by poisons, or benumbed by narcotics, immediately disturbs the brain, and agitates the other parts of the body. When it is stimulated or exhilarated by spirituous liquors, for example, we observe that the mind becomes more brilliant, and enthusiastic, or its character, more gay. All these effects seem to depend on the great mesh or plexus of the nervous branches, on the aorta and crura of the diaphragm, a remarkable nervous centre, called the solar plexus, from which depart, also, inferior fasciculi by secondary plexuses. Its nervous branches, which extend throughout the whole intestinal system, send out, as it appears, their filaments to almost all the organs of the body, and cause them to sympathize together, or connect them with this centre."

Here, also, he merely speaks of the influence of the phrenic region over the brain and other parts of the body. Nevertheless, M. Virey, as if he had *proved* that this region is the seat of the affections and passions, which with him are synonymous, continues:—

"M. Gall, on the contrary, pretends, as did Descartes formerly, that the passions reside in the brain and not in the ganglionic system, which is found well developed in animals without encephalon, *properly so called*, in which it would be difficult, adds this author, to suppose the existence of passions. Yet, who does not know that the minutest zoophytes, worms, and insects, experience fear, desire, love, &c. There are then, passions without the intervention of a brain, and in being least capable of ideas and reflections; for the passions belong, in fact, not to the will, but to instinct, in all the brute creation."

M. Virey does as much honor to the zoophytes, as Darwin did to plants. Let him be reminded of what I have just stated in regard to M. de Blainville and M. Balenchana, who supposed themselves obliged to admit of the operation of instinct merely, in all animals *whose organs of relation were not well characterized;* for those whose organization is the most simple, are almost reduced to the enjoyment of organic life, and at last become confounded with vegetables.

"The passions, properly speaking, belong therefore to animals as well as to man, because they reside more especially in the ganglionic nervous systems, or produce emotions of the heart. To become convinced of this, let us ascend a little, and show that the interior nervous system *influences eminently* the nervous tree of the life of relation or the cerebro-spinal system."

Influences eminently! but yet once more, is it the same thing to influence, as to be the seat of any thing?

And why dispute whether animals have affections and passions? what proves this better than the new physiology of the brain? On the contrary, according to the principles of M. Virey and his partisans, animals, cattle, horses, goats, &c. should have affections and passions much stronger than man; for their ganglionic system is much more powerful than that of the human species. Observe, also, that in the pacific frugivora and herbivora, the reindeer, the giraffe, &c., it is much more considerable than in the tiger and the hyena.

And as M. Virey never goes farther than to prove the *influence* of the ganglionic system on the brain, though he seems to desire to prove to his readers the *seat* of the passions, I readily accord to him the influence of gaming, milk-diet, Sherry wine, &c., on the functions of the brain.

To give additional force to such arguments, M. Virey supports himself on the authority of what Quintilian says: "*Pectus est quod nos disertos facit et vis mentis; ideo imperitis quoque si modo sunt aliquo affectu concitati, verba non desunt.*"

"If the passions existed in the brain, how would terror take away all presence of mind, all energy from the brain so as to induce syncope! It is, therefore, requisite that passion should exercise itself in some other part than the organ of thought," p. 429. He admits, however, p. 479, "that admiration and contempt depend more immediately on the brain, as well as curiosity, enthusiasm, infatuation, respect and veneration: vanity and pride are, according to him, mixed affections."

Let us, in the first place, with M. Virey, allow to the brain what belongs to it, whether a third part, a half, or two thirds, and let the different ganglions dispute for the rest.

Again: M. Virey says, "According to Prochaska, the passions act on the heart by means of the nerves of the eighth pair; but may it not be maintained, on the contrary, that the emotions of the heart ascend to the brain by these same nervous branches? For Vauvenargues said with reason, *great thoughts come from the heart.*" An excellent proof this of Vauvenargues, since every body knows that the thoughts of an animal are sublime, in proportion to the magnitude of his heart! Here we have, at one stroke, not only the affections, the passions, but also the thoughts, the sentiments, the propensities, virtue and vice, transported to the heart!!! Such an accumulation of offices should not be permitted.

The same inexhaustible and poetical M. Virey brings up again, in his *Historie naturelle des Mœurs et de l' Instinct des Animaux*, the same arguments, and with the same force.

At page 15, vol. i. By preserving throughout, the denomination *medullary matter* for the fibrous substance of the brain, he causes the nerves to emanate from the brain and spinal marrow, not bearing in mind that he is soon going on to speak to us of a large number of animals, who have nerves and a ganglionic system without having either spinal marrow or brain. This proves that a man may be extremely wise, without having a good memory. "Instinct," says he, "is innate in the

heart; it emanates from within the internal organs of life; it acts without the concurrence of the brain." Vol. i. p. 70, 71.

"From what we know of the marvellous instinct of insects, of many of the mollusca, and other headless animals, we can readily comprehend how deceptive the explanations proposed by Dr. Gall are to demonstrate the propensities of animals by the protuberances of the brain. Since there does not exist in acephalous animals nor in a host of other beings with very lively instincts, any brain, properly so called, nor, consequently, any *bumps* or protuberances, it follows that they should have no innate propensity, no determination whatever."

According to the same method of reasoning, the brain could no longer be considered, in the perfect animals, and man, the centre of life; since these imperfect animals enjoy life without a brain, and man, he every where expressly says, lives entirely by the brain.

M. Virey, as well as M. Balenchana, saw himself obliged, doubtless, conformably to comparative anatomy and physiology, to admit of instinct in those animals only who have the organs of relation.

But M. Virey knew perfectly well, of what volume this organ of relation, this brain should be, to be able to produce what he calls instinct. For this reason he was satisfied with affirming, that "in the mollusca, the shells, in the crustacea, or the crabs and lobsters, in insects and worms, the nerves are as much more scattered, as much more divided into different centres throughout the body, into different *little brains*, (a very happy term, which has been for a long time employed to designate them as the seat of the passions,) or ganglions, as there is *scarcely any, or almost no* brain in the head. Hence result very singular effects; for example, if you cut off the head of a snail or an earth-worm, these animals, far from perishing, reproduce a new head. But if you decapitate a quadruped, a bird, a reptile, a fish, who have brains, the animal necessarily perishes. Tom. i. p. 127." *In insects and worms the nerves are as much more*

scattered, as much more divided into different centres. May not the nerves and the scattered and divided ganglions, therefore, exist in other animals, and in man?

Water-lizards and snails have, therefore, no brain; since they not only do not perish when decapitated, but even reproduce the head. It is a deplorable embarrassment to be obliged to have recourse to such terms as *scarcely any and almost no* brain. Let M. Virey tell us what is the volume of the ganglionic nerves, in the smallest species of ants, and how those little points produce instincts, and an economy so admirable.

And if M. Virey admits that, in the more perfect animals, life is concentrated in the brain; whilst, in animals of an inferior order, it is distributed among several points, why should he refuse to admit, as I have declared in my large work, that the same thing may take place with respect to the affections and passions.

M. Virey betrays himself more and more. He continues, t. i. p. 467,—"The invertebrated animals have no brain, *properly* so called, since the ganglion which takes its place is an appendix to the nervous system, analagous to the great sympathetic, and which may be cut off, in worms and the mollusca, without the animal perishing."

I ask, then, whether the brain which we find in the head of wasps and tortoises, is not a brain—because we may cut off the heads of these animals, without their perishing, at least for a considerable length of time?

"Those," he insists, p. 471, "which are provided with a head, have not, on that account, a true brain, although we generally find in it a nervous dilatation, a ganglion, or a single or double knot. This imperfect brain is by no means in them the motive principle of the whole body. We decapitate earth-worms and snails, and, so far from perishing, they shoot out a new head. On the other hand, every vertebrated animal perishes when the head is amputated; because the brain in it, becomes as it were a centre about which every thing conspires."

M. Virey supposes an *intelligent* vital force, which causes the parts which have been amputated, such as the

head in the Naïada, the claws of lobsters, to be reproduced? That which causes the branches of a tree to shoot out, is also, doubtless, an intelligent vital force!

Should we not be tempted to suspect that all these gentlemen, who understand so thoroughly all the little brains of worms and insects, have employed, both for eyes and mind, microscopes of an admirable perfection, since the gross structure of the human brain, and of other large animals, remains unknown to them even to the present time.

I should not have laid so much stress on this subject, if the opinion of Cabanis, Broussais, Virey, &c., were not still the opinion of almost the whole medical world. Mr. Tupper has presented the same objection in his *Inquiry into Dr. Gall's system concerning innate dispositions*, page 52. And M. Delpit also says in the *Dictionnaire des Sciences Medicales*, t. xxxviii. page 263: —"We are very far from granting that the different organs of the affections and passions are concentrated in the brain, and exclusively attached to its partial divisions. The opinion of the philosophers of antiquity, as well as those of our own time, supported by the testimony of our own consciousness, have placed in the precordial organs, or in those of internal life which are farthest distant, and which appear the most independent of the brain, the seat of our most lively emotions and our most impetuous passions." M. Delpit does not allow, unconditionally, that even the intellectual faculties are concentrated in the brain.

He also cites Bichat for authority, that the organs of internal life, that is to say, the abdominal viscera, the ganglionic system, are the sole seat of the affections and passions, and that the brain is never affected by it. "Every passion," continues he, "has its determinate seat in some organ of the internal life: this is the goal to which they tend, the centre from which they depart. This result is proved, not only because the passions essentially sway the organic functions by affecting their viscera in a special manner; but still more, because the state

of these viscera, their lesions, the variations in their sensitive forms, concur, in a very marked manner, to produce a certain species of passion, such as joy, sorrow, love, aversion, courage, timidity, anger, indifference, &c."

Do my readers now know what instinct is? Have they been able, amid all these incoherent vagaries, to decide what all these gentlemen mean by instinct, the affections, the passions, the seat, influence, &c. &c.? Will they not be surprised to read in *Historie des mœurs et de l' Instinct des animaux*, by M. Virey, t. i. p. 483: "Instinct is nothing else than the external manifestation of that same wisdom, which in the interior directs all the vital functions of the body;" that it is instinct which contracts the pupil against the light, and which dilates it in darkness; which causes the stomach to revolt at putrid substances, which presides over the secretions and excretions; which retracts the muscles instantaneously, when they are pricked or burst. Finally, instinct does not result from the organization, but it precedes and elaborates it. "The interior or ganglionic nervous system, destined perpetually to concur with the nutritive and reproductive functions, is the exclusive seat of the instinct; from it emanate the spontaneous impulses, the affections of the heart, the passions which carry away man and animals to the performance of inconsiderate acts, and it is this system which watches, unceasingly watches, over the preservation of the individual, even in sleep, in delirium, (*especially when the delirious person casts himself from a window,*) in diseases; it presides over the perpetuation of the species, love, the fecundation of germs, over the egg and the fœtus." T. i. p. 493.

This is enough,—it is too much! Let us proceed.

Instinct, it may be inferred from all these passages, is sometimes an occult force, a single personage; sometimes it presents itself in the plural form. Its, or their functions are very various, and very irreconcileable. To-day, instinct keeps incessant watch over our preservation; to-morrow, it impels us to rash deeds; to-day, it gives us

up to gluttony; to-morrow, it commands us to suffer ourselves to die with hunger. It provokes automatic, involuntary motions; it is the organizing force, the moving power of vegetative life, the organ of the affections and the passions. Sometimes its seat is nowhere, since it precedes organization and presides over it; sometimes it exercises itself in the zoophyte without any nervous apparatus; and sometimes it is seated in the multiplied and scattered ganglions of worms, mollusca and insects; soon after it is concentrated in the phrenic centre, in the diaphragm, in the stomach, in the heart, or in some other viscus, without enjoying an exemption from the service of controlling at the same time all the viscera at once, and from contributing also to the formation of thought. The viscera are sometimes the source of intelligence, the immediate seat of the affections and the passions, and sometimes they exercise only a mediate influence on the brain. The mollusca, worms, and insects, have, sometimes, little brains all over their bodies; and sometimes the ganglions or nervous masses, placed above the œsophagus, are not brain. Animals sometimes have almost none, sometimes scarcely any, sometimes no brain, properly so called, sometimes next to no brain at all, in their little heads, and sometimes a very unimportant brain. P. 470, 471.

M. Virey ascribes, (proportion being observed,) more strength to a cockchafer, an ant, a flea, &c., than to an elephant: why does he not make the same calculation for their little brains?

Certainly; the physiognomy of truth does not present such contortions, such vacillation!

I ascribe all these errors to two sources; complete ignorance of the functions of the brain, and confused notions of the various phenomena of organization.

There is an inward consciousness, that the affections and the passions are exercised within us. Their action is much more marked in the viscera of the chest and abdomen, than in the head. We must needs seek for their seat. The brain and its functions being unknown,

they were consequently referred to the spot which was supposed to be most affected; that is, the heart, the stomach, the diaphragm; such was the most ancient and the most general opinion.

Scarcely had some superficial knowledge of the brain been acquired, before several philosophers and physiologists regarded it as the seat, not only of the intellectual faculties, but also of all the affections and all the passions.

Then came speculative philosophers and metaphysicians. They attributed to the soul all the phenomena of moral and intellectual life. They recognized no organ for any one of its functions. Impressions on the external senses gave birth to the instincts, the propensities, and the faculties; and, if the affections and passions were placed in the viscera, it was rather in consideration of their action, than of their origin and their seat.

At a later period, and much too late, especially in France, it was judged that there was some internal source for what is called instinct, affection, passion. As the brain at this time was held in no consideration, it was natural to make a present of them to the heart, &c.; and when the anatomy of the nervous system was brought to some perfection, this was immediately proclaimed as their seat and origin. Hence the ancient reputation of the heart; hence the zealous admirers of the wonders of the solar plexus; the phrenic centre, the ganglionic nervous system.

But now that we have become able to assign, with certainty, to each organ, to each nervous system, its proper function; now that we know the graduated scale of beings and of nervous systems, our ideas are altogether freed from these absurdities.

We know that the ganglionic nervous system, or the trisplanchnic nerve, is intimately connected with the vascular systems; they always coëxist, and, oftentimes, where there is no brain or spinal marrow.

All the branches of these ganglionic nerves accompany the arterial trunks, branches and ramifications, and enter with these branches into the different organs; which evidently proves, that the trisplanchnic nerve has no other office than to preside over the functions of the life of nutrition, to establish a reciprocal influence between this and animal life, by means of the branches communicating with the nervous system of the vertebral column.

We know the functions of the stomach, the diaphragm, the liver, the heart. We know that the mammiferous animals have these parts in common with man; that in the larger species they are even more voluminous than in man, although their affections and passions are neither so numerous nor so energetic. We catch a glimpse of the absurdity of entrusting the same part, the heart, for instance, with functions directly opposed to each other. We find it still more extraordinary to constitute the heart the seat of cruelty in the tiger, of gentleness in the lamb; of fidelity in the dog, of perfidy in the cat; of courage in the bison, and of timidity in the hare. We know, also, that emotion being felt in certain parts, in connection with the affections and passions, proves nothing as to their seat. We no longer confound the origin of our affection, with the reaction of this affection on some part, since experience has taught us, that by pursuing a method so bad, this or that passion or affection would have a different seat in each individual. Jealousy chokes me, commiseration painfully contracts my jaws and palate, amorous emotions excite violent sneezing; the sentiment of benevolence brings tears into my eyes; anger gives me colic, and indignation causes my knees or lips to tremble. Let each one watch himself, and he will himself discover a different seat for jealousy, pity, amorous emotions, the sentiment of benevolence, anger, indignation, &c.

The slightest attention demonstrates to us, also, the falsity of the opinion, according to which the brain is never affected in the affections and passions. To be

brief, let any one read on this subject all the works of the physiologists and psychologists; let him read the works of Pinel, Esquirol, Georget,* the last of whom, even if selfishness did not interest me in him, could never have too many readers,—and they will soon be convinced, that in all the affections, the brain is more or less disturbed. M. Georget, in the opinion of M. Spurzheim and myself, is the only author who has well distinguished the instincts, the affections and the passions; and who has proved, in the most decisive manner, the part which the brain takes in each affection. He establishes, with reason, that suffering and trouble, moral affections, are synonymous with suffering and trouble, cerebral affections. Among other proofs that the origin of the affections is in the brain, he says, page 339: "Observe, moreover, what are the most frequent accidents of these violent commotions of the organization; they are most frequently diseases of the brain, insanity, epilepsy, madness, convulsions, hysteric and hypochondriac vapors, syncope, apoplexy, catalepsy, the cerebral inflammations, ataxic fevers, &c., and sometimes sudden death. A remark, extremely important to be made, is, that, if the moral affections are followed by diseases of the brain, diseases of the brain are frequently characterized by certain moral affections; an evident proof that both are derived from the same source.

"The affections only ensue on the perception of an object; no one is frightened except at the unexpected approach of imminent danger; anger is usually the offspring of wounded self-love; we are not grieved unless disagreeable sensations, unexpected and unfavorable news have been received by the brain. The brain is, therefore, always affected first; it is also from the brain that issue those sudden and more or less violent movements, which radiate towards the principal organs of the economy, and sometimes towards them all.

* Physiologie du Système Nerveux, t. i. p. 315.

"If the affections and passions did not appertain to the action of the brain, and depended on the other viscera, they would be, as to number, extent, force, &c., in direct proportion to the volume and integrity of these last, and in nowise to that of the first. Yet, see the pacific herbivora, with four stomachs, with a voluminous liver, with enormous lungs and heart; their whole life consists in browsing upon herbs. They have, moreover, the great sympathetic nerve very much developed; which proves, that this nerve presides especially over the nutritive functions. Observe, also, the idiotic, imbecile, insane, the deficient in mind, all such as prefer to live more tranquilly under the dominion of the stomach than under that of the brain; all these individuals are generally gross and fat, and have enormous viscera, and the stomach in the best possible order; and yet the idiotic, imbecile and demented, have neither passions nor affections; the others are scarcely moved by operations, which shake the whole machine of beings with sensible brains. Cabanis, therefore, fell into a serious error, when, after having said,—'In other children the state of the brain entirely obstructs thought; yet they live more or less healthful and vigorous,' he adds, 'and the instinctive functions which appertain to human nature in general, manifest themselves in them nearly according to the ordinary periods and laws.'*

"How can we conceive of general effects so varied, otherwise than as those which accompany or follow the manifestation of these affections, these sudden and severe moral shocks, without ascribing to them a common source? You will, therefore, place shame in the cheeks, disappointment in the epigastric organs, joy in the organs of the thorax, because it is these parts which are ordinarily most especially affected in such cases. But in this way you will, most of the time, make these phenomena depend on the whole economy; for, frequently,

* Georget, t. i. p. 163.

the whole economy is reached by them. Thus in excessive fright, we observe, on the part of the brain, extreme moral disturbance; on the part of the heart, palpitations; the dejections take place involuntarily; the skin is covered with cold sweat, or becomes goose-flesh; the legs can no longer support the body; sudden jaundice supervenes, &c., or again, they will sometimes have different seats in different individuals; for in one, the stomach is most actively affected; in another, it is the liver; in a third, the brain; in a fourth, the lungs or the heart, &c. Can such opinions be admitted? If, on the contrary, you recognise the true cause of all these disturbances; if you resort to the brain, every thing is explained: this organ is in relation with the whole organization; it is susceptible of feeling impressions, variable in their nature and degree of intensity; its sympathetic reactions may be as various as its particular affections, and as the organs over which it exercises its influence.

"It is objected, that in those great movements of the economy, the brain participates in no degree with the general trouble of the other viscera. This is false; this cannot be true. Without reckoning, that it is by the brain, that the sensation, which has immediately preceded the passion or affection, is perceived, do we not see that the moral effect which we call anger, disappointment, fear, &c., is only a cerebral effect; that it is always accompanied by great derangement in the ideas; that it is very frequently followed by cerebral diseases, insanity, hysteria, hypochondriasis, and the whole host of symptoms denominated nervous; paralysis, apoplexy, febrile cerebral diseases, &c.? The brain, like all other organs, reveals its sufferings by changes in the exercise of its functions, in the manifestation of the phenomena of which it is the source. In these cases, for example, the moral state and the disorder of the ideas, are the expression of the cerebral suffering.

"Besides, does it not often happen, that the signs of the lesion of an organ are exhibited most manifestly in

other organs with which it has sympathetic relations? Will you say that in the phlegmasiæ, which are going on to a fatal termination, the organ, which is their seat, is not diseased, because the brain, sympathetically injured, can no longer perceive the painful sensations which it perceived before?

"So soon as physiologists shall consider the affections and passions as simple cerebral acts, as organic operations, it will be absolutely necessary that they should modify or even change the language, much too metaphorical and figurative, which they so frequently employ to delineate effects. From the manner in which they experiment, one would suppose, in truth, that they were treating with individual beings, with devouring monsters, who issue from some unknown lurking place, and spread their ravages on all sides. Such language should be reserved for poets and for certain moralists, and banished from the recitals of the observers of nature.

Let us determine, definitely, what is a passion and what is an affection, and all disputes will cease of themselves.

Every faculty, whether intellectual or affective, so soon as it has attained a very energetic and resolute degree of action, must be called *passion*. In this sense the philosopher may have the passion of thought, of seeking for the relations betwen cause and effect; the poet may have the passion for poetry, the musician for music; the painter, the mechanician, the mathematician, those for painting, mechanics and mathematics. As all these faculties have their organization in the brain, it follows that their exalted action has equally its seat there.

The affective qualities, the instincts, the sentiments, the propensities, when they become habitually imperious, are also passions. It is thus that love increases into a passion: excess of the sentiments of benevolence or of devotion is a passion: the love of offspring, propensities for combats, ambition, &c., may become passions. Now, I have proved, particularly in my special treatises

on each of these affective qualities, that, like the intellectual faculties, they have their organs in the brain. Consequently, their respective passions should also have their seat there.

But where are the organs of the affections seated? They have none, neither in the plexuses, nor in the viscera, nor in the brain. I will explain myself. Have pleasure and pain particular organs, peculiar to themselves in the brain? No; pleasure and pain are modifications, modes of the general sensibility of all the nerves. We have painful and agreeable sensations in the head, in the stomach, in the intestines, in the senses, &c. It is the same with the affections. They are modes, modifications, of the organs of the intellectual faculties and of the affective qualities; they are emotions, shocks, commotions, assaults; they are, literally, affections of the brain; they have, therefore, the same seat and the same origin as the intellectual faculties and the moral qualities. They all and always commence in the brain, which exercises its universal influence over all other parts of the body. And if a remote cause, a disease of the liver, of the heart, or of the stomach, disposes a man to some affection, it is because this same cause has first exercised its influence on the brain, and has altered its functions.

Neither of the five senses is the seat or the organ of any one moral or intellectual force whatever.

After what I have said, in my first volume of this work, on the functions of the five senses, and of the spinal marrow, it is superfluous that I should a second time engage in the detailed examination of this question. I have described the limits to the sphere of activity to each sense; I may, therefore, content myself here, with presenting some ideas intimately connected with this discussion.

If we except the instinct common to animals and man, which leads them to subsist, by preference, on vegetable or on animal substances, or to make use of a mixed nourishment, there is scarcely any intellectual faculty or moral quality, which we should be disposed to attach to the sense of taste. Those who still adhere to ancient prejudices, carry back science to the period when the internal forces both of animal and of man were absolutely unknown. They did not reflect, that the external instruments and the senses ought to be in unison with the more noble internal organs, and that, without the inspiration of these last, the first are absolutely impotent.

Others had perceived, before me, that the sense of smell by no means explains many of the phenomena which it is the custom to deduce from it. They have been obliged to have recourse to a sixth sense, to explain as well as they could, how the swallow, the nightingale, the quail, the stork, find their way in the spring to the habitation they had left in autumn; how dogs and pigeons which have been removed in a close carriage, or in a sack, to countries where they have never been, will, nevertheless, find their original lodging again.

If the ear is the primitive source of music or song, why do not all the animals, who have a more delicate ear than we, sing? Why do not all birds sing? Why, in the singing birds even, is the female almost always destitute of song? Why does each bird remain constant to the warbling of its species, even when it has never heard its parent sing, and though it may have been nurtured by birds of a different species from their own? Why is not a talent for music proportioned to the delicacy of the ear? How shall we explain the origin of music, if it has none other than imitation? Whence issues the creative genius of a Gluck, a Mozart a Haydn, a Grétry, &c.? Is it to the eye that the invention of painting is due? Ask the painter if he measures the perfection he has acquired in his art, by the perfection of his eye; you will find that he will

speak to you of something more noble than vision, and this even when the question shall not regard either invention, or design, or execution, but merely the perception of the true tone and harmony of colors.

The example of fools and of the imbecile refutes those who attribute, also, to the sense of touch, attention, memory, judgment, imagination, our desires, our intellectual faculties, and even our arts: "the intelligence, the solidity and the perfection of our ideas, the extreme delicacy of the sentiments and of the ideas, the delicacy of the perceptions, the sprightliness and address of woman, to her skin of thin and tender tissue."*

How, then, shall we explain, by the five senses, which are the same in the majority of animals, the great diversity of their instincts and of their mechanical aptitudes, &c.? How shall we explain why such a species of animal constructs nests, or burrows, and why another species lives in flocks, and another, solitary? Why is it that sometimes it is the female alone who rears the young, and sometimes the male and female concur in their education? Why is man, with less perfect senses, infinitely superior to animals by his moral qualities and his intellectual faculties? why do these qualities and these faculties vary much according to age, sex, &c., while the senses remain nearly the same?

There is, then, no relation between the moral qualities and the intellectual faculties, and the number of the external senses, nor the period of their development and perfection. The external senses are circumscribed to their proper and special functions; they transmit to the brain the impressions of the external world: the manner in which these impressions are put in operation, and the different ends for which they are ultimately elaborated, depend on the different nature of the internal powers.

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* *Virey*, Histoire des Mœurs des Animaux, t. i. p. 130.

The moral and intellectual powers are founded neither upon the entire organization nor upon the temperaments.

Many modern physiologists declare, that it is absurd to deduce any quality or function from any single part whatever. There is no part, say they, capable of acting by itself; no function, and, consequently, no manifestation of the moral and intellectual faculties becomes possible, but by means of the whole animal organization. This entire organization forms but a single organ, and all the differences which we observe in the functions of man and other animals, arise wholly from differences of constitution and temperament.

Each organ is, without doubt, subject to the general laws of organization. The parts cannot fulfil their destination before they are developed and brought to a certain degree of perfection: hence it follows, that each organ, although independent of all the others, in regard to its particular functions, must have communication with the whole body in general, and with the blood-vessels, lymphatics, nerves, &c. But, if we should conclude from this, that the whole body is the instrument of each particular function, we might as well say, an eye when plucked out, does not see, an ear when destroyed, does not hear, and therefore it is the body, taken collectively, which sees and hears. But why does the body, taken collectively, cease to see, hear, and secrete bile or saliva, when there is a particular derangement in the eye, the ear, the salivary glands, or the liver? If every thing depends upon the organization taken collectively, why do physiologists study the functions of the separate parts, and why has nature constructed such a variety of apparatus, when she might have accomplished her ends by one single expedient? But, if she has constructed a particular apparatus for each function, why should she have made an exception in the brain? Why

should she not have destined this part, so curiously contrived, for particular functions?

In regard to temperaments, I cannot stop here to examine, whether the idea formed of them is correct, and whether the manner in which they are divided is exact. Let them remain in the sense received by physiologists. I ask, is it correct to deduce from them certain primitive, determinate, moral or intellectual powers?

The idea, which the ancients had upon this subject, was founded sometimes upon chemical, sometimes upon mechanical principles, and varied according to the opinion which they adopted relative to the principle of life. But they pretty generally admitted, that the intellectual and moral character of man depends upon his temperament. When they recognized the influence of the body upon the functions of the soul, they attributed it much more to the proportions of the solids and fluids, than to any single part; as, for example, the brain. I pass over in silence innumerable errors of the ancients, and content myself with pointing out a few, which ought not to have been brought forward again, after the physiology of the nervous system had been studied with care and attention.

Richerand, speaking of the sanguineous, says with Pinel,—"The conception will be quick, the memory excellent, the imagination lively and cheerful; they will delight in the pleasures of the table and of love. Inconstancy and levity are the principal attribute of men of this temperament; extreme variety seems to be for them as much a necessity as an enjoyment; they are good, generous and sensible, lively, passionate, delicate in love, but fickle. Such was Richelieu. In vain will he whom nature has endued with a sanguine temperament, endeavor to renounce the pleasures of sense, acquire a fixed and durable taste, or attain, by profound meditations, to the most abstract truths; overruled by his physical propensities, he will be incessantly brought

back to the pleasures from which he would flee, to the inconstancy which is his lot."*

Speaking of the athletic temperament, he says "the head is very small. In the history of his twelve labors, we see him (Hercules) without calculation, or reflection, and as if by instinct, courageous because he is strong, and seeking obstacles in order to surmount them, sure of crushing every thing that resists him."

Of the bilious temperament:—

"The passions will be violent, the emotions often hasty and impetuous, the character firm and inflexible. Daring in the conception of a project, constant and indefatigable in its execution. Full of audacity, courage and activity. Such were Alexander, Julius Cæsar, Brutus, Mahomet, Charles XII., Peter I., Cromwell, Sixtus V., Cardinal Richelieu. They are capable of the deepest dissimulation, as well as the most obstinate perseverance. This temperament is also characterized by a precocious development of the moral faculties."

Of the melancholic:—

"The imagination is gloomy, the character suspicious and timid; Tasso, Pascal, J. J. Rousseau, Gilbert, Zimmermann."

Of the phlegmatic:—

"They have, generally, an insurmountable inclination to sluggishness, and an aversion from the exertion either of body or mind. They are ill suited to business. The imagination is frigid, the passions excessively moderate. They have virtues arising from temperament, on which they have no reason to pride themselves."†

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*In a note, p. 519, Richerand himself refutes what he has advanced in the text. He says,—"The histories of Henry IV., Louis XIV., Regnard, and Mirabeau, prove, that sanguine men, *when circumstances require it*, join to an extreme love of pleasure a great elevation in their sentiments and character, and can show proofs of the most distinguished talents of every species."

†Nouveaux elémens de physiologie, 7 édition, t. ii. 514, et suivantes, ccxxix. ccxxxiv.

Cabanis,* also, sought for the moral and intellectual character in the temperament, by following the steps of the ancients, whose spirit of observation he extravagantly admired. "The bilious, melancholic temperament," says he, "is the most unfortunate and fatal of all. This appears to belong to fanatical, vindictive, and sanguinary nations; it determines the sombre transports of a Tiberius or a Sylla; the hypocritical frenzy of a Dominic, a Louis XI., or a Robespierre; the capricious atrocities of a Henry VIII.; the deliberate and persevering vengeance of a Philip II.: it combines audacity and violence with inordinate ambition and resentment; the gloomy terror which leads from crime to crime, is augmented by its own peculiar effects."

Hallé likewise deduces from the temperaments, not only the mode and manifestation of the faculties, but also the moral and intellectual character, and determinate faculties, such as great promptitude in judgment, absolute will, &c.†

Fodéré asserts, that the conduct of the most celebrated men is conformable to their temperament, and cites in support of his assertion Plutarch's Lives of Illustrious Men.

According to Kurt Springel, persons of excessive irritability are liable to form false decisions; they have an ardent imagination, and treacherous memory; they are irresolute, inconstant, of a penetrating mind, and subject to profound sadness, and extravagant gaiety. He imputes the sensuality of women to the delicacy of their organization. "Persons of a lax temperament," continues he, "have a weak but tenacious memory, and a slow conception; they are indecisive and cold, both in love and hatred. Those of a rigid temperament are subject to many errors; they have a tenacious memory, and can contemplate, steadily, a single object; their passions, like their imaginations, are fiery. ‡

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* T. ii. p. 548.

† *Dictionnaire des Sciences Medicales*, t. liv. art. Tempéramens.

‡ Cabanis explains all the shades of character, moral and intellectual, by the diversity of temperaments. *Rapports du physique et du moral de l'homme*, 2d edition, t. i. p. 404, et seuvantes.

It must be admitted, according to these physiologists, that the intellectual faculties and moral qualities are determined almost entirely by physical and mechanical considerations. Laxness of fibre, indicates a weak memory; rigid fibre, obstinacy; a humid constitution, sluggishness in the intellectual functions; light blood, a ready conception; a robust constitution, courageous resistance. Can any accord better?

If the delicate constitution of women accounts for their lasciviousness,—to what is that of men, of the ape, the dog, the bull, to be imputed?

The examples in history of famous men, endowed with this or that particular temperament, prove nothing. These citations bear the character neither of a philosophical mind, nor a uniform law of nature. The temperament of an illustrious man has never been decided beforehand by a physician skilled in philosophy; and I omit, in silence, the prejudices which would have influenced such a decision. Plutarch has never determined the temperament of his heroes, either from his own observations, or the testimony of their contemporaries; yet physiologists of the present day pretend to know what was the temperament of Aristides, Timoleon, Cimon, Dion, &c. Each one endeavors to learn the actions of great men, and then, according to his own hypothesis in regard to the cause of their qualities, he ascribes to them some particular temperament. Innumerable observations induce me to adopt the opinion of Helvetius, who maintains that, with any temperature whatever, a man may, or may not, possess genius. Genius and stupidity are found in the sanguine, bilious, phlegmatic, the fat, lean, weak, and robust. I know both men and women, who, with a hereditary disposition to dropsy, feet constantly swollen, abdomen turgid, the skin cold and spongy, the face pale, and evacuations frequent and slimy, are of an irascible character, quarrelsome, violent, imperious, ardent in love, furious in jealousy and anger, rash in their enterprises, prompt, active and indefatigable in the execution of their projects. I know, on the

contrary, sanguine and vigorous men, who find pleasure in sleep and idleness only; whom neither the allurements of gold, the voice of honor, nor the charms of women, can arouse from their lethargy.

Whenever I read expositions of the temperaments, I imagine myself surrounded by fortune-tellers, such as Porta, Penchel, Pernetti, Huart et de la Chambre, who, if they know whether a person has black, fair, red, stiff, straight or curly hair, hazel or blue eyes, straight or arched eyebrows, the base of the nose wide or narrow, nostrils small or open, lips thick or thin, chin round or pointed, can draw his horoscope, and determine his qualities, his vices and his talents.

As the temperament signifies the general constitution of the body, the influence attributed to it over the faculties and propensities, ought to be universal; but how does it happen, that there is scarcely any one, who is not passionately fond of some things, and wholly indifferent in regard to others? Why do we coldly and without regret give up one object, whilst we strive for the possession of another with untiring perseverance? How does it happen, that a person has astonishing power in one department, and extreme weakness in another, which he has cultivated even with greater assiduity?

Every man who sincerely aims at truth, may at any time convince himself, that the exterior, so far as it reveals the temperament, is not at all in harmony with the faculties and propensities. It is by no means true, that the activity of the vital functions is in direct proportion to that of the intellectual powers; if it were so, these turbulent idlers, debauchees, and jovial fellows, who are so lively, would far surpass, in intellect, men apparently much more calm and sedate.

Where are the functions of organic life more replete with vivacity than in fishes, birds, apes, squirrels, &c.? But are the intellectual faculties of these animals superior to those of man, who has less mobility, or those of other animals whose inferior animal functions are less active? The assertion equally false is, that men formed

like Hercules, always have great courage, and small heads, as Richerand maintains, 8th edit. t. ii. p. 121. Large men have large heads full as often as small men; and experience at all times proves that, men above the ordinary dimensions, are not less distinguished for moral and intellectual faculties, than those of inferior stature. In regard to courage, every observer will acknowledge, that, among other animals, as well as in our own species, the superior in magnitude are often surpassed by the more diminutive. The rabbit of our warrens, although much smaller than the hare, always conquers him; the fighting cock, much smaller than that of our court-yards, gains the victory. The wren puts to flight birds much larger than himself. Alexander, Pepin-le-Bref, and Du-Guesclin, were of diminutive stature. I ask, finally, whether the intellectual faculties and moral qualities of man can be reduced to four or six categories as his temperaments have been; whether, if a man, in other respects healthy, becomes insane, his temperament loses its influence; whether those born idiots should not be registered in some one of the rubrics resulting from the division of temperaments; finally, whether any attempt has yet been made, by means of the temperaments, to account for the propensities and mechanical aptitudes of animals. I would by no means deny, that the particular constitution and the existing state of health, modify the exercise of the intellectual faculties and moral qualities. It is evident, that, according to the state of our health, we are more or less active, more or less susceptible. The mode in which the intellectual faculties and moral qualities manifest themselves, is, therefore, modified by the temperament. But the admission of this modification is a very different thing from deducing a particular, determinate and fundamental quality from a particular temperament.* The

* Richerand thinks to oppose organology by the following remarks: "Reduce by bleeding this intrepid warrior who has braved death in twenty battles; you make him weak and pusillanimous; in vain will

state of our health evidently affects our five senses, and yet nobody has ever conceived the idea of deducing the sight, or hearing, from our constitution or our temperament.

From what has been said, it is manifest, that we are to seek in the brain only, for the cause of the inclinations, propensities, mechanical aptitudes, affections, passions, moral qualities, and intellectual faculties; that we cannot find it in the nervous plexus and ganglions of the chest, and lower belly, in the nerves and organs of the senses, in the whole body taken collectively, nor in the temperaments. There remains the brain only, the noblest of all nervous systems. Hence I have, thus far, proved negatively, that the brain must be exclusively recognized as the organ of the moral and intellectual powers. I now proceed to the direct and positive proofs of this assertion.

The brain is exclusively the organ of the instincts, propensities, sentiments, and talents, of the affective and moral qualities, and the intellectual faculties.

I shall not, in this part, adduce all the proofs of this proposition: I shall bring forward many of them in the treatise on the functions of the five senses, and in dis-

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his cranium exhibit then the bump, which Gall is pleased to consider indicative of bravery."

This result must ensue according to every hypothesis, by which the exercise of the functions of the mind is made dependent upon any particular part of the body whatever. When every other part of the body is enfeebled, is it to be expected that the brain alone will preserve its energy?

Besides, Richerand may be reminded of Chevalier Bayard, who, oppressed by the pains of a long fever, did not cease to seek for battles, *and would not have lost, for ten thousand crowns, the good fortune* of fighting with the redoubtable Spaniard, Soto-Mayor. (*Vie de Bayard*, liv. ii. p. 93.) Who cannot recal a thousand other examples capable of proving to Richerand, that our warriors, weakened by their wounds and fatigues, were not the less vehemently urged on, till their last breath, by their ruling passions—glory and bravery?

cussing the origin of our moral and intellectual powers, especially in proving the dependence of their manifestation upon material conditions. What I shall say afterwards of national heads, and of the plurality of cerebral organs, in the particular exposition of the fundamental powers and the seat of their organs, will serve to confirm this principle. I shall here confine myself to some proofs, founded upon comparative anatomy and physiology, and upon pathology.

First Proof.

The gradual approach to perfection among animals, from those nearest to the vegetable kingdom, up to man, furnishes a proof, which would alone be sufficient to establish my assertion. In animal plants, zoophytes, and, generally, in all living beings without nerves, we as yet observe nothing analogous to a mechanical aptitude, an instinct, or a propensity. Human monsters, also, born without brains, are exactly in the same condition. Sensibility and its simplest phenomena appear with ganglions and nerves, which from them derive their origin. But yet these functions belong to vegetative life, to nutrition and motion.

In proportion as the ganglionic system is perfected, and a small brain is perceived above the œsophagus, we observe the manifestation of some instincts, and innate ingenuity. Bring the nervous system to a higher degree of perfection, furnish more acute senses, and a more perfect brain, and you observe, with admiration, the mechanical aptitudes and marvellous instincts of bees, ants, and other insects. By degrees you come to fishes, and amphibious animals, whose brains are generally composed of several ganglions, serving the purposes of the olfactory, the gustatory, the visual nerves, the fifth pair, &c.: the hemispheres of the true brain are yet very small, but varied according to the various faculties of the species. In birds, the hemispheres are much more

perfect, and the more so in proportion to the number of the qualities of the species. The brain of the hen is less perfect than that of the parrot. On coming to mammiferous animals, we find their brains more and more complex, according to the number and energy of their instincts, propensities, and intellectual faculties; the brain of a hare differs greatly from that of a dog; the brain of an ox from that of a horse. At last comes man, who is endowed with reason and liberty, and who is elevated above all the rest of the animal kingdom, wholly in consequence of the many cerebral parts bestowed upon him. To give some idea of the gradual difference in brains, I have delineated, in my large work, those of several different animals. Fig. 1, pl. xxxiii. represents the brain of a frog, with its spinal marrow; fig. 2, that of a hen; fig. 3, the brain of a kangaroo; and fig. 4, that of a lion; plate xxxiv. fig. 1, the brain of an ape; fig. 2 and 3, that of an orang-outang. Plate iii. the brain of a calf; plate vii. the brain of a sheep. Plate iv. is intended to facilitate the comparison of all these brains with each other, and with that of man.

The gradual perfecting of the mechanical aptitudes, instincts, propensities and faculties, is, therefore, in direct proportion to the gradual perfection of the brain, and not at all to that of the other parts of the body, such as the viscera, the ganglionic nervous systems, &c. From this it necessarily follows, that the brain alone is the organ of all the qualities and all the faculties.

Second Proof.

The manifestation of the moral and intellectual powers cannot take place, except with the development and energy of the brain and its different parts.

In new-born infants, it is difficult to discover, without previous maceration in spirits of wine, any traces of fibres in the large masses of gray and reddish substances of the great cerebral ganglions, which strengthen and

perfect, or as others think, put into action the hemispheres. The nervous fibrils are visible in the middle and posterior lobes earlier than in the anterior. In the same manner, the fibrous structure is discernible, by the naked eye, in the cerebellum, only by degrees, and in proportion to its development. All the nervous fibrils, at this early stage, are so submerged in gelatinous substance more or less red, and among the blood-vessels, that the whole brain has the appearance of pulp or gelatine.

The only functions of a child at this epoch, are those of the five senses, which are as yet very imperfect, and that of voluntary motion, hunger, the sensations of ease and pain, and the want of sleep.

After some months, those parts of the brain situated towards the anterior and upper region of the forehead, increase more rapidly than the other portions. The forehead of the child, from its previous flattened form, projects forward, and it begins to fix its attention upon external things, to compare them, to form abstract ideas, and to generalize.

By degrees, the entire cerebrum becomes more and more developed until between the ages of thirty and forty, when it arrives at its maximum relative to each individual. The cerebellum also, which, relative to the cerebrum, is small in proportion to the degree of youth, is developed and perfectly formed between the ages of about eighteen and twenty-five. The youth of both sexes feel an interest for each other; the talents and propensities manifest themselves, are brought into action, and approximate towards perfection, until the age of complete maturity. From about thirty to forty, both cerebrum and cerebellum remains nearly stationary until the age of fifty, sixty, or seventy years, according to the individual constitution. The same takes place with regard to the moral and intellectual powers. In the mean time, certain cerebral parts, especially those situated towards the anterior and lower region of the forehead, have begun to diminish; and a more treacherous

memory, and a less ardent imagination first remind us of the approach of old age, and the decline of our faculties.

Finally, the whole cerebral mass gradually loses its nervous turgescence; it diminishes, becomes meagre, and shrinks: the consistency of its two substances is changed. The moral and intellectual powers decline in the same proportion; propensities and talents disappear; the affairs of the world assume a different aspect; for, times past only afford us any pleasure; and at the age of decrepitude, nothing remains but the foolishness and weakness of second childhood.

Since the development of our propensities follows that of the brain, step by step, and these powers exist and decline in the same degree that the brain maintains or loses its perfection; the brain must necessarily be the organ of our moral qualities and intellectual faculties.

Third Proof.

In some instances nature makes an exception to her usual course; sometimes the intellectual faculties appear with all their vigor at the age of infancy. There are some individuals in whom the precocious development seems to extend to all the faculties; in others, it is confined to one. On the other hand, we see examples of individuals, who appeared imbecile, until the age of twelve or fourteen, and who, nevertheless, after this epoch, have not only had their faculties unfolded, but have become distinguished men. How are these phenomena to be explained?

The development of the rest of the body bears no proportion to that of the intellect; *prodigies* are indeed almost always children of a feeble constitution. Those endowed with a particular talent for one department, for example, music or mathematics, are seldom physically different from other individuals at the same age.

It is very different with regard to the development of the brain. The precocious development of the intellectual faculties, is always accompanied by a precocious development of the brain; these remarkable children therefore have very large heads.

The observations which I have had occasion to make during a long course of years, have convinced me, that when there is but one faculty prematurely developed, the organ of this faculty alone is found developed in the same proportion.

When the development of the faculties has been late, it is because there existed, previous to the epoch of development, a cerebral weakness, a disposition to dropsy, or a real dropsy in the brain, &c.

In treating of the innate dispositions, I have cited many examples which apply to what I have just said; I shall adduce still more, when I treat of the plurality of organs, and of the fundamental qualities in detail. Every one must perceive, that these examples can be explained only upon the hypothesis, that the brain is the material condition of all the faculties, both moral and intellectual.

Fourth Proof.

Woman generally possesses certain qualities and certain faculties in a more eminent degree than man, whilst man has the superiority in regard to other qualities and faculties. The individuals of the same family or the same nation, are distinguished from each other, both with respect to moral character and intellectual capacity; different nations have the same moral and intellectual character. Whence arise these differences? Can they be explained by diversities in the viscera, the plexus, the nerves, or the ganglionic nervous system? Certainly not. But study the different forms of the brain, the craninm and the head, and you will perceive a direct relation existing between these different propensities and talents, and the cerebral organization. You will

see that woman generally has the posterior part of the head more elongated than man; that the latter has the higher and broader forehead. You will perceive, that different cerebral parts are more developed in some individuals than in others; you will be convinced of the same circumstance in the brains and heads of different nations, and this information will reveal to you the material causes of phenomena so diversified. In treating particularly of the organs, I shall describe these differences in detail. All this proves, that the cause of the moral qualities and intellectual faculties must be sought in the brain.

Fifth Proof.

Neither the cerebrum nor the cerebellum is indispensably necessary to automatic or organic life. Even in different species of mammiferous animals, the upper part of both hemispheres, the great commissure of the two hemispheres, and indeed more than half of the hemispheres both of the cerebrum and cerebellum, may be cut, destroyed by suppuration or dropsy, compressed, affected by atrophy, or removed, without necessarily causing death or preventing the senses from performing all their functions. We see some children, born vigorous and thriving, who live some time, although from the first wholly destitute of brain. Some animals, as fishes, insects, &c. are endowed with an extreme vivacity, although their brain is exceedingly small. The activity of the brain of the fœtus, while in the womb, is very much restrained, and yet, in comparison with the other periods of life, the body of the child is very rapidly developed within the mother. During sleep, when the brain, in regard to its special functions, is at rest, the body continues to live, and all the functions of organic life are perfectly performed. In mental diseases, when the brain frequently suffers considerable changes, the vital functions often continue in all their activity. Insects, sala-

manders and tortoises continue to live a considerable time, after having been decapitated. *

Since the whole brain is not appropriated to organic life, to nutrition, circulation, the excretions and secretions, the voluntary motions, the functions of the senses; and since, of all the nervous systems, it is the most voluminous, and the most perfect, is it not natural to infer that its purpose must be the most noble, the most elevated, that of rendering effective the qualities and faculties which admit of explanation by no other system?

Sixth Proof.

In my endeavors to prove that the mode, in which the faculties of the mind manifest themselves, depends upon material conditions, I have relied upon the fact, that the faculties of the animal are essentially the same, whenever there is no essential difference in the structure of the brain. This proof serves, also, to show, that the brain is the organ of the mind. All human brains, if they are not naturally defective, exhibit the same parts and the same principal convolutions; they are distinguished from each other only by the relative proportions of the convolutions, and by some differences in accessory convolutions. Hence the reason why men, in all countries and in every age, have essentially the same propensities and the same faculties. All the differences in this respect are but slight. Hence, as I find in the brain of the negro, the same parts as in that of the European, it is certain, that they both occupy the same degree in the scale of the animal kingdom.

If, at some future day, naturalists should become better acquainted with the structure of the brains of animals, they may perhaps find in the brain the surest principle for the division into genera. All the species and all the

* Sömmering Hirn und Nervenlehre, p. 368, etc.

individuals of the same family have essentially the same brain; for the principal convolutions do not differ. The brain of the lion or the tiger, in regard to its principal convolutions, is the same as that of the cat; the brain of the wolf, the same as that of the fox, the dog, and all the canine varieties, whatever differences may be found in the external forms of these animals; for, how remarkable is the difference between the form of the terrier and that of the grey-hound! Therefore the essential qualities of these species are the same, and the differences observable in the faculties of the varieties, arise wholly from the various degrees of development in the different cerebral parts, as I shall show, when I treat of the primitive powers and their organs. All mammiferous animals, with some modifications, have the same viscera; therefore, if the intellectual faculties and moral qualities depend upon the viscera, they should all have the same faculties and the same qualities. In all cases, when animals are found to have different qualities and faculties, comparative anatomy observes essential differences in their brains. These circumstances furnish an irresistible proof, that the brain alone is the organ of the intellectual faculties and moral qualities.

Seventh Proof.

Every one knows, that the operations of the mind take place in the head. The impressions, and the ideas which give rise to the affections or excite the passions, have their seat in the brain. An excessive exertion of the mind particularly, fatigues, exhausts and irritates the brain; and, if it is continued too long, one at last imagines, that, with his eyes shut and in obscurity, he sees external objects so distinctly, that he can with difficulty dispel the illusion; from thence follow watchfulness, pains in the head, vertigo, syncope, apoplexy, weakness of the stomach, inflammation of the brain, acute and chronic hypochondria, paralysis, &c. &c.

When one is afflicted with headache, every thing that fixes the attention or requires intense thought, instantly augments the pain. When the brain is enfeebled, or rendered too irritable in consequence of an injury, a disease, or a violent concussion, the least application causes headache, or occasions a tension or burning heat in that part. A man, after having been cured of a wound in the brain, still experienced a dull pain, and itching, and a sensation of torpor in the region of the wound. The least application increased this pain: the torpor in this case extended to the other side of the head; if the exertion of mind was prolonged, he felt pains more and more acute, until at last he became delirious, and the whole of one side was paralyzed.

Eighth Proof.

The experience of all ages proves, that when the moral qualities and intellectual faculties are exercised with much energy, there is almost always a great development of the brain or of some of its parts. The ancients, indeed, if they wished to represent a man endowed in a high degree with the most noble intellectual faculties, give him a very elevated forehead; because the intellectual faculties of the soul are seated in the anterior and upper part of the head, (compare the cranium, pl. xxx. of a man distinguished for his talents, with those of idiots already cited;) in this they were apparrently guided by observation. If they represented a wrestler, a Bacchus, a Silenus, &c., they placed all his faculties in the posterior part of the head, and in the nape of the neck. As I have already treated of this subject in the first volume, and shall subsequently consider it in all its details, I shall at present dismiss it without any farther observations.

Ninth Proof.

On the other hand, when I spoke of the influence, that the state of the organs has upon the mode in which the moral and intellectual faculties manifest themselves, I cited several examples of defective, incomplete organization of the brain; and I observed that this imperfection was always accompanied with a proportionate imbecility.

The brain, described by Willis, pl. xviii. fig. 2; two others, examined by M. Bonn, at Amsterdam, pl. xix. fig. 1; a fourth, the cranium of which is in the possession of M. Pinel; a fifth of the same kind, found in the collection of the School of Medicine at Paris; two similar ones, in my own collection, pl. xviii. fig. 1, and pl. xx. 1, 2, belonged, without exception, to persons completely imbecile from birth. These brains contained not more than a fourth or fifth part of the ordinary mass in man, although the individuals had attained the age of seven, eleven, twenty and twenty-five years.

When the imperfection is less marked, the imbecility is less complete in the same proportion. At Heidelberg, a girl nine years of age, whom I mentioned when treating of the innate dispositions, had about half the usual cerebral mass; she showed affection for her relatives, played, without knowing any better, with the most insignificant objects, talked in broken phrases, &c.

A boy sixteen years of age, living at Hamburgh, had the inferior-anterior parts of the forehead well developed, but the whole forehead was scarcely an inch in height, so that the anterior and superior frontal parts were either wanting or had not been developed. He learned names, numbers and history, and was able to recite mechanically what he had learnt. But he was absolutely devoid of the faculty of combining, comparing, judging, &c. I have seen a similar instance at Paris.*

* Richerand cites two similar cases, *Nouveaux elemens de Physiologie*: 7 edition, t. ii. p. 193. In treating particularly of the fundamental

As this defect of the brain was not accompanied by any defect in other parts of the body, except such as are met with in others as often as in idiots, the imbecility more or less complete of such individuals, must be attributed to the imperfect development of the brain, which, therefore, ought to be considered as the organ of our moral qualities and intellectual faculties.

Tenth Proof.

Provided the brain is left untouched, all the other parts may be affected by disease, or separately destroyed; even the spinal marrow, at a certain distance of the brain, may be compressed or vitiated, without immediately injuring or annihilating the functions of the mind. In madness and tetanus, when it is caused by wounds, we sometimes see the intellectual faculties and moral qualities continue in all their vigor until death, although the nervous systems, except the brain, are most violently affected. I shall have occasion, hereafter, to speak of the influence, which diseases of the viscera have upon the brain.

Eleventh Proof.

If, on the contrary, the brain is compressed, irritated, injured or destroyed, the intellectual functions are either modified and totally or partially deranged; or they cease to exist altogether. A man who suffers these accidents, falls asleep, becomes insensible, stupid or insane; a cerebral inflammation produces delirium or stupor. If the disorder of the brain disappear, the compression be

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qualities, I shall show that the anterior-inferior parts of the brain perform the functions here attributed to them, and that the anterior-superior parts, on the contrary, are destined for the more noble faculties.

removed, the extravasated blood or the pus be evacuated, or the cerebral inflammation allayed, consciousness and the power of thought revive, and sometimes even instantaneously.*

These considerations are of the greatest importance to the medical art, especially in judging of mental diseases; and as they afford me, at the same time, an occasion to rectify the uncertainty which exists in the works of physicians and physiologists, in regard to the seat of alienation, I shall stop to avail myself of some examples, in which the viscera can have no influence upon the brain; which examples, consequently, fix our ideas relative to the seat of derangement, irrevocably in the functions of the moral qualities and the moral and intellectual faculties.

Hildanus reports the case of a boy, ten years old, whose skull had been depressed by an accident; as no particular symptoms appeared, no remedy was applied to the depression. In the mean time, this individual, who had previously shown excellent capacities, gradually lost his memory and judgment: he became completely stupid, and remained so until he died, at the age of forty.

Another boy, about nine years of age, was attacked by a violent pain in the head, accompanied by fever; the cause of his disorder was probably misunderstood: he recovered by degrees, but very imperfectly. Soon after he was observed to lose gradually his former vivacity, and the amusements of his age no longer interested him. Although, previous to his sickness, he had manifested pretty good abilities, he was now far from satisfying the expectations of his parents and teachers. He frequently had convulsions, and in sleep he generally kept his head drawn back: the physicians who were consulted, supposed that he had worms; but I regarded

* M. Sœmmering has already adduced a part of these proofs, i. c. p. 371.

his malady only as the consequence of a cerebral inflammation which had been neglected: he died, at the age of thirty, in the institution of Vienna, called Theresianum. On opening the body, we found no worms; but all the superior anterior part of the brain, where he had previously experienced pains, was covered with a great number of pseudo-membranes and purulent substances; the cerebral mass was eroded, and the corresponding part of the cranium was more compact and thicker than the rest.

Blanchard, the aeronaut, fell and struck his head; from that time he was subject to attacks of apoplexy, and to a general weakness of the mental faculties: he seemed to have only a confused recollection of his former talents, and he died, at the age of fifty-three, in consequence of an apoplectic fit.*

In a case of autopsy we found the meninges adherent and thicker than usual: among other derangements of the brain itself, we found, as I had predicted, several foci of suppuration in the middle lobe.

A lady of fine talents, in a fall, struck the back part of her head against the mantel-piece of a fire-place. After this fall, she was subject to periodical fits of mania, and insensibly lost all her brilliant qualities. That part of her head, which had been struck, was constantly hot, and, in her paroxysms, she mechanically placed her hand upon the suffering part: at last her malady degenerated into insanity.

At Pforzheim, in the grand duchy of Baden, I saw a man, who, at the age of six years, had broken the whole of the fore part of his skull: he had been cured of his wound, but from that period he was subject to periodical fits of madness.

Another man, living at Weil, near Stuttgard, had his skull broken in by a blow from a stone. Before this accident he had been known as a peaceful citizen; but

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* Gazette de Santé, de 1807, 21 mars, p. 71. Autopsie, Blanchard.

after his convalescence, people saw with surprise that his character was wholly changed: this man, previously so mild, had become quarrelsome, and excited contentions; his cranium, which I preserve in my collection, is thick and very dense, and proves, by mere inspection, how much the brain had suffered.

Richerand attended an old woman, whose brain had been to a considerable extent laid bare by caries. One day, while cleansing away the pus, he pressed downwards a little more forcibly than usual; immediately the patient, who, an instant before, answered his inquiries very correctly, became silent in the middle of a sentence: the respiration and the pulse continued: as this pressure occasioned no pain, he repeated it three times, and always with the same result. Each time the patient recovered her faculties, the moment the pressure ceased.

A man who had been trepanned for a fracture of the cranium, perceived, that, in proportion as the pus accumulated in the interval between the removal of successive dressings, his faculties declined, and the consciousness of his existence became more and more enfeebled.*

Esquirol mentions the following cases, in which blows upon the head preceded, many years, the manifestation of the delirium. A child three years old, fell and struck his head; afterwards it complained of the headache; it grew up, and at the age of puberty the pain in the head increased, and insanity appeared at the age of seventeen. A lady, returning from a ride on horseback, struck against a gate, and was thrown from her horse; some months afterwards she became insane, and was cured, but died, at the expiration of two years, of a brain fever.

Similar facts induced Boerhave to maintain, that when the brain is pressed by the bones of a fractured crani-

* Nouveaux Elémens de Physiologie, 7 édit. t. ii. p. 195 et 196.

um, the consequences are vertigo, drowsiness, and the loss of consciousness. Morgagni, Haller, and others, cite in their works many instances, in which inconsiderable injuries of the brain disturbed the exercise of the intellectual faculties.

In all the cases which I have hitherto mentioned, the rest of the body was in a healthy state; consequently the phenomena observed, cannot be imputed to any foreign influence. These facts prove, then, in an irresistible manner, that the manifestation of the moral and intellectual faculties essentially depends upon the brain.

Cases, in which an injury or violent concussion of the brain has awakened into exercise all or some of the intellectual faculties, still further confirm what I have advanced. The account given of Mabillon, (already cited in the first volume,) is well known. Until his eighteenth year, he could hardly talk, and could neither read nor write. On account of a fall, it was found necessary to trepan him; during his convalescence, Euclid fell into his hands, and he made a very rapid progress in the mathematics; so certain is it, that a simple irritation of the brain is capable of exciting the moral and intellectual faculties.

In the same volume, I have reported the case of two boys of small capacities, whose powers were developed by a fall. Even the moral character of one of them suffered an unfavorable change.

In the same part of my work, I have spoken of a young man trepanned by Acrel, who, before his mishap, had felt no inclination to theft, and who, after his recovery, was impelled to it by an irresistible propensity.

Haller mentions an instance of one born an idiot, who, by a wound on the head, was cured of his imbecility, but who relapsed into his former state after his wound had cicatrized.

In these cases, also, we cannot suspect the brain to have been influenced by any viscus whatever.

Twelfth Proof.

I shall add some further observations, to prove that insanity has also its immediate seat in the brain. This point demonstrated, will demonstrate with equal force that the moral and intellectual functions are seated in the brain; since functions in their healthy state can have no place, except where the derangement of them manifests itself.

Mania generally arises from causes, which act immediately upon the brain. Such are a concussion, a wound, an inflammation of the brain, an organic disease of the brain itself, or of the meninges, an asperity on the internal surface of the cranium, a uniform and too long continued exertion of the mind, a project long pursued which happens to fail, disappointment in a long cherished hope, unbounded pride or ambition, wounded vanity, frustrated love, jealousy, exalted ideas either religious or superstitious, excessive circumspection and timidity in the execution of a project, a contest between principle and sensuality continued to excess; in a word, the numerous moral causes. "Hence it happens," as Pinel very judiciously remarks, "that persons of either sex, endowed with an ardent imagination and profound sensibility, those susceptible of the strongest and most energetic passions, are most disposed to mania, unless a sound, active, and energetic reason has learnt to counterbalance this furious impetuosity; a sad reflection, but invariably true, and well calculated to excite an interest in favor of those who unfortunately suffer under an alienation of mind."*

For the same reason, the experience of all ages proves that ecclesiastics, monks, artists, for example, painters, sculptors, musicians, and poets, lawyers, especially when

* Sur l'alienation mentale, 2d edit. p. 141.

they indulge in excesses of any kind, are more subject to mania, than those whose occupations offer greater variety and allow more tranquillity of mind, such as naturalists, philosophers, chemists, geometers. This accounts also for the fact, that all those predominant opinions, prejudices, and great events which engross the whole attention, which act powerfully upon the moral nature of man and deeply interest the mind, and which favor fanaticism, political or religious, so often produce mania.

The usual termination of incurable mania proves, with equal force, that its immediate seat is in the brain. When it continues many years, the cerebral mass is diminished, the cavity of the cranium contracts, and incurable dementia is the result. If, at the commencement of the disease, remedies too debilitating have been used, as very frequent and contraindicated blood-letting and purgings, it often degenerates into dementia. This imbecility of mind, in some manner artificial, is not always absolutely incurable; sometimes it yields to a more moderate remedy, sometimes nature herself effects a cure by means of a violent fit of frenzy or fever, &c. In all these cases, upon examination after death, the brain and cranium exhibit the most unequivocal marks of the changes that have taken place, as I shall prove in treating of the influence of the brain upon the cranium. What proves still more evidently that this dementia, and consequently the preceding mania, had their seat in the brain, is, that as soon as the mania manifests itself, the functions of vegetative life operate with more than usual activity. The person sleeps better, has a better appetite, digests more easily, and gains flesh; all the vegetative functions, in short, are better performed than ever, whilst the brain is deteriorated and its functions enfeebled. If dementia had its seat in any part appertaining to vegetative life, ought it not to disappear in proportion as vegetative life recovers its activity?

What adds weight to my assertion, is the fact, that mania is frequently accompanied by paralysis and apo-

plectic symptoms, and experience proves, that, in all these cases, it is incurable; and undoubtedly for this reason, that the first cause of the disease is constantly augmenting, and the vital injury produces successively organic injuries, effusions, agglutinations, adhesions, and compressions which daily become aggravated.

Finally, the kind of death which maniacs suffer, affords to the enlightened physician an irresistible proof, that mania, in all the pathological forms which it assumes, has its seat in the brain. Apoplexy, paralysis, epilepsy, cerebral inflammations, nervous fevers, both acute and slow, most remarkable changes in the viscera of the thorax and abdomen, are maladies which attend a wound, concussion or inflammation of the brain. These changes are a necessary consequence resulting from debility in the functions of the parts affected, and of all the cellular tissue; a debility which occasions a diminution of all the solids and fluids, and which is followed by the scurvy, obstinate diseases of the skin, sloughs, carbuncles, gangrene, cancerous ulcers, decomposition of the fluids, and involuntary discharges.*

Observations upon the objections to the doctrine, that the brain is exclusively the organ of the moral qualities and intellectual faculties, and upon the doubts opposed to it. Refutation of these doubts and objections.

I shall continue the subject upon which I have been occupied, and begin by refuting the objections to the assertion, *that insanity has its immediate seat in the brain.*

To prove that the seat, both of the regular functions of the mind and of their derangement, is in the brain, I have cited many cases, in which injuries of the brain have been followed by derangement of its functions. It

* Dictionnaire des Sciences Médicales, t. xvi. p. 209. *Esquirol.*

is pretended, that an equal number of observed cases may be arrayed against me, in which the most considerable injuries of the brain have not induced the least derangement of the mental faculties. A man was shot in the head; the ball was arrested in the brain; after his death it was found upon the pineal gland, nearly in the middle of the cerebral mass. This man, however, had lived many years, without experiencing the least diminution in the vigor of his mental faculties.* A boy, eight years of age, had his skull fractured by the kick of a horse; there came out pieces of the cortical substance larger than a hen's egg; this individual was healed of his wound, and his mental faculties suffered no injury.† Another boy, seven years old, fell from a horse, and made a large opening in his head, from which issued excrescences of the brain that were constantly renewed; his mental faculties did not experience the least alteration, and yet the ulcers had penetrated even into the substance of the brain.‡ A youth, fifteen years old, received a blow from a stone upon his head; the brain became black and protruded from the wound; being intoxicated with wine, he tore off the dressing, which brought away with it a large portion of the brain; it was found vitiated as far as the great commissure of the two hemispheres; the patient became paralyzed, but his mental faculties did not suffer in the least.§ A girl, aged thirteen, in a violent attack of the cramp, lost two ounces of cerebral substance through an imperfectly cicatrized wound in the head; all her limbs were indeed paralyzed; but she retained her judgment and the faculty of speech until the fifth day, when she died.‖ A boy, who had a wound upon his head, lost, in the space of four months, a considerable quantity of brain, by excrescences which

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* Mémoires de l' Academie de chirurgie, t. i. p. 134.
† Mémoires de l' Acad. de chirurgie, t. i. p. 126.
‡ *Van Swieten*, t. i. p. 440.
§ Mémoires de l' Academie de chirurgie, t. i. p. 2—150.
‖ Medical Essai, t. ii. p. 245, 249.

were often removed; at the seat of the wound, the cortical part was wholly destroyed; the space, partially void, was completely enveloped with pus, and yet the patient talked rationally till the moment of his death.*

Mr. Tupper relates the following facts:

A child, six years old, received a pistol-shot in his head; a suppuration followed, which, every time the wound was dressed, caused the discharge of a large quantity of cerebral substance. The child died at the expiration of eight days, having retained his faculties to the last moment. The head, being opened, did not contain a portion of brain larger than a small hen's egg!!

Another, after a disease of twelve years, died without ever having been deranged. After his death, the whole cerebral substance was found so soft, so filled with water, that it could not be cut without great difficulty. The spinal marrow was also very soft, and had lost half its volume.

Mr. Tupper, who cites these observations from M. Ferriar, who makes use of them to confound materialism, and to prove that the mind exercises its intellectual and moral powers independently of organization, quotes M. Ferriar's own words.

"A girl died on the fourth month of an arthritic disease, with evident signs of a compression of the brain; but her intellectual faculties remained unimpaired. On removing the scalp from the cranium, before opening the dura mater, I was surprised at the flaccidity of the brain. It seemed but imperfectly to fill its membranes, and offered but a slight resistance to the touch. The patient had been dead only twenty-four hours. We found the ventricles filled with water, and an effusion of blood on the right side of the tentorium. But the principal malady appeared to consist in a total change in the consistence and color of the entire brain. It was im-

* *Nau Swieten*, t. i. p. 440.

possible to handle it or cut it; every thing was in extraordinary confusion."* Lallemand speaks of an examination, reported by Diemerbrœk, of a female domestic, "who experienced a comminutive fracture on the right side of the coronal suture, occasioned by a stone at least thirty pounds in weight. Fragments were forced in, and the brain was wounded. Two days after the extraction of the fragments, the brain being laid bare, began to issue through the wound, gradually acquired the volume of a goose egg, and separated, diffusing an infectious odor. A new portion of the brain protruded, sloughed, and was replaced by another; so that in the course of the treatment, a portion of the brain as large as one's fist, was destroyed by putrefaction. Nevertheless, the patient lived thirty-six days, and during all this time retained the use of her reason, and the functions preserved perfectly their action, except that only the whole left side of the body, opposite the wound, was affected once or twice with convulsions, and remained constantly paralyzed from the first; she also had the hickups.

"After death, a large cavity was found in the brain, instead of the portion which had issued from the wound. The putrid affection had extended even to the ventricles of the diseased side. In this case there is no doubt of the existence of gangrene.

"The symptoms were the same that we have observed in almost all other cases of inflammation of the brain, except the continuance of reason till the last moment; for that side of the body opposite the disease was affected with intermittent convulsions and paralysis."

Authors have carefully collected such examples, either to contradict the received principles of certain physiologists, or because they are fond of the marvellous, and are not sufficiently impressed with the principle, that the exercise of the intellectual faculties is impossi-

* Inquiry into Dr. Gall's System, p. 752.

ble without organization, and especially the organization of the brain.

It is said, that there are instances equally numerous, in which the mental faculties were deranged in a very striking manner, and yet no disease was observable in the brain. Other cases also are cited, in which irritation that had its seat in the stomach, the intestines, the liver, or in any other part beside the brain, has produced considerable derangements in the mental faculties.*

It is inferred from these facts, that, if an injury or disease of the brain induces derangements in the mental faculties, this by no means authorizes the conclusion, that the brain is exclusively the seat of these faculties.

To rectify these facts, partly true, partly false, and to appearance contradictory, we must begin by resolving the two following questions: 1st. Have individuals, hitherto, been qualified to determine, with accuracy, the imperfections, injuries, and diseases of the brain? 2d. Have they been capable of fully appreciating the consequent effects?

Have individuals, hitherto, had the knowledge necessary to determine accurately the imperfections, injuries and diseases of the brain?

It is impossible to make accurate pathological observations upon a part, of whose structure we are ignorant, and upon which we have only false ideas.

Richerand rejects the observations made by Greding, upon the brain of deranged persons, because, says he, this observer was not sufficiently acquainted with the organization of the brain.†

Yet from the time of Greding to that of Richerand, the knowledge of the brain has not undergone any re-

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* *Pinel*, de l' Alién. ment. p. 453 et 454.
† Physiologie, 7th édit. p. 191.

markable change. Greding speaks of the brain, in the same spirit as those at present speak of it, who think they must disdain our discoveries. He designates all the parts with the same names as are used by anatomists of the present day: we have proved, in its proper place, that the structure of the brain was not better known in France than in Germany. Besides, Greding recorded so great a number of autopsies, that he was able to arrive at indisputable results. It is now but a few years, since the autopsies of the French physicians, far from being sufficient to establish the principles of the German observer, were insufficient even to verify the accuracy of them.

What knowledge of the pathology and physiology of the brain, can we suppose anatomists of the present day to possess, when we see Malacarne, Reil, and Tiedemann, maintain that the cerebellum is composed of a less number of follicles, than that of persons who have their mental faculties entire; when we see cases of common hydrocephalus continually cited, in which the cranium is entirely destitute of cerebral substance, and filled with water only; when we see others coincide with Morgagni in the assertion, that a cerebral substance too firm, occasions incoherence of ideas, and when it is too soft, sluggishness of ideas, and consequently fibres too tense produce insanity, and fibres too lax, imbecility? People also speak with Dumas, of the rounded form, which they pretend to observe in the brain of persons endowed with remarkable intellectual faculties, of a more or less deep color of the brain, according as the inclinations of the deceased were more or less mild. Others, besides Dumas and Richerand, find the brain indurated after death. The account related by Theophilus Bonnet is still copied, according to whom the brain of a man, who, after having a delirious fever, had become maniacal, was found hard, dry, and friable between the fingers: it is still maintained, that deranged persons remarkable for their obstinacy, had hard and tough brains, whilst those of a flexible character had soft brains. In accordance

with Portal,* the brains of deranged persons are still found to have convolutions less deep than those of other men. The same author pretends to have seen the cerebral cavities invested with the vascular membrane only, so that the least incision made in this membrane, penetrated into the lateral cavaties.† We yet hear men continually speaking of cerebral dissolution in hydrocephalus, of ossified and even petrified brains.

In my numerous investigations of the brain, I have never found any similar phenomena; with the exception, however, of one single well-formed cranium, of a still-born child, which I found filled with water, without being able to observe the least trace of a brain. If physicians, who allow themselves to be dazzled by the splendor of certain names, find nothing similar in the brains of deranged persons, does it follow that these brains have suffered no deterioration whatever?

If one is not accurately acquainted with the structure of the brain, he may frequently suppose that an injury, a fungus, or a hydatid which he discovers, is found in the fibrous part of the brain itself, while it really exists only between the convolutions, or between the two hemispheres. How frequently do authors tell us, that pieces of the gray substance, a cubic inch in magnitude, or even as large as a hen's egg, have protruded from the cranium! and yet throughout the surface of the brain, the gray substance is scarcely a line in thickness. Sometimes it is thought, that this same substance is destroyed, when it is only discolored. In blindness, it is pretended that the optic thalami are affected with atrophy; but we have proved, that the optic nerves do not arise from the optic thalami, and that consequently atrophy can extend to the optic nerves only, which are merely adherents to the pretended optic thalami. In diseases of the optic nerves, a diminution in the anterior pair of the quadrigemina is never mentioned, although we have seen nume-

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* Anatomie medicale, t. iv. p. 67. † Anatomie medicale, t. iv. p. 76.

rous instances of it.* We hear much said about regeneration of the cerebral substance, excrescences of the brain in wounds of the cranium; and all seem to be ignorant of the fact, that, when the convolutions are unrestrained by any external resistance, they unfold themselves and penetrate through the opening; this is the reason why, in such cases, we find the cerebral cavities enlarged. I saw, in a boy, thirteen or fourteen years old, a cerebral hernia, caused by a blow upon the head, which had produced a separation of the bones of the cranium; the physicians were so confident that it was water between the meninges and the brain, that they advised a puncture, which would surely have caused immediate death. What confidence can we have in accounts of diseases and imperfections of the brain, drawn up by men who are so far behindhand in regard to pathological knowledge?

If, in some mental diseases, no discernible unsoundness is perceived in the brain, it does not prove that there really exists no alteration. What anatomist perceives any change in the fibres of the brain, or in the nerves, when these parts become paralyzed? Is any alteration perceptible in certain kinds of convulsion, in tetanus, violent concussions of the brain or spinal marrow, in the extinction of all irritability, by violent affections or by lightning? When the gout, measles, and scarlet fever attack the brain, are any traces of their miasmata discoverable in that organ? Finally, are not the functions of other parts frequently as much disturbed as those of the brain, without a possibility of discovering any sensible vestige of this derangement?

Let physiologists and physicians place themselves in a more elevated point of view; let them consider, that the subject of their observations is not a lifeless machine, in which all the derangements must manifest themselves

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* Anatomie des nerfs des sens, t. i. p. 82 et 83. édit. in-fo; p. 115 de l'édit. in 4.

by visible, mechanical, or organic imperfections! We have to do with life; we shall never ascertain what life is; consequently, we can never, by means of our senses, know what disturbs or causes it to cease. Mechanical or organic derangements are subordinate to those which affect life: the former are mere consequences of the latter; and the life of a part or the whole of the body, may be attacked without any visible organic derangement.

This shows why, when a mental disorder has been of short duration, it frequently happens that not the least trace of it can be found by an examination of the remains; whilst, on the contrary, when the same kind of alienation has been of long continuance, the most marked changes are perceptible in the brain, the meninges, and the cranium: for instance, ossified vessels, a diminution of both cerebral substances, deposition of osseous matter on the internal surface of the cranium, excrescences of the cranium, &c.; results of a change inappreciable by the senses, which that power has undergone, upon which life and its functions depend.*

Sometimes, indeed, considerable injuries of the brain do not disturb its functions so much as might have been expected, and at others, the slightest injuries are followed by the severest effects. But the same thing occurs in other parts: we frequently find in the lungs large sacs of pus, without the respirations having been sensibly incommoded, or the health having sensibly suf-

* M. *Royer-Collard* (Bibl. Médicale, April, 1813) is therefore under a mistake when he says, "After a fall upon the head, which happened to the patient in his infancy, the hemiplegia which this fall had occasioned, the continued weakness of the whole left side, and the mental alienation which manifested itself after all these accidents, was it not natural to regard this alienation, as the effect of an organic injury of the brain? Does not this opinion appear incontestibly confirmed by the nature of the alienation, its uniform course, and its almost evident incurability? But what is most astonishing, is the perfectly sound state of the cerebral system." Fodéré is equally wrong, in concluding from similar facts, "that the brain is not primitively injured, on the appearance of the first symptoms of insanity, and that it ought to be considered only as a secondary organ."

fered. Even ossifications have been found in the heart, and yet the individuals never complained of any indisposition during their life. Who would infer from these facts, that the lungs are not the organ of respiration, or that the heart is not that of circulation?

When the irritability or the excitability of the patient is not great, considerable wounds frequently produce no very marked symptoms. On the contrary, when the irritability is excessive, the least injury is followed by the most tumultuous derangements. Physicians have every day opportunities to verify this remark. Every one knows, that doses of medicine should be proportioned to the irritability of the patient; a grain of emetic produces the most violent vomiting in one patient, while four or six grains affect another very faintly. The smallest doses of mercury produce in one a very violent mercurial fever, whilst ten times the quantity produces scarcely any change in the functions of another. Therefore, what pertains to the constitution of the patient, ought not to be attributed to the nature of the disease. From all that has been said, it follows, that very little confidence can be reposed in the reports of physicians upon the imperfections, diseases, and injuries of the brain, so long as the authors neglect to make themselves acquainted with the most recent discoveries upon the structure and functions of the brain. I proceed to the examination of the second question.

Have individuals, even up to the present time, been sufficiently enlightened, to judge accurately of the influence which the imperfections, maladies, and injuries of the brain exercise upon the intellectual faculties?

No one ought to be more strongly impressed with the insufficiency of the notions which have hitherto prevailed, in regard to the intellectual faculties, and the derangements of the faculties, than a physician who undertakes to treat of mental diseases. Mr. Haslam says, "Until

we are better acquainted with the functions of the brain, and each of its parts, we shall be incapable of judging correctly of the derangements incident to these functions, and assigning their degrees." Dr. Powel complains of the imperfect state of our knowledge, relative to the diseases of the brain and the whole nervous system. Pinel despairs of our ever being able to distinguish the different species of alienation; because we are too little acquainted with the functions of those parts in a state of health, the derangement of which occasions alienation.* But why does this learned man, otherwise so distinguished, appear to contemn the researches upon the functions of the brain? I take this occasion to show, that it is only by the aid of these researches, that physiologists will ever be able to remove the difficulties, and extricate themselves from the contradictions, in which they are incessantly involved. The solution of the problem in which I engage, will afford an answer to the question—Where is the seat of mania, dementia, and imbecility?

I pass over in silence those cases, in which physicians like Everard Home have unphilosophically confounded the phenomena of vegetative life, and the inferior phenomena of animal life, with the moral qualities and intellectual faculties. I shall content myself with examining the spirit of those observations, according to which considerable defects, or serious injuries of the brain, have not occasioned the derangement of one of the higher intellectual faculties.

What I have said above, upon the just appreciation of the morbid changes of the brain, is also applicable in this place. To judge correctly of derangement in the intellectual and moral faculties, we must have an accurate knowledge of these faculties. But it is certain, that hitherto very few philosophers have had any correct ideas of the primitive faculties of the mind. I have

* Observations on Madness, p. 237.

ealrady proved this assertion in the first volume, while treating of the animal life of man and other animals, or the special functions of the brain. No philosopher, till the present time, has had sufficiently clear ideas, or sufficiently comprehensive views on this subject; to point out the errors, in the received notions, and to define in a satisfactory manner, the primitive faculties of the mind, or the different functions of the brain. It is, however, only through the aid of this knowledge, that we can properly appreciate the consequences which must result from imperfections or injuries of the brain. It would be digressing from my design, to go into a full examination of this matter here; I shall merely offer to the reader the following observations.

All the accounts of diseases or injuries of the brain, which did not, as is said, occasion derangement of the mental faculties, may be reduced to this: The patient walked, ate, and talked; he did not lose his reason, that is to say, was not delirious; he retained his memory and his judgment, and, consequently, had lost none of his mental faculties. A man had the anterior part of the os frontis fractured by the kick of a horse; although stunned, he answered slowly, and in an interrupted manner, the inquiries of the surgeons. Several hydatids were found in the brain of a camel, which had never ceased to eat or recognize its conductor. Therefore, this man, and this animal, had lost neither consciousness nor any of the intellectual faculties.

Lallemand speaks of examining a brain, which had received an injury on the left side: a large part of the cerebral substance had protruded; the upper and lower limbs on the right side were paralyzed; the sight and hearing on the same side were impaired; and he adds, "It is quite remarkable, that this incipient paralysis of the organ of sense, should have been confined to the paralyzed side of the body; *and because it is certain that the patient saw with one eye, and heard with one ear, we must suppose that he retained his understanding!*"

I repeat with Lallemand, that all the facts of this kind resemble each other so much, that it would be useless to multiply citations, and I refrain from them the more readily, because the greater part of them, having been examined only under a purely surgical point of view, want the most important details relative to the symptoms, and especially relative to the injury sustained by the moral and intellectual powers. And what confidence can be placed in such citations, made expressly with the intention to prove the manifestation of the intellectual and moral faculties, without regard to material conditions, and thus, by a misunderstood course of reasoning, to refute materialism?

The conclusion, intended to be deduced from such facts, would be true, if consciousness, memory, recollection, and judgment, formed alone the sum total of all the intellectual and moral powers of man and other animals. Many animals evidently possess consciousness, memory, and recollection; they often judge very correctly of what is passing around them; but do they therefore enjoy all the moral and intellectual faculties of man? If a man, therefore, by a defect or disease of the brain, were degraded to the state of a dog, or an ape, could it be said that he had lost none of his faculties?

Mr. Tupper, who thinks that, with the loss of any cerebral part whatever, some function of the brain is lost, always uses such general expressions as *reason, intelligence, faculties, some mental alienation*, &c. He never designates a propensity, a talent, or a definite sentiment.

Have those, therefore, who, after a concussion of the brain, an attack of apoplexy, or a cerebral inflammation, cannot remember names, but who recollect every thing else, and retain their judgment entire, experienced no loss?

When one man, whose character had been pacific, became quarrelsome, after having received a blow from a stone on the head, which laid open his skull; when another, whose previous inclinations had been honest,

after having been wounded upon the head, experienced an irresistible propensity to steal; can we say of these individuals, who certainly retained their consciousness, memory, judgment, &c., that their wounds had exerted no influence upon the manifestation of their moral and intellectual faculties?

If, in our inquiries relative to the loss of cerebral functions, we regard nothing but consciousness, memory, and judgment, hardly any cases will be found, except those of complete imbecility and dementia, in which it may be said, that the intellectual or moral functions have been disturbed, or that there exists mania; for the most frantic maniacs retain consciousness, memory, recollection; they commonly judge, with correctness, of their sensations, and their imagination is frequently quite vivid.

What shall we say, in short, of those cases, in which a man is insane relative to one object only, and perfectly rational in regard to all others; or entirely rational with respect to one object, and insane with regard to all others? In both cases, then, consciousness, memory, and judgment, are unimpaired, and in both cases these faculties are deranged.

Suppose a patient has lost one or several of the primitive or fundamental faculties, for example, that of music, how can we ascertain whether the disease has occasioned its loss? How shall we make the experiment relative to each special faculty, to convince ourselves of its presence or absence? What means are there of proving in animals the loss of one of these faculties? We see that captivity alone is sufficient to shackle the instincts and mechanical aptitudes of animals; and shall we confidently decide upon the state of animals grievously mutilated?

Can the patient himself instruct us? That is impossible, except when he has only partially lost a particular faculty, or when this faculty has only been enfeebled. A short time ago, an officer severely wounded above one of his eyes, complained to me that he had lost the recollection of names. But, as I have already

said, it is probable that, when an organ has completely lost its activity, the recollection of the particular kind of impressions, which this organ transmitted to us, becomes impossible.

What shall we say, when there is not an entire cessation of any particular faculty or quality, but a diminution of energy in all, as is the case in decrepitude?

"No importance," says Georget, "is attached to disorders in the functions of the brain, unless there exists a complete want of reason; although an individual is attacked by inability to sleep, cephalagia, moral, intellectual and muscular debility, and sometimes even experiences very marked changes in his tastes, habits, and character; yet, if he reasons, reads, and has some coherent ideas, it is confidently affirmed, especially if there is no cephalagia, that his brain is sound, and that the functions of this organ are not deranged. Observe the inconsistency! If another individual feels a diminution of appetite, a slight disrelish for food, &c., his gastric obstruction is immediately termed a disease of the stomach."*

I pass over in silence the immense influence, exerted by the brain upon the whole animal economy; for, as Georget very correctly remarks, when this organ is diseased, it sometimes occasions the development of sympathetic phenomena, and very serious diseases, sometimes apparently more so than that of the brain itself.

As hitherto these considerations were familiar to no observer, all those observations must be pronounced incomplete and suspicious; according to which it is pretended, that, in cases when the brain was wounded, the moral and intellectual faculties remained unimpaired. Let us see now, whether the information of physiologists prior to the present time, could enable them to fix the seat of mania, and prevent them from eternally falling into contradictions with themselves and with nature.

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* T. ii. p. 204, 6, p. 205.

Further researches upon the seat of mania. New proofs, that the brain is the organ of the moral and intellectual powers.

I have already, in this work, abundantly shown, the uncertainty of the opinions of physiologists upon the functions of the brain. The opinions of physicians, in regard to the immediate seat of mania, are not only quite as divergent, but they are even contradictory. Physicians cite numerous instances, in which the functions of the moral qualities and intellectual faculties were disturbed in the most unequivocal manner, and in which, however, no sensible traces of derangement were found in the brain, whilst the viscera, such as the liver, the stomach, &c., exhibited very marked derangements.

Pinel, speaking of the researches of Greding, says: "Can any connection be established between the physical appearances, manifested after death, and the injuries of the intellectual functions observed during life?"*

Speaking of complete mania, he thus expresses himself: "It appears, generally, that the primitive seat of this alienation is in the region of the stomach, and that from this, as a centre, the disorder of the understanding propagates itself by a kind of radiation." †

He quotes Goza, Bordeu and Buffon: he is of the opinion, that the abdominal region participates in these sympathetic relations; and, to support his opinion, he gives a detailed enumeration of all the symptoms that are observed, previous to the manifestation (or eruption) of the mania.

"A sense of constriction," says he, "often manifests itself in these parts, (the stomach and intestines;) also a voracious appetite, or a decided disrelish for food, an

* De l' Alienation mentale, préface, p. xx.
† *Ibid.* p. 142 et 147.

obstinate constipation, and intestinal heat, which causes a desire of cooling drinks; then succeed agitations, vague disquietudes, panic terrors, a constant sleeplessness; and soon after the disorder and disturbance of ideas are indicated externally by unusual gestures, singularities in the countenance, and motions of the body, which cannot fail to strike vividly the observant eye. The deranged person sometimes keeps his head elevated, and his eyes fixed upon the heavens; he speaks in a low voice, or utters cries and vociferations without any known cause; he alternately walks and stands still with an air of deliberate admiration, or a sort of profound recollection; some are affected with vain fits of jovial humor, and bursts of immoderate laughter. Sometimes, also, as if nature delighted in contrasts, the symptoms are a gloomy taciturnity, an involuntary effusion of tears, or even concentrated sorrow, and extreme anguish. In some cases, the almost sudden redness of the eyes, an exuberant loquacity, presage the near out-breaking of mania, and the urgent necessity of close confinement. A deranged man, after long intervals of calmness, talked atfirst with great volubility: he frequently burst out into laughter, then he shed a torrent of tears; and experience had taught the necessity of immediately confining him, for his fits were excessively violent. Paroxysms of maniacal devotion are often indicated by ecstacic visions during the night; it is occasionally with enchanting dreams, and a supposed apparition of the beloved object, with the features of seductive beauty, that mania on account of love, furiously breaks out, so that it may assume the character of a delicious reverie, or else exhibit extreme confusion in the ideas, and an entire subversion of reason."* Shortly afterwards, the same author thus expresses himself: "A prejudice most injurious to humanity, and one, perhaps, that is the deplorable cause of the abandoned state, in which the insane are almost

* De l' Alienation mentale, 2d edition, p. 142, 143, et 148.

every where left, is that of regarding their malady as incurable, and referring it to an organic injury of the brain or of some other part of the head. I can affirm, that, in the great number of cases that I have collected upon delirious mania, which became incurable, or terminated in some other fatal disorder, all the results of autopsy, compared with the previous symptoms, prove that this kind of alienation has generally a purely nervous character, and is not the result of any organic unsoundness in the brain. Every thing, on the contrary, relating to these insane persons, indicates a strong nervous excitement, a new development of vital energy; their continual agitation, their occasionally furious cries, their propensity to acts of violence, their obstinate watchfulness, the animated look, their passion for the pleasures of love, their petulance, their lively repartees, an indescribable sense of superiority in their own powers, in their moral faculties. Hence arise a new order of ideas, independent of the senses, new emotions without any real cause, all sorts of illusions and forebodings. We ought not therefore to be surprised, that expectant medicine, that is, moral and physical regimen, should sometimes effect a complete cure." *

He thinks, in short, with Everard Home, Frederic Lobstein, and Fodéré, that the organic injuries, which are often discovered in deranged persons after death, prove nothing, because they are frequently observed after diseases which have nothing in common with mania, such as epilepsy, apoplexy, convulsions, nervous fevers.

I have already answered most of the objections and difficulties, which Pinel finds in these passages. We see, to our great astonishment, that this learned man seeks for the primitive seat of mania in the lower belly, that is, in other words, he places in the abdomen the seat of the intellectual faculties; but this error I have amply refuted.

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* *Ibidem*, p. 154 et 155, § 157.

The symptoms which, according to his observations, presage the eruption of mania, have evidently more connection with the brain than with the abdomen. *Agitation, vague disquietudes, a constant state of watchfulness, disorder and disturbance of ideas, reveries of admiration and abstraction, excesses of jovial humor, concentrated sorrow, ecstatic visions during the night, enchanting dreams, the apparition of the beloved object, an entire subversion of the reason*, are surely symptoms which must be imputed to a derangement of the brain.

Pinel lays it down as a principle, that the character of mania is purely nervous, and thinks thus to exclude its seat from the brain; but, when reasoning in this manner, he does not reflect that the brain itself is the greatest and richest of all nervous systems; he forgets the difference, that exists between a derangement of the vital functions, and an organic derangement; a difference of which I have already spoken, and which Boyle has admirably explained.* It is the vital functions of the brain which suffer most in mania, and this is proved by the symptoms alleged by Pinel. *The continual agitation, furious cries, acts of violence, obstinate watchfulness, the animated look, passion for the pleasures of love, petulance, lively repartees, a sense of superiority in their own powers, a new order of ideas independent of impressions made through the senses, &c.*, are not these so many proofs, that the instruments of the moral qualities and intellectual faculties is in a state of inordinate excitement?

I admit that these same organic injuries may be found in other diseases, as are often found in alienation; but, according to Pinel's own observations, that proves absolutely nothing in favor of his assertion.

This able man very judiciously observes, "That

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* Dictionnaire des sciences médicales, t. ii. p. 61. Anatomie pathologique.

causes the most diverse may in certain cases produce the same varieties, and that the same cause may occasion very different cases of mania." * Thus, then, in general, the same causes may produce in different individuals diseases absolutely different, and different symptoms in different individuals, affected with the same disease. The same kind of food refreshes one, and affects another with indigestion; the same indigestion causes in one, violent pains of the head; in another, apoplexy; in a third, convulsions, vomiting, diarrhea; in a fourth, frightful dreams, nightmare, delirium, &c. It is the same with external impressions. The same affection, the same impressions, and even the same poison, that occasions in one a violent colic, a total prostration of strength, fainting fits, plunges another into complete mania, and affects a third with a transient irritation only. We need not be astonished, then, if epilepsy, apoplexy, and mania, are sometimes produced by the same cause. "There is no insanity, therefore," says Fodéré, (" or it will be only temporary, or on account of organic imperfection,) without some predisposition; †" and the species of insanity will differ according to the nature of the predisposition. I cannot agree with Pinel, when he affirms, that, in most cases, he has been unable to find any visible trace of disease in the brain of those affected with incurable mania. The autopsies of Morgagni, Greding, Ghisi, Bonnet, Littre, as well as our own numerous researches, contradict Pinel's assertion.‡ If, in future, this learned man will bestow more attention upon the diminution of the cerebral mass, and the changes produced in the craninm, modifications which I shall point out, when I treat of the influence of cerebral diseases on the brain, he will find in the contents of the cranium, much more frequently than he has

* De l' Aliénation mentale, p. 140, § 146.
† Traité du deliré, t. ii. p. 120.
‡ *Cabanis*, du moral et du physique de l' homme, (2 edit.) t. ii. 449 et 450.

heretofore done, sensible traces of mania, at least as secondary consequences of the previous derangements, which the vital functions had experienced.

I am persuaded, indeed, that the cause of numerous mental diseases susceptible of cure, is found in the lower belly; but it is found there so far only, as diseases of the abdominal viscera become remote causes of those diseases; the proximate cause of mania exists, and must exist, in the contents of the cranium. When intestinal worms occasion itching in the nose, sternutations, cough, blindness, epilepsy, mania, who would presume to maintain, on this account, that the seat of the itching, sternutations, cough, blindness, epilepsy, mania, exists in the intestines? Physicians have explained, always, the symptoms which appear in parts remote from the seat of the disorder by sympathy. But are there any parts between which exists a sympathy more marked than that between the brain and the abdomen?*

For this reason, physicians who undertake the treatment of mental diseases, ought never to lose sight of the great influence which the brain exercises over the viscera of the abdomen. Every one knows how much an exertion of the mind too long continued, enfeebles the digestive powers; that grief often gives rise to diseases of the liver, &c. In like manner, it is frequently very difficult to determine, whether disorders existing in the abdomen, have reacted upon the brain and disturbed its functions, or whether the brain was the first cause of the disorder in the abdominal functions.

It is certain, that the observations of Pinel prove nothing against the doctrine of the brain's being the

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* M. Dubuisson justly remarks—"In sympathetic mania, all the disorders have the seat in some of the abdominal viscera, or in the organs of generation; whence emanate, as from a focus of irritation, the perturbing influences, which disturb the natural rhythm of the cerebral functions, and determine the subversion of the understanding." Dissertation sur la manie, p. 72.

seat of mania. I address myself now to his pupil, who, like him, is especially engaged in the treatment of the insane.

Esquirol, after many doubts, finishes with the following expression: "Delirium is idiopathic in acute or chronic inflammation of the meninges or of the brain; in effusions acute or chronic, primitive or secondary; in organic injuries of the cranium, the brain, or its membranes. Wounds of the head, inflammation of the meninges, cephalitis, hydrocephalus, apoplexy, mania, dementia, paralysis, idiotism, cretinism, offer numerous examples of idiopathic delirium."*

Afterwards, Esquirol speaks of causes which indeed exist in remote parts, but which nevertheless occasion a sympathetic mania. We find, then, in this author, the same ideas that I have developed above, upon the immediate seat of mania, and upon remote causes which cooperate in a secondary manner.

I shall cite the autopsies of Esquirol, so that the reader may be able to appreciate the advantage to be drawn from such examinations.

Esquirol attended a woman, who, after a series of afflictions, had lost her mind: she died at the expiration of about five months. "On opening the cranium, a very fetid odor from suppuration was exhaled. The dura mater was slightly injected, but sound. There appeared, on the sides of the middle portion of the longitudinal sinus, two oval branches, an inch in length, eight lines in thickness, and elevated two lines at their centre; they were formed by a protrusion of the convolutions in this place, and by some granulations. In the corresponding parts of the particles there were two depressions made in the thickness of the bones, which, in this place, were thin and transparent; that portion of the arachnoid, which covers the dura mater, was sound.

"The portion of the arachnoid investing the cere-

* Dictionarie des Sciences Médicales, t. viii. p. 253, article *Delire*.

brum, exhibited here and there white patches. On the left side, under this membrane, which retained its transparency, was seen a broad, yellowish patch, formed by pus, effused into the subjacent cellular tissue, in quantity about an ounce.

"The whole tissue of the pia mater was infiltrated with pus; the arachnoid of the lateral and inferior parts of the cerebellum was covered with true purulent coatings, so firm that they could be moved in the form of opaque, yellowish membranes, under which was found the arachnoid itself, of a whitish color and thickened. The pia mater on the inferior surface of the cerebellum exhibited the same infiltration of pus as that of the cerebrum. It was the same with the portions of membrane investing the annular protuberance.

"All the gray substance of the base of the cerebrum was blackish, flabby; the pia mater could not be detached from it, without converting it into a pap almost fluid and very fetid.

"At different points in the convolutions of the base of the cerebrum, the white substance had become bluish and softened. This alteration, which was observed in the peduncles, did not penetrate more than half a line into their interior.

"This disposition was equally remarkable in the two substances of the cerebellum and its peduncles.

"The two lateral ventricles were much distended, and contained each three ounces of turbid, purulent serosity; the middle one contained about two drams; the coats of all these cavities were not smooth, as they are in a natural state; but they were covered with a purulent membrane, of a yellowish white color, which gave them a rough aspect. In some places, laminæ could be taken off from this false membrane; but almost every where the attempt reduced the whole to a pulp.

"The optic thalami were of a deeper color, and less consistence than in their natural state.

"The corpora striata, above all, exhibited a very re-

markable alteration; they had lost their general form, but they were interspersed with depressions and protuberances, which gave them the appearance of an old fungous ulcer; their substance was diffluent under the finger, and in a true state of putridity; the viscera of the chest were sound. The mucous membrane of the intestines exhibited, at different points, fungous prominences, but no ulcerations."

The subject of the second observation is a female, aged thirty years. At the age of twenty-five, suppression of the menses took place from fright, on account of a fire; the next day delirium supervened, and afterwards mania and stupor alternately.

"Cranium thick, ivory like, contracted in front, and especially on the left side; dura mater strongly adherent to the cranium; purulent effusion throughout the whole duplicature of the two laminæ of the pia mater, penetrating the sinuosities of the convolutions, and even into the ventricles.

"The gray substance of the cerebrum was discolored, soft, and in some cases almost fluid. The white substance appeared in the same state, particularly in the lateral ventricles." *

In the *Dictionnaire des Sciences Médicales*, article *Démence*, Esquirol recapitulates the phenomena observed in his autopsies.† "The cranium," says he, "is often thick, sometimes of an ivory appearance, sometimes diploic, very frequently injected; it is more rarely thin, but then sometimes injected; its thickness varies in different regions. The dura mater is often adherent,

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* Ibid. p. 12, 13 et 14. "What, above all, renders these facts very remarkable," say the compilers, "is that, notwithstanding the great alteration of the brain, its membranes and all their dependencies, no external symptom afforded any suspicion of the nature of the malady, during the life of the patients."

If these gentlemen would endeavor to investigate the doctrine, which they think it their duty to oppose on all occasions, they would be found less frequently fighting against wind-mills.

† Dictionnaire des Sciences Médicales, t. viii. p. 290—292.

either to the vault, or the base of the cranium, sometimes thick; frequently its vessels are developed, injected. The internal surface of the dura mater is lined with a membraniform thalamus, as if the fibrine of the effused blood had extended itself in the form of a membrane over this surface; almost always serous and albuminous effusions are found between the arachnoid and the pia mater, which cover and almost efface the convolutions. Effusions at the base of the cerebrum are common: they almost always occur in the ventricles of the cerebrum."

The autopsies of Esquirol reveal organic defects in the brain of deranged persons, much more frequently than Pinel supposes; and it is because our discoveries have rendered the former attentive to many circumstances that had escaped the latter. Esquirol, however, would remain faithful to the principles of his master; but, at every step, the evidence of facts compels him to admit, that the brain is the organ of the intellectual faculties, and, consequently, in opposition to Pinel's opinion, that mania and dementia have their seat in the brain, and by no means in the abdomen. Nevertheless, this distinguished man, some years ago, perhaps through excusable timidity, manifested a singular disposition to deny the functions of the brain; a disposition which certainly can alone explain the contradictions into which he fell at that time, in his various articles upon delirium, insanity, mental alienation, &c.

Finally, if Esquirol did not believe the brain to be the seat of the moral qualities and intellectual faculties, and, therefore, of mania and dementia, why should he measure and draw the heads and craniums of the insane? Why should he expect, by those means, to arrive at important results, relative to the theory and treatment of the different kinds of alienation?

It is very desirable that Esquirol should collect, into one general view, what he says under the article *Folie*, upon the causes, generally moral, of alienation, and upon the symptoms which are its precursors; upon the

transition from one species of insanity to another, and upon the kind of death peculiar to the insane. With what truth he expresses himself upon the predisposing causes of insanity!

"I am more than ever convinced," says he, "that the existing causes of insanity do not act abruptly, except when the patients are strongly predisposed. Almost all the insane exhibited, before their disease, some alterations in their functions; alterations which commenced many years previously, and even in their early infancy; the greater part had had convulsions, cephalagias, colics or cramps, constipation, menstrual irregularities; several had been endowed with great activity in the mental faculties, and had been the sport of vehement, impetuous, and angry passions. Others had been fantastical in their ideas, their affections, and passions; some had had an extravagant imagination, and been incapable of continuous study; others, excessively obstinate, could not live, except in a very narrow circle of ideas and affections; whilst many, void of moral energy, had been timid, fearful, irresolute, indifferent to every thing. With these dispositions, a mere accidental cause is sufficient to make the insanity break out."*

It is therefore proved, by the very observations of Pinel and Esquirol, that the brain must be recognized as the seat of mental diseases.

It is a very lamentable thing, when writing for men, who should have the clearest ideas upon mental disorders, to be obliged first to fix the true seat of mania. Fodéré also falls from one contradiction into another, while opposing the doctrine of the cerebral functions.

He undertakes to prove, at the same time, that the brain is neither the seat of the propensities, instincts, and faculties, nor the immediate seat of mania, which he calls *delirium*.

"It must be perceived," says he, "that animals, espec-

* Dictionnaire des sciences médicales, t. xvi. p. 195.

ially the mammiferous, notwithstanding the extent of their brain and its construction, almost in every point analogous to that of the human brain, have a very slightly developed sensibility; that they want ideas and imagination; that they possess very few moral affections; that their passions are limited to physical necessities, and entirely subordinate to the bodily powers; that, in short, they are exempt from that disease known under the name of *insanity*. Therefore, the most intelligent men of all ages have concluded, that, even if the brain is an organ which ministers to intelligence, if it concurs in the phenomenon of insanity, its maladies (for that of brutes is equally susceptible of them,) are not sufficient to produce it; they have been confirmed in this conclusion by the absence or extreme minuteness of brain in several animals, whose instincts are considerably acute; and hence they have said, that the brain is not even the exclusive seat of instinct." And he adds in a note—"What proves more effectually than every thing else, that the intellectual energy is far from being proportionate to the cerebral mass, is the observation which every one can make, that the volume of the head predominates in the early stages of life, although this is the precise time, when our understanding is characterized by the greatest weakness. The researches of anatomy demonstrate, that the cerebral mass, which at birth constitutes a sixth part of the body, afterwards relatively decreases, so that in the adult it forms only a thirty-fifth part: it is not, therefore, by its mass that the brain can contribute to intellectual life." *

I shall prove, in this volume, that the proportion which the brain bears to the whole body, is a deceitful means for estimating the degree of intelligence; besides, it is very natural, that, with equal volume, a brain which has not yet attained its maturity, should not as yet exercise its functions in their full vigor. And, indeed, how

* Traité du délire, t. ii. p. 82.

can we expect sound views from writers, who, like Fodéré, have the most erroneous ideas of comparative anatomy? Let one compare a calf's brain, pl. iii. that of a sheep, pl. xiv, that of the orang-outang, pl. xxxiv, that of a lion, pl. xxxiii, fig. 4, with the brain of a man, in order to satisfy himself whether these brains have the same extent, and a structure, in almost all respects, analogous to that of the human brain.

Fodéré, in support of the assertion, that the brain is not the seat of mania, says, p. 134—"In considering the seat or proximate cause of insanity and predispositions, we have stricken from the list injuries and organic defects, because these aggregated solids are in contrast with the mobility of the seat of many diseases."

Fodéré confounds the products of the first cause of mental alienation, the organic injuries, with injuries of the vital functions. There are maladies which, like the gout, may have their seat in any part of the body possessed of sensibility: a similar malady may affect today the head, to-morrow the foot; but as the brain is exclusively the seat of the intellectual faculties, that alone can be the seat of their derangement. Fodéré thus continues: "The phenomena of nutrition, of secretions, leave no room to doubt, that we are constantly renewing some part of our body; John Bernoulli, having calculated the amount of this renovation, found, that, by a continual change of matter, a man loses two-thirds of his body in the space of a year; that, at the expiration of two years, there does not remain more than a fifteenth part of the original matter, and that a man who lives eighty years, has his substance renewed twenty-four times during the lapse of that period. However exaggerated this estimate may be regarded, it is impossible, from the daily instances of the astonishing power of the absorbent system, to deny that it is fundamentally correct; but if the sensible part of our bodies are incessantly changing, whilst the habits, temperaments, and predisposition to diseases remain the same throughout life, we must conclude, that there exists a primordial

type, to which these propensities and dispositions are attached, and which changes much less than the other parts of the body."

True, there does exist a primordial type, and according to this type the body is organized during the whole of its existence. If one did not exist, the human body, in the course of eighty years, would have assumed twenty-four entirely different forms, and the same individual would have become twenty-four different times a stranger to his own eyes. Yet Fodéré himself grants that the propensities and faculties change with age, in proportion as the organization becomes improved or deteriorated. Let us see now what this author substitutes for the organ of the faculties, the qualities, and *delirium:* he admits a *vital principle*, and "it is particularly in the blood," according to him, "that this principle of life chiefly resides." How is it possible to conceive, according to this hypothesis, that the propensities and qualities remain always the same? Does the blood change less *than the other parts of the body?*

Fodéré, in spite of his assertions in opposition to my doctrine, is obliged to return to my ideas. "This principle," says he,* "is, like the other fluids, subject to the laws of statics, and its equilibrium maintains life and health; *its accumulation in certain organs augments their activity, and frequently at the expense of those that are the least favored by it. The organs are its ministers; each of them, under its impulse, fulfils the function assigned to it;*" and in another place,† he adds—"The impulse given to the vital principle, communicates itself immediately to the organs through which it exists, and without which it cannot subsist." What can be said more favorable to organology in general, and to the doctrine which places the seat of the soul in the brain in particular?

Indeed, our author thinks his theory so well ground-

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* Page 139. † Page 85.

ed, that he undertakes to draw from the observations of Mr. Home, several corollaries, of which I shall cite the following:

1st. "That, since compression of the brain, by breaking in the cranium or otherwise, disturbs the exercise of the intellectual faculties; and the removal of the compression restores this exercise, the brain is really a viscus which is connected as an instrument with the state of reason or insanity." *

3d. "The intervention of the brain in the animal functions, is also proved by the pathological state which is very frequent in the brain of insane persons, and more frequent than in any other disease; but it is quite evident, that, setting aside the accidents occasioned by wounds, fractures, contusions, concussions, which immediately produce an interruption in the exercise of all the functions, and which form a particular exception, the brain is not primitively injured when the first symptoms of insanity appear; but the injuries observed after death, are created during the disease. We have instances in which the brains of maniacs, who committed suicide before the disease had produced those organic alterations, that would occasion a natural death, are found in a perfect state of integrity; whence we must conclude, that in researches of this kind, the brain should be considered only as a secondary organ." †

Here again Fodéré takes no account of the vital functions, the derangement of which always precedes the organic injuries.

5th. "That a state of automatic dementia, and idiotism, is almost always accompanied by marks of flaccidity or relaxation of the encephalic organ, either partially or throughout its whole extent; which pretty plainly indicates, that a cohesion or some tenacity, or what is understood by energy, is necessary, both to the perfect exercise of the intellectual faculties, and to the generation of mania." ‡

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* Page 111. † Page 112 et 113. ‡ Page 113.

Fodéré even asserts, that, "as the temperate climates exhibit the greatest development of the intellectual faculties, and the highest degree of moral energy, so they are also the most fertile in maniacal and melancholic affections."

A new proof that mania must have the same seat as sound intelligence.

To all these avowals of our adversaries, I add the following observations:

"The internal organization of the cerebral pulp," says Cabanis, "is still in a great degree unknown; it does not appear that the instruments, which we at present possess, can afford us any new discoveries. We have, I think, nothing more to expect from the use of the microscope, or the art of injection. If we wish to investigate farther the human anatomy in general, and that of the nervous system in particular, we must have recourse to other methods, other instruments. The organic conditions, also, without which this system performs its functions imperfectly, or not at all, are at least very difficult to determine; but the observation of diseases and autopsies, have furnished some useful considerations, which are also intimately connected with the usual phenomena of sensibility. I proceed to bring together these results.

"In the natural state of the brain, it is easily seen, that its color, consistency, the capacity of the vessels which inclose it, or which are immersed between its divisions, have been determined and regulated by nature.

"It cannot be doubted, that there exists a direct relation between these circumstances, and the manner in which the functions of sensibility are performed; for a change in the one, is attended by a proportionate modification in the other. When the pulp is more or less consistent, more or less colored, than it should be; when its vessels are in a collapsed or excessively dilated state; when their continued fluids have too great consistency or tenuity, are inert or acrimonious; the sensitive functions no longer are performed according to their estab-

lished order. Sometimes the brain is found in a peculiar state of softness: it is drenched with serosity or lymphatic and gelatinous matter; its color is tarnished and slightly yellowish; its vessels, almost collapsed, show in their main trunks scarcely any vestiges of blood, and that, pale and impoverished; sometimes the cerebral mass, on the contrary, has a firmer consistency than in its natural state; its pulp has a dry appearance, and is almost friable to the touch; frequently its vessels are then injected with brisk vermilion blood, sometimes with that which is thick, blackish, and viscid. Sometimes also the eye perceives traces of real inflammation, that is, not only are the arteries and veins brightly delineated, the former with purple, and the latter with blue, tinged by an unusual reddish cast, but the white membranes and the pulp itself are specked in different points with a bloody shade.

"Finally, as we have already remarked, (t. i. p. 188,) it may happen that the pulp may be of unequal consistency, firm and dry, in one part, soft and humid in another, and foreign bodies of different kinds be pretty frequently formed in it, as ossifications, calculi, cartilage, schirri, &c. All the causes inherent in the nervous system, upon which delirium and insanity often depend, are comprehended under two general heads: 1st, the peculiar maladies of this system; 2d, the vitiated states, which it is susceptible of assuming.

"In a paper, dictated by the true genius of medicine, Pinel says, he has several times observed in idiots a remarkable depression of the vault of the cranium: there are few practitioners who have not had an opportunity to observe the same thing; but Pinel referred it to geometric principles, and, according to these, determined the forms best suited to the action and free development of the cerebral organ, and those which obstruct its enlargement and disturb its functions. I have also, several times, seen imbecility produced by this cause. I have thought, in other cases, that I could refer it to the extreme smallness of the head, to its almost perfectly

spherical form, especially to the flattening of the occipital bone and the posterior parts of the parietals.

"These defects of conformation, although, in their location, and generally as respects their cause, foreign to the brain itself, nevertheless influence its habitual state in a manner so directly organic, that they may be reckoned among its peculiar diseases. I place in the same class, ossifications or petrifactions of the meninges, (particularly those of the dura mater,) their schirrous degenerations and violent inflammation. All these diseases may cause great disorder in the intellectual operations, and it is generally by occasioning convulsive fits, accompanied by delirium, that they disturb the action of the sensitive system.

"Anatomic dissections have shown in a considerable number of subjects, who died in a state of dementia, various changes in the color, consistency, and all the sensible appearances of the brain. Pinel affirms, that he has discovered nothing of the kind in the bodies that he has dissected; and we may confidently rely upon the assertions of an observer, so sagaciously and so scrupulously accurate; but it is impossible to reject those of many skilful anatomists, who are not less worthy of credit. Besides the malformations of the skull, and the alterations of the meninges, of which we have been speaking, Ghisi, Bonnet, Littre, Morgagni, and several others, have observed in the remains of the insane, different, and much deeper degenerations of the very substance of the brain. There have been found schirri, masses of calcareous phosphate, several species of true calcule, osseous concretions, effusions of corrosive humors; the vessels of the ventricles have been seen, sometimes distended with brisk and vermilion blood, sometimes stuffed with blackish, viscid, and deleterious matter; and as, in a more moderate degree, these organic disorders have, many times, been accompanied by correspondent and proportional disorders of the mental faculties, when they are found in maniacal and furious insanity, it is difficult not to attribute it to them.

"But the most remarkable observation is that of Morgagni, who, in his numerous dissections of the brains of the insane, almost always saw augmentation, diminution, or more frequently inequality of consistency in the brain; so that the pulp was not always too hard, or too soft; but generally the softness of certain parts was in opposition to the firmness of others; which seems to explain directly the want of harmony in the functions, by that of the tonic powers peculiar to the different parts of their immediate organ.

"Such, in general, are the organic dispositions of the brain, proofs and examples of which have been furnished by medical anatomy. But the comparison of many dissected subjects, have enabled us to refer these phenomena to the sensitive dispositions, which correspond to them during life."*

Since my arrival at Paris, the brain has become an object of particular attention. Autopsies have been multiplied, and they have fully confirmed my own observations.

Georget, enumerating the causes that have prevented physicians from finding the seat of mental alienation, charges even autopsies with having had that effect. "On the one side," says he, "the delicate and imperfectly known organization of the brain, hardly allows us to appreciate all the changes that can occur; on the other, in diseases of this organ, which, without being of themselves fatal, may endure for a great number of years, it is impossible, judging merely by an examination after death, to avoid confounding the cause of these diseases with the cause of death, and to avoid taking the latter for the former, the cause of death being generally much more evident than that of the cerebral affection. There is another consideration, which has always struck me, because it appeared to me highly important: it is, that we are seldom enabled to see a brain perfectly sound, since

* T. ii. p. 447.

few patients die without having been affected by fever and delirium, phenomena which depend upon irritation of this organ. A truly pathological state of the brain must therefore most generally be taken for a sound one; and I have almost always observed, upon brains supposed to be sound, both internally and externally, a multitude of colored shades in the gray substance, from pale rose bordering upon the yellow, to a very deep rose. I have observed the same in cases of alienation. Sometimes this coloration is general; sometimes it exists in certain convolutions only; and sometimes it varies in the different regions occupied by the gray substance."*

As inflammation of the brain is the most common cause of derangement in its functions, I think it will be useful for me to bestow a few remarks upon that subject.

"The inflammatory state of the brain," says Georget, "is far from being known in all its organic gradations of color, and yet this state must very often occur; to this must necessarily be referred all those cerebral disorders, functional or otherwise, which are characterized by a general or local excitement. The autopsies of recent times, particularly those published by Rostan and Lallemand, have already produced very satisfactory results. I will acknowledge, that it is especially since I have read the reflections of the professor of Montpellier, on the organic characters of the first degree of cerebral inflammation, I have observed a variety of tints in the two substances of the brain, particularly in cases of alienation. A Mrs. Dieudonné died last winter at la Salpétrière, exhausted by an attack of acute mania, which had existed four months. The white substance of the brain was injected, of a violet color; the gray, throughout its whole extent, was of the finest rose. Dr. Mitivié opened the body of M. B***, who had died after an attack of mania; the brain exhibited precisely the same tints.

* Physiologie du système nerveux, t. ii. p. 205.

In many other cases less remarkable, we have had occasion to repeat the same observations. I am convinced that, in the course of a few years, the pathological anatomy of the brain will make great advances, and that few bodies of insane persons will be examined, without exhibiting appreciable traces of the affection of this organ."*

Lallemand says, that he has, within a few years, observed a greater number of cerebral affections, than any author who has written upon the subject. I soon perceived, says he, that they were much more common than is generally supposed, and much more imperfectly known than those of any other organ. He frequently found circumscribed congestions, efforts at hemorrhage, with or without effusion of blood, inflammation of the brain with mollification and vascular injection, infiltration or effusion of blood, mollification with infiltration of pus or incipient suppuration; abscesses; chronic affections, for example—encysted abscesses, scrofulous tubercles, fibrous, osseous, schirrous, cancerous tumors, hydatids, foreign bodies; affections of the arachnoid, for example—circumscribed congestion, sanguine, sanguinolent, or serous exhalation, acute inflammations of different degrees, turbid, lactescent or gelatinous serosity, suppuration; chronic inflammation, as, thickening of the arachnoid, increase of its consistency, diminution of its transparency, development of granulation at its surface, acute hydrocephalus, chronic hydrocephalus, &c. †

Another work, in many respects highly valuable, but relative to the treatment of arachnitis, very bad, makes us acquainted with the frequency and nature of inflammation of the cerebral envelopes, especially of the cerebral and spinal arachnoids. ‡

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* L. c. p. 219.

† Recherches anatomico-pathologiques sur l'encéphale et ses dépendances. 1820. A Paris, p. i. et xvii, &c.

‡ Recherches sur l'inflammation de l'arachnoide cérébrale et spinale, par, M. M. L. Martinet et Parent—Duchâtelet. Paris, 1821.

Lallemand has made some excellent reflections upon the treatment of inflammation of the brain and its membranes. But his excellent advice was rarely followed in the observations, reported with great accuracy in this work.

Inflammations the most decided, and recognized as such, were, from their commencement, treated with emetics, blisters, frictions of camphor, the most irritating antispasmodics, the most exciting lotions, and all promiscuously, leeches, venesection, blisters, camphor, nitre, sinapisms, sulphuric lemonade, quinquina, ether, arnica, valerian, &c. What pernicious examples for students and readers are the modes of treatment mentioned on pages 190, 234, 237, 245, 252, 257, 260, 279, 299, 312, 320, 341, 345, 353, 356, 364, 367, 386, 440, 464, 513, 522, 524, 543, 560, 572, 577, 583, 588! Throughout nothing appears but inconsequence, regardless of principle, and the most revolting contradiction in the choice of means! Is it astonishing, then, that the reporters should have been obliged to acknowledge, that success in this disease is very rare in the hospitals, and that the disease is almost inevitably fatal, when it is highly acute, when its progress is very rapid, and that delirium and the comatose state appear at the very commencement? Broussais and Lallemand succeed infinitely better by the use of frequent and copious venesections, cooling beverages; in short, by a method purely enfeebling, soothing, antiphlogistic, without any contradictory mixture, as I was taught, in all kinds of inflammation, by my immortal professor Stoll!

When I was engaged, at Vienna, in my researches upon brains, nearly all of those which were brought to me from the insane hospital and almshouses, especially those of persons, who died of supposed nervous fevers, malignant, dynamic fevers, of the typhus, showed evident signs of inflammation. I imparted this general observation to Peter Frank, and several physicians, who had become Brownists. They replied, that these apparent inflammations were nothing but passive congestions.

In vain I told them, that I not only found the meninges and the cerebral substance injected, gorged with blood; but also serous exudations coagulable lymph, adhesions, granulations, *pus-like* and *purulent* matter, very frequently suppurated points, and that, consequently, I saw genuine active inflammation. But, from that time, I taught in my lectures at Vienna, in my travels, and at Paris, that the typhus, the nervous, malignant, adynamic fevers, were, in most cases, nothing but real inflammations of the brain; and that in the mental alienation there generally existed an inflammation, at first acute, but which afterwards became chronic. I have also, in that way, shown why the crania of the greater part of insane persons, either became thickened, or more frequently of an ivory hardness.

In the hospital at Munich, we saw a very robust young man, who had just entered. He had drunk too large a quantity of bock, a very heady kind of beer; he had a frightful pain in his head, and soon lost his reason; his delirium continued, his face became very red, his eyes excessively bloodshotten, &c. Spurzheim, and myself, pronounced the disease to be a very acute inflammation of the brain. This was denied, on account of the extreme prostration and convulsions of the patient, and the exciting treatment was continued. He died the next day, and we found both the brain and the meninges in the most intense state of inflammation.

A short time after my arrival at Paris, I was called, on a consultation, to a young man, twenty-one years old, of a vigorous constitution, &c.: he had been excessively heated on horseback by a very hot sun. An intense headache obliged him to return home. Remedies were applied, which the physicians and the women call calming, (*tranquillizing sedative;*) the headache increased to such a degree, that he soon became frantic, with a total prostration and universal rigidity. There you might have seen five doctors, zealous to pour down the patient's throat, wine, tinctures, ether, to rub him with camphor, and every thing else high-

ly volatile and spirituous, to administer irritating lotions, &c. I declared, contrary to the opinion of my five brethren, that I had never seen an inflammation of the brain more decided, more strongly characterized than this. They would not listen to me. At my departure, I requested these gentlemen to be so kind, as to invite me the next day to the examination of the body. The patient died towards night, the body was opened, but they were careful not to invite me. In this case, the total prostration of strength and the convulsive state were alleged against me. But these are the precise circumstances, which most decidedly characterize a very acute inflammation of the brain and its envelopes. In fact, how can the powers subsist, when they are attacked at their very source? and how can the nervous system and its dependencies remain calm, when the brain is so violently irritated?

I was suddenly taken with a violent pain in my head; as it frequently happened after I had eaten any indigestible food, for instance, the minutest portion of mutton. At first I was not inclined to use any remedy. But the pain became insupportable; all the veins of the head and face were swollen; I felt an extreme heat; at the same time my thighs and legs were twitching with convulsions. I then caused myself to be copiously bled. Scarcely had this been done, when the convulsions ceased, the pain in my head diminished, and in a few hours it had wholly disappeared. It would be difficult to estimate the evil which erroneous notions, relative to different kinds of debility and the word *calmans*, (tranquillizing,) continue to produce every day!

After this digression, I must now continue to dissipate doubts and refute objections.

Continuation of the doubts and objections against the theory, according to which, the brain is the organ of the intellectual faculties and moral qualities.

Cases, in which one hemisphere, or the entire brain, has been annihilated, as it is pretended, without directly affecting the exercise of the intellectual and moral faculties.

Some think they have seen an entire hemisphere of the brain destroyed by suppuration, without having occasioned any derangement in the exercise of the intellectual faculties. Ought it not to be expected, that, in such a case, the exercise of the functions of at least half the intellectual faculties, would be rendered impossible?

I might say, that observations of this kind are very doubtful; but let us admit them to be absolutely correct, since I myself have observed such a case in the Institution Thérésienne, at Vienna. An ecclesiastic suffered a long time from an erysipelas upon the forehead, which often disappeared, and after a while appeared again. All his left side was so debilitated, that, in order to walk, he was obliged to use a staff; at last he was struck with apoplexy, and died at the expiration of a few hours. Three days previous, he had preached, and, as usual, attended to the instruction of youth. Upon examination, I found half of the right hemisphere converted into grumous substance, of a dirty yellowish white color. At the time of this autopsy, I had not discovered the true structure of the brain, and, consequently, was incapable of making a perfectly accurate observation. Nevertheless, it is manifest, that the exercise of the intellectual faculties had continued in an astonishing manner, notwithstanding so considerable a deterioration of one hemisphere. How can we conceive of this phenomenon, if it be true that the brain, and its in-

tegrant parts, are exclusively the instruments of the mental faculties?

I have proved, in the first volume of my large work, that the nervous systems of the spinal marrow, of the organs of sense, and of the brain, are double, or, in pairs. But, as, when one of the optic nerves, or one of the eyes, is destroyed, we continue to see with the other eye; so when one of the hemispheres of the brain, or one of the brains, has become incapable of executing its functions, the other hemisphere or the other brain, may continue to perform those belonging to itself; in other words, the functions may be disturbed or suspended on one side, and remain perfect on the other.

Tiedemann relates an instance of a man, named Joseph Moser, who was deranged on one side of his brain, and with the sound side observed his own alienation.

Some physiologists think such a case is a partial alienation, rather than an alienation of one entire side of the brain; but I have good reasons for being of a different opinion. A minister, at Vienna, was attacked during three years with the same disease; he communicated to me an account of it; he described minutely the manner in which each side of the brain was affected. On the left side he continually heard insults uttered against him, so that he always turned his eyes that way, although, with the right side, he distinctly perceived, that these sounds came from no other source than a derangement in the left side of his head. When he had a fever, he was incapable of combating the illusion. For a long time after his recovery, whenever he drank wine to excess, or abandoned himself to anger, he perceived, on the left side of his head, the signs of a relapse.

At Paris, I attended a young lady, who frequently expressed to me her apprehension of falling into dementia on one side of her head, because she observed, that the process of thought was not the same on this side as on the other.

Another lady, a woman of infinite sense, made nearly the same remarks to me; she distinctly felt, she said, that

she perceived every thing differently with her left side from what she did with the right; that every thing affected her differently on different sides. She told me, that sometimes her faculty of thinking was completely shackled on that side, and that this inability was accompanied by an icy torpor: it seems to me, (these are her own words, and she applied her hand perpendicularly upon the middle of her forehead,) it seems to me, that from the front to the back of my head, the brain is divided into two distinct halves. Neither of these ladies had the least knowledge of the cerebral structure, or of my physiological discoveries.*

The following case, which I have already cited elsewhere, is also appropriate here. A physician, with whom I studied in Vienna, frequently complained that he could not think except with one side of his head; he felt distinctly the inefficiency of the other side. Indeed, the weak side was much less elevated, and much narrower than the other.

Many physicians think it improbable, that the two hemispheres could exist in states so different, and that the exercise of their functions could differ in so striking a manner. But what is hemiplegia, but a paralysis of one half of the brain, which occasions paralysis of one side, and generally the opposite side of the body? I have seen a patient thus affected, who was confined to his bed more than twenty years; the diseased side wasted away, the eye on that side became gradually affected with atrophy, whilst the other retained all its vigor; the mouth was constantly drawn one side; and yet I did not observe that he had lost any one of his intellectual faculties.

In cases of cerebral effusion, which so often occur in

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* Extract of a letter of Dr. Bailey, written from Rome to Dr. Brayer, 30th May, 1822. "You may tell Dr. Gall, that I have a cast of Tasso, which was taken from his face, and that although one part of the organ of poetry is cut off, still the lateral breadth of the cranium in this direction is enormous.

children, after an inflammation of the brain, that has been misconceived or badly treated, one side of the head is almost always hotter than the other, and to this side they keep it inclined. Generally on this side, the blood-vessels are more turgescent, and we find inflammation, and even suppuration, hydatids, in the cerebral membranes, and a more abundant effusion.

In the megrim,* the blood-vessels are manifestly more turgescent on one side than on the other; we have had an opportunity of verifying this, through the complaisance of Osiander, professor at Gœttingen. This eminent man showed us the brain of a young girl, who, after having suffered a long time with the megrim, had died of this disease; the vessels of the diseased side were much more distended than those of the sound side.

A child died in consequence of a blow received upon the right side of the head; the middle portion of the right parietal, as well as the portion of skin covered with hair, were bruised. When I had laid the brain bare, I found the whole right hemisphere pale and void of blood, while the left hemisphere was of a bright red, very much injected and inflamed. This proves, to a demonstration, that the two hemispheres may be found in a diametrically opposite state. If the child had lived, it would certainly have been paralyzed on the left side, and would have experienced violent convulsions on the right side.

In the optic thalami of a woman, who had been in a state of dementia several years, we found, on the left side, a large ulcer which had destroyed a part of it; in consequence of this waste, the corpora striata, and all the left hemisphere, were sunken and diminished by one half. Plate lii.

Since, therefore, the state of one hemisphere of the brain may be wholly different from that of the other,

* Megrim, (hemicrania,) a pain which affects only one side of the head.

this difference must extend to the functions of these hemispheres also; and since all the organs of the primitive faculties of the mind are double, it is possible that, in the severest diseases and injuries of the brain, all those faculties may exist, whose organs have not been paralyzed or destroyed, at the same time, on both sides.

My doctrine upon the functions of the brain would be more than compromised, if what Bérard and Montégre assert in the following passage were even possible. "In short," say they, "experiments, but especially pathological facts, show, that all the parts of the brain can be successively destroyed, and yet the functions of animal life, at least for some time, remain entire; which proves, that all the parts of the nervous system can, to a certain extent, mutually supply each other." *

This is not only demolishing, at a single blow, the whole of my physiology of the brain, but also destroying the possibility of any kind of cerebral physiology.

It is apparently, from the experiments of Zinn, Arnemann, Le Gallois, &c., that Bérard and De Montégre deduce so fruitful a corollary. I have already shown how we should judge of such violent mutilations, the authors of which confound phenomena, arising from irritability, with those of sensibility; besides, in these experiments, not a word is said about any moral quality, or any intellectual faculty; and who indeed would be so infatuated, as to expect the least manifestation of an innate aptitude or propensity, from an animal whose brain had been mutilated or entirely extracted?

I promise Bérard and Montégre, that I will renounce all those discoveries so vexatious to them, the very moment they give me evidence of a single experiment, in which all the *functions of animal life*, and, consequently, all the intellectual faculties and moral qualities, exist even for a moment, either in an animal, or in a man, *all*

* Diction. aire des Sciences Médicales, t. vii. p. 318, art. Cranioscopie.

the parts of whose brain have been gradually destroyed.

And, as to pathological facts—will these gentlemen tell me of monsters born without brains? I wish to know the intellectual faculties and moral qualities of these monsters!

Will they cite the magical effects produced by magnetism? In this case, I will refer them to the section upon the difference of the nerves;* there I have showed, that each nervous system has its peculiar sphere of action, from which it cannot depart. But I will also renounce those arguments, the moment they show me a somnambulist who sees with his nose and hears with his fingers, a clairvoyant,† who makes a discovery in anatomy or physiology.

Cases, in which no brain has been found, or, rather, in which it is pretended that the brain has been dissolved or disorganized, by water accumulated in the cranium, without causing a cessation in the exercise of the intellectual faculties.

Have heads void of brain ever existed?

Durverney found a cranium entirely without cerebral substance, and filled with nothing but water.‡ Zacutus Lusitanus saw a child without brain, which lived three years, but the meninges were double. Other anatomists recount similar facts; and in our travels, we have met with physiologists who believed that heads could exist without brains. Although we were then unable to point out the precise errors of these observations, the manner in which Morgangi regarded them, would be sufficient to make us suspect them; this accurate and faithful ob-

* T. i. p. 127, édit. in 4to, et p. 91, édit. in folio.

† One who sees through the eyelids, bandages, &c.

‡ Liber i. Observatio iii. In this case, as in that which I myself observed, the child was apparently still-born.

server, as well as Bonnet, Vesalius, Tulpius and others, having discovered the existence of brain, in precisely similar cases, reproaches Duverney upon the subject.

Lauffer indeed rejects the observation of Zacutus Lusitanus, because he knows, that, in the case alleged by that anatomist, the brain had been dilated into a thin membrane; but he himself speaks of a new-born child, in whose brain he found water, but no cerebral substance. He attempts to prove that a brain had previously existed, but that it had been dissolved by the water. Generally it has been admitted, that in hydrocephalus the brain is dissolved by water; this dissolution has been designated by the particular name of *colliquatio* or *dissolutio cerebri;* hence Boerhave thought that, by a moderate fire, the brain might be converted into a subtile vapor. Haller and Sœmmering speak of these erroneous observations, without denying them.

Even those who regard the brain as the organ of the mind, think that in hydrocephalus it is dissolved, and to this circumstance they impute the inefficiency of the senses and intellectual faculties, or the complete imbecility which appears to them a necessary condition of this disease. Walter of Berlin expressly says,—"In cases of internal hydrocephalus, the medullary substance is softened by the acridity of the water, and becomes liquified; but it is urged towards the periphery, so that when examining such a brain, we make an opening in the cortical substance, which, on account of the pressure it has experienced, is not more than a line in thickness, the water flows out, bringing with it a greater or less quantity of the liquified cerebral substance." "This enables me to comprehend," continues this anatomist, "why persons affected with hydrocephalus, can eat, sleep, keep awake, respire, and why all their secretions and excretions can go on, whilst their intellectual faculties are lost. It cannot be otherwise; for when the workshop

of the soul is demolished, she can no longer act upon the body."*

Ackermann maintains, that, in this case, the cerebral mass, on account of its softness, is evidently distended by the water, and that there is undoubtedly a destruction of its organic form. Boyer thinks, also, "that, in hydrocephalus, the gray and white substances are confounded."

Many physiologists were well aware, that the medullary substance sometimes became dilated like a bladder by effusion of water into its cavities; but they could form no idea of the nature of this dilatation; they could not conceive it possible, that a substance purely medullary, or, even medullary fibres so delicate and soft, could be uniformly distended throughout the whole mass, without rupturing those parts, which, being dilated first, would be found the thinnest.

Admitting the reality of all this destruction, they conceived it impossible for the intellectual faculties to exist. Tulpius, however, had seen a person affected with hydrocephalus, who retained all his intellectual faculties. Upon examination of the body, he and all the assistants were astonished to find, that, with such a state of the brain, the exercise of the faculties should have been continued; from that time he thought, that the structure of the brain must be very different from that taught in the schools. Vesalius and Camper report similar cases, and with the same astonishment.

Indeed, if in hydrocephalus, the brain is dissolved or disorganized in any manner whatever; if this waste is a necessary consequence of its structure; it must either be denied that there are any cases, in which, with any considerable degree of hydrocephalus, the faculties have been retained; or it must be acknowledged, that the brain is not necessary to the exercise of the mental fac-

* Etwas über Doctor Gall's Schœdellehre.

ulties; that it is not the organ of the intellectual functions.

Whilst I was in this state of uncertainty, a woman, whose head was so large, that I thought it must contain at least four pounds of water, called for my assistance. This woman, in spite of her hydrocephalus, appeared to have intellectual faculties, in no respect inferior to those generally possessed by women in her station. After her death, which occurred in her fifty-fifth year, I found, in fact, more than four pounds of water in the cerebral cavities. Plate xxv represents this brain in its natural dimensions; I have removed the superior part of the unfolded brain, so that the inferior half of the two cerebral cavities is visible. N, N, N, N, N, N, is the contour of these cavities, the whole surface of which is of the color natural to the white fibrous substance. The convolutions were not completely unfolded, except in the superior part of the brain. We perceive, however, that the convolutions situated towards the front, are already considerably unfolded and flattened; 25, 25, p. p., are the so called optic thalami; l, l, l, l, the corpora striata; there no where exists in it, therefore, either rent, solution, or mixture of the two substances.

During our travels, we became acquainted with a distinguished naturalist, whose head, to judge by the extraordinary extent of the anterior-superior part of the front, must also contain about four pounds of water. He manifests no weakness of the mental faculties, except that he frequently falls asleep in the midst of amusements, at table, at the theatre, &c. His son, afflicted with the same disease, has a remarkable talent for music.

At Copenhagen, I had occasion to present to my auditors a girl, thirteen years of age, who was affected with hydrocephalus; her head measured (Vienna measure) twenty-five inches in circumference, eighteen from ear to ear, and the same from the origin of the nose to the nape of the neck; her feet were almost paralyzed, so that it was necessary to carry her; still, she was

quite amiable, and improved well at school; this person has, at least, from ten to thirteen pounds of water in her head.

At Augsburg, I also exhibited to my audience a girl, twelve years of age, whose head had the same form and dimensions as that of the woman at Vienna: this girl, like the woman, was very small; she talked with much intelligence and spirit.

Laumeyer and Nueffer, professors at Friburg, in the grand duchy of Baden, have in their possession the skeleton of a girl, aged nine years. The cranium contained seventy ounces of water; this girl retained for several days what she had heard read, and talked in a very agreeable manner.

We saw, at Bruchsal, a girl, fourteen years old, who already menstruated, whose head was enormous, and must have contained twelve or thirteen pounds of water; she was paralyzed to such a degree, that she could not quit her bed, and her intellectual development had not advanced in proportion to her age; yet she spoke very rationally upon subjects which interested her.

Tobias, of Leipzig, showed us the cranium of a man who had had the hydrocephalus: he had lived to the age of thirty-five; at the age of thirty-four, having indulged in a fit of violent anger, he lost his reason.

At Marburg, a girl was shown to us, who, we should think, by the size of her head, must have at least three pounds of water in her brain: she was not observed to manifest any weakness in the intellectual faculties.

Doctor Maler, of Carlsruhe, gave us an account of a patient affected with hydrocephalus, who had attained the age of twenty years; his head contained more than ten pounds of water, and he had enjoyed all his faculties.

Dr. Spurzheim wrote to me from London, relative to a very remarkable case of hydrocephalus,* pl. lv. fig. 5.

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* He caused an engraving of it to be made in his Physiognomical system, p. v. fig. 2.

"It is a young man, nineteen years of age: the circumference of his head is thirty-three inches; from ear to ear it measures twenty-four inches and a half, and twenty-three inches and a half from the base of the nose to the middle of the nape. This young man enjoys all his intellectual faculties; he reads English very well; his chirography is beautiful; he readily comprehends what is said to him, and has religious ideas; his language indicates good sense and an amiable character. At every sudden movement, he feels a sensation which he compares to the fluctuation of warm water. He never has any evacuations from the bowels, except by the aid of art; he sleeps very little, and the least noise awakes him; his cranium is entirely ossified."

Dr. Spurzheim saw another very remarkable case of *hydrocephalus*; the subject was a girl twelve years old. From the nape of her neck hangs a membranous sac, filled with water, and communicating with hydrocephalus. This girl hears and understands very well all that is said to her, but cannot speak. This observer has already met, in England, with five cases of hydrocephalus, the subjects of which enjoy their intellectual faculties.

We see, then, cases of dropsy in the brain, or considerable, and in some instances, extraordinary, hydrocephalus, which have not prevented the manifestation of the intellectual faculties. In all these cases, there existed, as is supposed, in consequence of known physiological laws, and, as I myself formerly believed, a solution, a twitching, a laceration, a compression, a crushing of the brain: in spite of all this, the manifestation of the faculties still continued: can I yet maintain that the brain is the organ of the mind?

The solution of these difficulties will not embarrass such of my readers as have perused, in my large work, the section upon the structure of the cerebral cavities and convolutions, and upon the natural and artificial unfolding of them. They will recollect that the medullary fibres of the brain are prolonged perpendicularly

above the cerebral cavities; that, uniformly, two layers of these fibres form a convolution, so that a convolution is nothing but two agglutinated nervous layers, each of which is prolonged perpendicularly from the external periphery of the cerebral cavities, which are covered with a layer of gray substance, about a line in thickness. If, therefore, a considerable quantity of water acts in the cerebral cavities, it will gradually separate the two perpendicular laminæ of each convolution, so that at last these will be unfolded to their summit, pl. lv. fig. 1. In this manner they become flattened out, in proportion as the water penetrates them, and when the unfolding is at its maximum, they form one and the same membrane.*

What I have said, will enable us to conceive how the brain, which, above the cerebral cavities, forms thick medullary masses, can be distended into a membranous sac, whose walls are hardly a line in thickness. It is precisely this membranous appearance of the brain, thus unfolded, which caused Zacutus Lusitanus, and others to see nothing but a double vascular membrane; and other anatomists, also, equally inattentive, to see merely a thick vascular membrane, without any trace of a brain.

As, in such a case, there is merely a pressure exerted by the water, and a moderate distension, but by no means a destruction of the cerebral fibres; as the functions of those fibres, which have passed from a vertical to a horizontal direction, do not, in the least, depend upon their situation, we conceive it possible for the exercise of the intellectual faculties to be continued in cases of hydrocephalus.†

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* See the particulars of this subject, in our answer to the report of the first class of the Institute, and t. i. of our great work of Anatomy of the Brain.

† Sir Everard Home attributes the destruction of the cerebral functions, in hydrocephalus, to absorption of the cerebral substance. The subject of the observation which he cites, was a child that died at the

When these heads are opened, limpid water flows from them; but if, after death, such brains have been transported hither and thither, and much agitated, or if

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age of six years, and whose brain weighed only from two to three ounces, whilst the brain of a child, six or seven years old, in a healthy state, weighs two pounds and twelve ounces.

The observation of Sir E. Home would prove favorable to his opinion, if the brains of all children of the same age had equal weight. But the brains of children, as well as those of adults, differ both in weight and volume.

Sir E. Home, after having proved, as he thinks, that, in hydrocephalus, the cerebral mass is dissolved by water, ends his reflections thus:—

"The preceding facts demonstrate, in a satisfactory manner, that the brain is formed of thin convolutions of cortical and medullary substance, enveloping the two lateral ventricles; that these convolutions expand in proportion as the cavities of the ventricles augment, and in this state of expansion, the functions dependent upon this portion of the organ, can retain their perfect action."

Does Sir E. Home mean to appropriate to himself the discovery of the unfolding of the cerebral hemispheres? Several years before I undertook my travels, which were commenced in 1805, in my lectures, at Vienna, before numerous auditors of all nations, I demonstrated the unfolding of the brain. In 1805, we demonstrated in the most celebrated universities of Germany, in Denmark, Holland, Switzerland, &c., and finally, in 1807, in Paris. Would not Sir E. Home have been informed of it? My discovery created too great a sensation, to admit of the supposition that he was not. Our memoir before the Institute, and the report of that society upon it, were made in 1808; our answer to that report, in 1809: this answer was sent to the Royal Society of London, the same year. In 1810, the first volume of our large work, on the Anatomy of the Brain, was sold even in London; and in that volume it is expressly said, as it is in our memoir presented to the Institute, and in our answer, that it was the observation of hydrocephalic cases which led me to the discovery of this unfolding. Finally, in the presence of the London Medical and Surgical Society, Dr. Spurzheim demonstrated the structure and expansion of the brain, previous to the time when Sir E. Home read his memoir to the Royal Society.

Sir E. Home, then, could not be ignorant of my discovery: what motive has he, then, to claim it? *

M. Sœmmering, to deprive me of the honor of my discovery, pretends that it is a very ancient one. In a memoir, entitled, Academicæ

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* It has been recently stated, that Sir Everard Home was in the habit of publishing the discoveries of others as his own. It is said that, having access to the manuscripts of Mr. Hunter, he transcribed many of them, and gained much of his reputation as their author. If this charge be true—and we could wish for the honor of man, that it were not—it is difficult even to conjecture, without a particular examination, the extent of his thefts from the literary and scientific labors of others.—Ed.

indeed the subject had been several days dead in the womb, as was the case of the individual examined by Lauffer, it is not astonishing that the water should be turbid; and, from this circumstance, the anatomists may be induced to believe, that a solution of the cerebral mass has taken place.

Therefore, all that was said relative to cerebral dropsy, to heads without brain, brains destroyed, disorganized, dissolved, falls to the ground, and, consequently, all the inductions drawn from these pretended facts, and tend-

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Annotationes de cerebri adminstrationibus anatomicis vasorumque ejus habitu, printed in the Memoirs of the Academy of Munich, volume of 1808, he expresses himself thus: "Non novam autem esse opinionem istam de cerebri plicata fabrica, Jacobi Berengari Carpensis verba satis superque probant." Anfractus cerebri inquit (Commentaria super anatomia, Mondini Bononiæ, 1521, p. 431;) Quos Avicenna commissuras vocat, sunt certe *pliche* seu *plicaturae*, vel crispitudines, quæ sunt in parte exteriori substantiæ cerebri, sicut sunt plicaturæ et crispitudines in vestibus sericeis, laneis et lineis, non totaliter extensis, sed circumvolutis nostris corporibus, quando non sunt totaliter extensæ, et ideo faciunt illas plicaturos. Quarum aliquæ sunt parvæ aliquæ mediocres, aliquæ magnæ, et simili modo sunt in cerebro plicaturæ, quas plicaturas sequitur pia mater ad intra eas. Hæc verba adeo luculenta videntur, ut nullo commentario ageant."

"This opinion of the folded structure of the brain is not new, and this is evidently proved by the expressions which James Berengari de Capri uses:—"The infractuosities of the brain," says he, "which Avicenna calls commissures, are indeed folds or corrugations, which exist in the external surface of the brain, and they resemble the folds and crispations, which silk, linen or woollen stuffs contract, when they are not drawn closely round the body, but when we are loosely robed with them, so that they form folds, some small, some of moderate dimensions, others ample; in the same manner there exist in the brain, folds, which the vascular membrane accompanies in their sinuosities. These expressions, I think, are so clear that they need no explanation."

Berengari merely describes the convolutions and anfractuosities of the brain, as they appear to the eye; he compares them to folds formed by stuffs, as others have compared them to intestines and called them intestiniform; in the rest of the work there is not a single word which would lead us to presume, that he had any idea of the unfolding of the brain, as I have demonstrated it. Surely, if he had made such a discovery, he would have expressed himself in terms so clear, that anatomists would have had no occasion to read my works and see my anatomical demonstrations, in order to discover traces of the unfolding of the brain in the above passage of Berengari. When a well-attested discovery can no longer be denied, nothing remains but to question its real author.

ing to prove that the brain is not the organ of the mind, are annihilated.*

On brains supposed to be ossified or petrified, notwithstanding which, as is pretended, the faculties continued perfectly to manifest their energy.

Ossified and petrified brains are reckoned among the most appropriate phenomena, to array against the doctrine of the brains being the organ of the mind. Such ossifications were shown me, at Vienna, Leipzig, Amsterdam, Cologne, Paris, and always for the purpose of opposing my doctrine.

My opponents every where mention the ossified brain of an ox, which Duverney presented to the Academy of Sciences at Paris,† and maintain with Dumas, that as, by the testimony of Duverney, the ox had retained all his faculties, the case completely refutes the physiology of the brain.

Lastly, much has been said of a similar ossification, which Giro and Moschetti, provided with written attestation, were very anxious to pass for an ossified brain; and these gentlemen expressed their regret that this fact should overthrow my doctrine upon the functions of the brain.‡

Albert also saw a brain converted into an ivory-like substance,§ which had been given by a butcher to the celebrated Deyeux. Dr. Albert warrants this osseous mass to be a truly ossified brain. Every thing relating to the ossification of the brain has been carefully collected, and considered of great importance, for the very reason, that the world is in a complete error in relation to the whole subject.

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* I propose to consider the subject of *cerebral effusions* more thoroughly in a separate work.

† Acta acad. Regiæ scientiar. 1703, p. 314.

‡ Gazette de Santé, No. xxxii. 1809, 11 Novembre.

§ Ibidem, 1811, No. ii. premier janvier, p. 3.

These osseous masses are not so rare as is commonly supposed, neither are they so common as Dr. Marie Saint Ursin endeavors to prove. Relative to the petrified brain, spoken of by Giro, Moschetti and Ultini, he cites the thesis of Jægerschmid; but, except a single case which the author mentions incidentally, and upon the authority of Duverney, no instance of a supposed petrified brain is alluded to in this thesis. De Horn, Botall, Mogling, and Scheid, quoted by Jægerschmid, speak merely of small bones which are often found in the meninges, and Marie Saint Ursin cites these little bones as so many examples of petrified brains!

The pretended case, in which the cortical substance was ossified, and in which, within this ossification, all the rest of the brain was found in a natural state, never existed; indeed, an instance has never been presented, which could deceive the most superficial observer.

All the petrified brains, which some pretend to have seen, were and are nothing but osseous tumors upon the internal surface of the cranium, that gradually thrust back the brain, without destroying it. Sometimes these excrescences are formed upon one surface only of the cranium, sometimes upon the external only, and sometimes upon both; in this case, they project externally as far as they penetrate within. This is the case with the cranium, which Peter Frank presented to the university of Goettingen. A similar cranium is presented at the Medical School of Paris. Its external, as well as its internal excrescence, represents a horn, from two to three inches long, and one inch in thickness.

This single circumstance would be sufficient to exclude every supposition, tending to prove that these osseous masses are really ossified brains; some exhibit a spongy mass, considerably friable; the greater part are hard like ivory, but never calculous.* When they

* We sometimes find, in the cavity of the cranium, concretions, independent both of the cranium and the brain, which, from their appearance, may be called calculous; but it would be more accurate to call them osseous, since they are always formed of phosphate of lime.

are very large, and there are none larger than a common brain, the cavity of the cranium is unusually capacious; their surface is unequal like stalactites, and these asperities are what physicians and anatomists, who, I think, never saw a brain stripped of its meninges, have taken for convolutions.

We never can discover, either upon the exterior, or in the interior of these excrescences, the form of any part of the brain. It was, by this fact, that we convinced Professor Bonn, of Amsterdam, that the osseous mass, which he preserved so carefully, was not an ossified brain. From the same circumstance, Haller and Sœmmering have always been of the opinion which we profess. The external layer is of a dirty yellowish brown, the interior is of an ivory-like appearance, whitish, and of a fibrous structure.

Giro and Moschetti cut off their supposed ossified brain at the height of the great commissure; they found the color of the interior substance different from that of the exterior; but they could discover neither any cavity, optic thalami, corpora striata, corpora quadrigemina, nor origin of the nerves; and yet they maintain, that the ox, to which this brain belonged, had manifested no sign of disease! Doctor Simson speaks of another pretended petrified brain; he allows that the cerebrum is more voluminous than that of a common ox, that the cerebellum is at least six times as large as in its natural state; that even its form is absolutely different from that of the ordinary brain, &c.; finally, he adds, that it had been attached at one end to the cranium, and violently separated from it; and yet, after all these avowals, he considers this osseous mass as an ossified brain, and merely because a butcher found it in the cranium of an ox!

Twenty years ago, Valisneri advanced every thing that can be alleged, to prove that these osseous masses are not petrified brains. He begins by proving, that there can be no question in regard to the petrified brains, whose existence a Benedictine friar attempted to establish. He then shows, that the brains supposed to be ossi-

fied, are mere excrescences of the cranium; he proceeds to say, that one of these excrescences in his possession resembles the brain of an ox much more than that of Duverney; but that the prominences and depressions which it exhibits, can by no means be compared to convolutions; that in the interior, nothing can be perceived similar to the plexus choroides, or any other part of the brain of an ox.

Other bodies, he observes, when they become ossified, retain their primitive form. Duverney and the Academy of Sciences made a great mistake, by relying upon the testimony of a butcher; if Duverney himself had opened the cranium, he would have found, besides the osseous excrescences, the brain of the ox. A butcher of Modena is said to have been more observant, and actually to have found the brain by the side of the excrescence. Valisneri has given engravings of similar ones; every body, at first sight, would take his pl. ix. for the representation of an ossified brain. It exhibits a furrow in the middle, and two lateral parts covered with prominences; but, upon closer inspection, it is perceived that these prominences have no resemblance to the convolutions of a natural cerebrum, and that there is no part of the excrescence which can be compared to the cerebellum. As Duverney, in his osseous mass, showed the pineal gland, Valisneri made an engraving of this same mass. In the first place, the supposed pineal gland would be enormous; moreover, this gland being situated within the brain, and Duverney's ossified brain having never been cut, it would evidently be impossible to see the pineal gland, even if it were present. The portions, which Duverney maintains to be the cerebellum and the *processus vermiformis*, have not the least resemblance to those parts; Duverney even thought that he found the *processus vermiformis*, and the pineal gland, in a region opposite to that in which nature has placed them; and the Academy made no objection to all this!

Duverney thought that these osseous excrescences were exceedingly rare, and that no known specimen

existed, except that in his own possession. Valisneri, to controvert this opinion, mentions five, and gives drawings of them all; he also took the pains to give a true representation of the brain of an ox, along with that of the pretended ossified brain of Duverney, in order to make the difference perfectly manifest.

We can conceive the reason, why Giro, Moschetti, and Ultini imagined that they had found the centrum ovale. If these osseous excrescences be sawed in any direction whatever, the internal surfaces will be found of an ivory white, that is, nearly of the same color as the brain exhibits, when cut in that part which Vieussens calls the centrum ovale.

As to the state of health of the subjects that have osseous excrescences in the head, it is true that men, as well as animals, can live for years with such excrescences, and enjoy the exercise of various functions; yet in all the known cases, symptoms have been observed which result from great pressure upon the brain. In all those cited by Valisneri, not only were the animals meagre, but all their functions had become enfeebled.

If this extraordinary pressure can be endured so long a time, it must be attributed, apparently, to the slow formation of these excrescences.*

Ossified brains, therefore, owe their existence to the ignorance and love of the marvellous, manifested by observers, who pretend to have discovered them; and the objections to the doctrine, that the brain is the organ of the mind, founded upon these ossifications, do not deserve the least attention.

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* M. Fodéré proposes the truly original opinion, that the soundness of the faculties of an ox, which has an ossification in the brain, proves the great pre-eminence of the nervous system of man over that of brutes.

SECTION II.

ON THE MEANS OF FINDING, BY THE AID OF THE CEREBRAL STATE, A MEASURE FOR THE INTELLECTUAL FACULTIES, AND THE MORAL QUALITIES.

NOTWITHSTANDING the discrepancy of opinion upon the design of the brain, there have been found some philosophic physicians and physiologists, of sufficient sagacity, to maintain, that the brain is not only the instrument of all the intellectual faculties, but also of all the moral qualities; in general, the organ of the whole human character. These physicians and physiologists, such as Buchard, Boerhave, Van Swieten, Channet, Haller, Mayer, Sœmmering, Cuvier, &c., made the brain the particular object of their meditations and researches; they were convinced, that determinate relations must exist between the brain and the propensities and faculties; they attempted to discover the laws of these relations; and, to obtain their object, they neglected no resource which science in their times could afford them.

If we reflect upon the innumerable difficulties which they must have encountered, we readily excuse them for failing in their attempts; and, indeed, we must acknowledge, that we have been but a short time in a condition completely to embrace this subject. Let us not forget, that every species of animals is provided with a brain appropriate and peculiar to itself, relative to the appropriate and particular qualities of each species; let us remember that thousands of species of animals are yet wholly unknown to us; that the species which we know, as to name and external form, have not been studied, either in regard to the integrant parts of their brain or their peculiar qualities. What do we know of

domestic animals? The advantage which we derive from them. What knowledge have we of wild animals, other than that which enhances the pleasure of the chase? What do we know of insects, reptiles, amphibious animals, birds, of the infinitely diversified species of the inhabitants of the sea?

This cheerless prospect is surely of a discouraging nature to the most intrepid physiologist. At each step, his goal recedes: but, when he reflects upon the grandeur of the object which he is pursuing, his courage revives; it is the history of the brain that he proposes to trace; it is the history of the animal, of the living man, that he is to write; his purpose is to fathom all the depths of thought and all the caprices of the will; to unveil the springs of all the propensities, inclinations, mechanical aptitudes, in short, of all the faculties; his ardor is rekindled, his heart is warmed; he feels that he has received a sacred mission to accomplish so sublime a task; and if an inward sentiment of insufficiency warns him that he will produce only a sketch, he says to himself, "I shall have furnished some materials for a magnificent edifice."

I proceed to give an account of the attempts which have been hitherto made, to determine the relations existing betwen the brain and the functions of the intellectual faculties; I shall estimate the value of these attempts, and finally show, what we may expect from the most recent discoveries.

*The absolute volume of the brain, compared with its functions.**

If it be admitted, that the brain is the organ of the mind, the conclusion, that its functions must have a di-

* If, in this discussion, the *mass* of the brain is sometimes spoken of and sometimes the *volume*, it is because, among the authors whom I cite, some have attended to the mass, others to the volume; but as our observations are applicable in both cases, this difference is of no importance.

rect relation with this volume, is perfectly natural. A much larger cerebral mass has been found in man than in the largest of our domestic animals, for example, the ox, and horse; and, without more accurate researches in the animal kingdom, the predominant qualities of man were attributed to his greater cerebral mass; the world maintained generally, with Aristotle, Erasistratus, Pliny, and Galen, that, of all animals, man had the most considerable mass of brain; an opinion which has also been embraced by some moderns.

At a later period, it was found that the cerebral mass of the elephant, (pl. xxxv.) and several of the cetaceous order, was more considerable than that of man. This circumstance would naturally embarrass the partisans of the opinion to which we have just referred. In vain shall we extol the faculties of the elephant, and constitute the whale, king over the marine inhabitants; we shall scarcely be authorized to attribute to them those qualities, which form the pride of man. It became necessary, therefore, to renounce the opinion, that the intellectual faculties were to be estimated by the absolute mass of the brain.

The dog and the ape have a less cerebral mass than the horse, the ox, or the ass, and yet, in regard to intelligence, the former greatly surpass the latter. The wolf, sheep, swine, and tiger, are nearly in the same predicament, relative to the cerebral mass; and yet they are endued with qualities the most different, and even the most opposite. The fly-catcher and pigeon have nearly equal masses of brain, but there is a great difference in their instincts.

We see, moreover, that, by means of an extremely small cerebral mass, nature can produce the most wonderful effects; instances of this are the ant, and the bee: who has not observed their domestic economy, local memory, mechanical activity, their anger, the revenge which they inflict in a body, their careful education of the young, the harmony which reigns in a hive, or ant-hill? What is better adapted to its purpose than the spider's web, or the shaft of the formica-leo? Do we not see in the

staphalinus the blood-thirsty image of the panther? that of the jealous, proud, intrepid stag, in the valiant cock? those of the belligerent morse and wild boar, in the warrior,* and red-breast? Who will venture to say, that nature is deficient in the brain of the minutest insect, and that she has exhausted her resources in the brain of the whale?

If the mass only of the brain were to be considered, if its integrant parts were not to be regarded as elements in the calculation, the only difference between animals possessing a large cerebral mass, and those having a small brain, would be a greater or less intensity in the exercise of the intellectual faculties. The qualities peculiar to each species cannot be explained by the mere mass of the brain. The individuals of one species live solitary, those of another form societies; in some, the males and females live in a state of marriage; in others, no lasting union exists between the sexes. One kind of animal takes tne greatest care of its offspring; another abandons them; some animals build habitations; others migrate; others sing, &c. Can all these different instincts be explained by the magnitude of the cerebral mass? It is idle then, to seek, in the absolute mass of the brain, for a scale by which to measure the instincts, propensities and faculties.

The proportion between the volume of the brain, and that of the body.

Physiologists have manifested some reluctance in abandoning the idea, that the volume of the brain furnishes a scale for the measure of instincts, inclinations and faculties; they could not deny that the elephant and whale have a more considerable mass of brain than man; but, said they, the cerebral mass must be com-

* A kind of woodcock, called the warrior. (*Fringa pugnax*, Linn.)

pared with that of the entire body; and it is very evident that the mass of the elephant's or whale's body, divided by that of its brain, gives a greater quotient, than the mass of man's body divided by his cerebral mass. Moreover, they added, the spinal marrow and other nerves, both of which should be considered as continuations of the brain, constitute in these animals a much larger mass than in man; hence, a great part of the cerebral mass of these animals, is destined to the use of the organs of sense, to that of the voluntary motions, in a word, to the functions appertaining to nervous systems of a secondary order. In man, on the contrary, whose nerves are generally much smaller, it is quite the reverse. According to calculation, a much smaller cerebral mass, in the elephant and whale, is appropriated to the superior functions than in man. Hence, it follows, that the elephant and whale have, in proportion to the mass of the body, a much smaller brain than man.

Many phenomena strengthen these opinions, both with respect to the proportion of the cerebral mass to that of the whole body, and with respect to the proportions of the absolute mass of the brain. Reptiles, amphibious animals, and fish, have extremely small brains, both in regard to absolute mass, and in comparison to the entire mass of the body. The brain of a crocodile twelve feet in length, of a serpent eighteen feet long, or of a turtle weighing from three to eight hundred pounds, weighs, at most, two or three drams. The brain of the great vulture is not more voluminous than that of the crow. The turkey-cock has a less cerebral mass than the gray parrot; facts which favor the opinion, that it is the proportion of the cerebral mass to that of the whole body, which furnishes a scale, by which the instincts and faculties are to be estimated.

But the facts, above mentioned, are subject to many exceptions. Wrisberg, Sœmmering, Blumenbach, Cuvier and others, found that the sparrow, green canary, robin, wren, and especially several kinds of monkeys, have, in proportion to the body, a much larger brain

than man. These animals, then, in regard to intellectual faculties, ought to surpass man, and be infinitely superior to the stag, dog, and elephant. Several small species, also, in which nearly the same proportion exists, between the mass of the brain and that of the whole body, should likewise have nearly the same instincts, and the same faculties, and in equal degrees of perfection; but this is in direct opposition to experience.

Besides, it is almost impossible to determine the proportion between the mass of the brain and that of the body. Cuvier and others have attempted it; but their attempts are far from producing perfectly satisfactory results. The brain of an adult, according to Cuvier,* is to the body in the ratio of one to thirty-five. But, in fact, it is much more frequently as one to forty, fifty, and even sixty; for, suppose an adult to weigh from a hundred and twenty to a hundred and fifty pounds, and his brain from two and a half to three pounds, the proportion is that which I have stated above.

Cuvier, therefore, in comparing the cerebral masses of man and other animals, sets out from false data. Furthermore, he does not tell at what point he separated the brain from the parts adherent to it, whether, when he weighed it, there were larger or smaller portions of the nerves and medulla oblongata attached to it; whether he had stripped off the meninges or not; whether the meninges, if remaining, were filled with blood, or whether they were free from it; what was the age of the subject, whose brains he weighed.†

Haller had already remarked, that, in infancy, the brain is larger in proportion to the body, than in adult age. If, then, when investigating the measure of the

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* Anatomie comparée, T. iii. p. 149.

† There is, also, another source of inaccuracy. Individuals, possessed of very superior faculties, have, other things being equal, larger brains than those of ordinary talents. If, then, you compare the weight of a man's brain, endued with extraordinary qualities and talents with the weight of his body, you will find a very different proportion from that, which would result from the same experiment made upon a fool.

intellectual faculties, we were to consider the proportion only which the brain bears to the body, the infant should have more intelligence than the man or woman.

Sœmmering and Cuvier find, also, another difficulty in determining the ratio between the weight of the brain and that of the body. The weight of the body, say they, may be increased or diminished by one half, by a change of the individual, from a fleshy state to that of leanness or the reverse, but the brain does not participate in this change.

It is true, that the brain is not susceptible of growing fat, that is, as little adipose matter is deposited in the cerebral, as in the pulmonary substance; but it is certain that the contents of the cranium participate, with all the other integrant parts of the body, in the effects which result from very abundant or insufficient nourishment. Both in men and other animals, of a mean age and well fed, the brain is heavy, the convolutions are turgescent and compacted against each other. In decrepit, emaciated subjects, on the contrary, the brain, with equal dimensions of body, is sometimes not more than half as heavy as in the former case. The convolutions are flabby, and in some places even sunken. When persons have died of consumption, sometimes upon the whole internal surface of the cranium is found the impress of the convolutions; because, in consequence of the emaciation of the convolutions themselves, they leave wider intervals between them, and because the meninges become thin. I have made, with respect to this, most accurate observations upon rabbits, cats, monkeys, birds, and human subjects.

The proportion between the brain and the nerves.

Wrisberg and Sœmmering were therefore correct in the conclusion, that they must look otherwhere, than in the direct proportion between the cerebral mass and that of the body, for a scale to determine the inclina-

tions and faculties. These physiologists have observed, that, in other animals, the nerves bear a much greater proportion to the brain than in man. Hence they concluded, that, of all animals, man has the largest brain, not absolutely, nor relative to the body, but in comparison to the nerves. They, therefore, regard the proportion between the mass of the brain and that of the nerves, as the measure of the intellectual faculties. Afterwards, Cuvier adopted the same opinion.

This point of view is more generally correct than the other. In some insects a single nerve contains a much greater mass than the entire brain; in fishes, reptiles, amphibious animals, the mass of the nerves is immense compared to that of the brain; even in the most noble mammiferous classes, the spinal marrow, or at least several of the nerves of sense, compared with the brain, are much larger than in man. Yet this proposition is not generally true. If the monkey, the little sea dog, or birds, be compared with man in this respect, the result will be in their favor. If animals have some nerves larger, as for example, the optic nerve of birds; others, for example, the olfactory, are as much smaller. The porpoise has a larger brain, compared with its nerves, than the orang-outang; the phoca, a greater cerebral mass than the dog. The brain of a young unweaned porpoise was found a third larger than that of an adult human subject, although, with the exclusion of the optic nerve, which is entirely wanting, or according to Cuvier, extremely small, its nerves are not much more considerable than those of man.

The proportion between the nerves and the brain, therefore, cannot serve as a rule for the instincts and faculties. Besides, this comparison is founded upon the erroneous opinion, that the brain is the point to which all the nerves converge; that all the nerves proceed from the brain; that they are all a mere prolongation of it, ramifying into all parts of the body; and, consequently, that nature appropriates to the nervous functions, a

smaller part of the cerebral mass, according to the diminutive volume of the nerves.

Sœmmering found, perhaps, in some female subjects, smaller nerves than he had usually found in males; he, consequently, maintains that women have larger brains than men, in comparison with their nerves; and that by this means nature makes a recompense for the inferior magnitude of their brain, in reference to that of man. In our dissections we have paid particular attention to this circumstance; but, as, in the same individual the optic nerve may be very small, whilst the olfactory nerve is quite large, and *vice versâ*, as in general the relative proportion of the nerves admits of great variation; so, a large brain may coexist with very small nerves, and a small brain, with nerves of very considerable magnitude. A person of very weak organs of sense, and a delicate constitution, may have as much intellect and even genius, as if he had the eyes of a lynx, a very acute ear, &c. and the body of an athlete.

The proportion between the brain and spinal marrow.

Messrs. Cuvier, Sœmmering and Ebel, consider the relative proportion of the brain and spinal marrow, as the most infallible measure of the intellectual faculties; because, say they, this proportion shows how far the organ of thought prevails over the external senses. But Cuvier himself admits that there are exceptions to this rule, and adduces the dolphin as an instance; but, besides the nerves of the spinal marrow, as well as all others, have their particular functions independent of the brain; and the exercise of the cerebral functions cannot have less intensity, because some other nervous system has a greater intensity in the exercise of its functions. Were it otherwise, it would be decreed, in the name of physiology, that all persons of delicate complexion should have strong heads; and all robust, well built and muscular men, weak ones.

Finally, if the proportion of the brain to the spinal marrow and nerves, really afforded a direct means of determining the amount of intellect, this determination never could be made upon individuals while living; for the secret of ascertaining this proportion, otherwise than by autopsies, has not yet been discovered.

It is proved, therefore, that the doctrine of proportion between the organization and the intellectual faculties, can derive no light from this point of view.

The proportion between the brain and the face.

Some physiologists, among whom are Sœmmering, Cuvier,* Richerand,† Burdin,‡ Dumeril,§ measure the brain to ascertain its proportion to the face; they maintain that, under this point of view, man, of all animals, has the largest brain, and that animals are stupid and ferocious, in proportion to the magnitude of their jaws compared with the brain. This, say they, arises from the circumstance, that the smaller the brain is, compared with the face, the larger are the olfactory and gustatory nerves; but, they add, smell and taste are the very senses that reign in animals; for hunger and the sexual passions act upon them with an irresistible impulse, by which they are impelled, with blind fury, to unbounded cruelty. Therefore, the proportion between the brain and the bones of the face, furnishes an accurate measure for the faculties, instincts, and intelligence of animals; and the study of this proportion is of the very highest importance to the naturalist. Cuvier, in order to ascertain more accurately the magnitude and expansion of the optic and gustatory nerves, makes a vertical section from above downwards, through the

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* Leçons d' anatomie comparée, t. ii. p. 4.
† Elemens de physiologie, &c., edit. t. ii. p. 119.
‡ Cours d' etudes médicales, t. i. p. 26.
§ Traite elementaire d' histoire naturelle, p. 367.

middle of the cranium and the upper jaw, then compares the height of the cranium with that of the bones of the face.*

The ancients, continues Cuvier, appear to have observed, that a large forehead, in comparison to the face, indicates remarkable intellectual faculties; for this reason, they gave to their heroes, sages, demigods, their Jupiter, very projecting and large foreheads, compared with the face.

This opinion has been generally adopted; but none is further from the truth, for it is not founded upon experience.

It is by no means the large proportion, which the brain bears to the bones of the face; but it is the large head, the reservoir of great cerebral masses placed in the frontal region, that indicates superior intellectual faculties; for, whether such a voluminous brain is accompanied by a large or small face, there will always be, if accessory circumstances are the same, faculties equally eminent.

Who does not know men endued with superior talents, with very large faces, high cheek-bones, and both jaws broad and prominent? Leo X., Montaigne, Leibnitz, Racine, Haller, Mirabeau, Franklin and others, had, at the same time, very large heads and very large faces. Bossuet, Voltaire, Kant, and others, had quite small faces and very large heads. These proportions are as various in women, and Sœmmering mistakes, when he asserts that women have, in comparison to the face, larger heads than men. The sloth and phoca have, in proportion to the brain, the facial bones much smaller than the stag, the ox and horse. The bones of the cat's face compared with the brain, are smaller than those of the dog. But will any one maintain that the dog, the horse and the stag, are less intelligent and more ferocious than the cat and the sloth? The ass is less intel-

* *Cuvier*, Leçons d' anatomie comparée.

ligent than the horse, not because he has a smaller brain, compared with his jaws, but because he has, in general, a smaller cerebral mass than the horse. Animals, which swallow their food without chewing it, or which have very weak masticating muscles, such as the ant-eater, bear-rat, phoca, and most kind of birds, have very slender facial bones. The facial bones have therefore a relation to the nature of the food, the mode of mastication, and the olfactory and gustatory nerves; but they are not proportionate to the faculties, instincts, propensities, either of the animal or the man. Consequently, the scale in question is not at all applicable.

The proportion between the brain and the neck.

Bichat* and Richerand have revived a method of measuring the intellectual faculties, spoken of by Plato; according to whom, men and other animals that have long necks, possess intellectual faculties inferior to those of others, because the brain being more remote from the heart, must experience a less degree of irritation through the medium of the blood.†

Here the authority of Plato proves but one thing; which is, that men who enjoy a great reputation, ought, above all others, to avoid throwing out ideas at random; for, however erroneous they may be, they will be repeated for centuries.

The relative proportion of the cerebral parts.

Finally, the relative proportion of the cerebral parts has been examined, to see if this would not furnish a means of determining the nature and degree of the intellectual faculties.

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* Sur la vie et la mort.
† Nouveaux élémens, Physiologie, 7th édit. t. ii. p. 134.

Cuvier thinks there is not the least difficulty in comparing the weight of the cerebellum with that of the cerebrum, since neither is subject to the deposition of fat, and, in general, neither is influenced by the variations, which alterations of the health produce in other parts. He makes this proportion in man as 1 to 9 ; in the saïmiry, as 1 to 14 ; in the ox, as 1 to 9, &c.

Must we conclude that, because the proportion between the cerebellum and cerebrum is the same in man and in the ox, they are possessed of equal faculties?

I confidently affirm, that no two men exist, whose cerebral parts have the same relative proportion ; and that, in each individual, the proportion of the cerebellum to the cerebrum, differs from that of others. I have in my possession several craniums, in which the cerebrum was very large, and the cerebellum quite small: I have others, in which the cerebrum was small, while the cerebellum had attained to a high degree of development. Generally, in men, the cerebellum, compared with the cerebrum, is larger than in women ; the contrary rarely occurs. From infancy to the age of puberty, the younger the individual, the smaller the cerebellum compared with the cerebrum, except in a few cases, when this part, contrary to the general rule, is prematurely developed. In women, the posterior lobes, in comparison with the cerebrum, are much more voluminous than in men. In the same brain, it frequently happens that isolated convolutions are of considerable magnitude, whilst others are very small. Tupper repeats the assertion of Sœmmering and Rudolphi, *that the form and dimensions of the cerebral parts, are the same in one individual as in another.* If this were the case, all heads and all brains should have nearly the same form and dimensions; but even a superficial comparison is sufficient to establish the contrary.

From what has been said, it follows, that we must renounce the idea of any fixed proportion between the different parts of the brain.

But this extends to those parts only, which constitute

respectively an independent whole, and by no means to the integrant parts of the brain. Each of the cerebral parts which, of itself, constitutes an independent whole, has peculiar functions to perform, and must be considered as a real organ. These parts, as I have already said, have not determinate proportions to other parts.

But, it is wholly the reverse with the various apparatus, which make a part of one and the same organ; for instance, the different origins and various accessory apparatus of the optic and olfactory nerves. There are determinate proportions between these integrant parts, and the organ which they constitute, so that the magnitude of one of these integrant parts enables us to judge of the magnitude of the organ. Thus, for example, a certain proportion exists between what is called the pons varolii, and the cerebellum; determinate proportions exist between the corpora pyramidalia, the anterior part of the great fasci-crura, the supposed optic thalami, or great superior source of supply, the corpora striata, and the anterior and lateral parts of the hemispheres; it is evident that from these proportions between the accessory or supplying apparatus, and the integrant parts of an organ, we can draw inferences in regard to the intensity of particular faculties, but that we can infer absolutely nothing in regard to the intensity of the sum total of the faculties. I here merely indicate this inference; I shall resume it hereafter, and rigorously prove it.

The facial line of Camper.

In order to determine the cerebral mass, and, consequently, the intellectual faculties, Camper draws a base line from the roots of the upper incisors, to the external auditory passage; then another straight line, from the upper incisors to the most elevated point of the forehead: according to him, the intellectual faculties of the man or animal, are in direct proportion to the magnitude of the

angle, made by those two lines. Lavater, with this idea for a basis, constructed a scale of perfection from the frog to the Apollo Belvidere. As nature really furnishes many proofs in support of this opinion, it has been generally received, even by anatomists and physiologists; and, notwithstanding the arguments by which it is victoriously opposed, the learned cannot resolve to abandon it. Cuvier himself furnishes a list of men and animals, in support of this doctrine; few naturalists oppose it, but almost all give it their support.*

Camper's attempt necessarily failed; for his manner of drawing the lines and measuring the facial angle, enabled him to take into consideration the anterior parts only of the brain situated near the forehead: he entirely neglects the posterior, lateral and inferior cerebral parts. This method, then, at most, could decide upon those faculties only, whose organs are placed near the forehead.

Cuvier estimates the facial angle of the new-born infant at ninety degrees; that of the adult, at eighty-five; that of decrepit old age, at fifty.

From this statement it appears, that, at different ages, changes take place in the form, either of the brain or the cranium; hereafter I shall prove that such changes really occur.

The forehead of a new-born infant is flattened; on the contrary, that of a child some months old, and until the age of eight or ten years, especially in the case of boys possessed of superior talents, it is projecting, and forms, notwithstanding the approximation to the age of puberty, a larger facial angle than in the adult; this angle, therefore, does not diminish in the inverse ratio of the age. In like manner we find decrepit old men, whose facial angle is as great as it was in the vigor of manhood; for, although in decrepitude the brain is subject to atrophy, there are old men, the exterior contour of whose crania undergoes no change. The angle, as

* This doctrine is revived, *Dict. des Sciences med.* Delpit and Reydellet.

stated by Cuvier, for different ages, were measured upon different individuals; if it were estimated upon the same persons at different epochs of his life, the result would be entirely different.

In general, the proportion between the forehead and the face, is different in different individuals. No conclusion can be drawn from the proportions, which exist in one person, relative to those of another; among a hundred individuals of the same sex and age, no two can be found, in whom the same proportion exists between the forehead and the face; it necessarily follows, then, that no two will have the same facial angle. Physiologists seem to admit, that the proportion between the brain and the bones of the face, is different in different species of animals; but they appear to think that, in all the individuals of the same species, all the young, all adults, all the old, there exists a constant proportion between the cerebral mass and the face.

The researches of Blumenbach show that three-fourths of the animals known, have nearly the same facial angle; and yet what a disparity between their instincts and faculties! What information, then, do we derive from Camper's facial angle?

Moreover, as Cuvier himself observes, the cerebral mass is by no means placed in all animals, immediately behind or beneath what is called the forehead. In a great many species of animals, on the contrary, the external table of the frontal is at a considerable distance from the internal, and this distance increases with the age of the animal. The brain of the swine is placed an inch lower than the frontal bones seem to indicate; that of the ox, in some parts three inches; that of the elephant, from six to thirteen. In other animals, the measurement is generally commenced at the frontal sinus instead of the cerebrum. From these considerations, Cuvier was induced to draw a tangent to the internal instead of the external surface of the cranium. The cerebrum of the wolf and many species of dogs, especially when the individuals are very old, is placed

directly behind the frontal sinuses. In the wolf, especially the large and most ferocious variety, it is depressed as in the hyena; in the dog it is situated higher or lower, according to the species; but, notwithstanding this difference in the situation of the brain, the facial angle, as it is commonly measured, must be the same; from this the inference would be, that the dog, the wolf, and hyena have the same qualities, and each in the same degree. In the greater part of the rodentia, the morse, &c., the brain is so depressed and so placed behind the frontal sinuses, that the facial line cannot be drawn. The facial line of the cetacea, on account of the singular conformation of the head, would lead to results absolutely false.

I know many negroes, who, with very prominent jaws, are quite distinguished for their intellectual faculties; Yet the projection of the jaws renders the facial angle much more acute, than it would be with the usual conformation of Europeans. In order that the same angle should exist in a European, the forehead must be flattened and retreating. But the foreheads of the negroes in question, on the contrary, are very projecting. Who, under these circumstances, would expect to find the same amount of intellect corresponding to the same facial angle?

The facial line cannot be applied to birds, as many naturalists have already observed.

From what has been said, we should expect that naturalists would at length renounce the facial angle of Camper; but the most ignorant are generally the most conceited.

In spite of this complete refutation of Camper's facial line, Delpit extols it in the following terms:

"If ever a relation of this kind presented characters of generality and fixedness, adequate to excite a reasonable confidence in matters belonging to the domain of empiricism, rather than that of science, it is the relation or proportion of magnitude, which Camper first perceived and revealed, by comparing the brain of man

with that of the different species of animals. We here see a successive decrease of intelligence, proportionate to the acuteness of the facial angle and the consequent diminution of the cerebral cavity. This affords a constant and fixed relation. It can be appreciated with a sufficient degree of exactness by the direct light of comparative anatomy, and by observation of the habits and intelligence of the different classes of animals; it can also be verified by the comparison of men very unequally endowed with intellectual faculties, in whom the contraction of the cerebral cavity and the magnitude of the facial angle exhibit the most remarkable diversities. Here the physiognomical sign has, if I may be allowed the expression, a wide extent of acceptation; it rests upon a broad basis, upon a definite division, and one of easy comprehension and verification; for, if there is some discrepancy of opinion, in regard to the number and nomenclature of the faculties of the mind, the sentiments of the soul, the modifications or shades of character which give birth to particular passions, moral dispositions, habits, whether virtuous or vicious; if these classifications are, in a great measure, arbitrary, and the language used somewhat vague; if, in short, the greater part of these nominal faculties are mere abstractions of the mind, purely imaginary existences, and therefore cannot be actually located in any part of the brain; the case is quite different, when we merely seek to establish a general relation between a constant sign manifested in the organization, and the degree of reason, mind, or intellect attributed to different men, or the degrees of sagacity attributed to different species of animals. Here, no one is at a loss, because there is ample latitude for comparing and judging; in the system of Gall, on the contrary, the comparisons rest upon minute points, which are subject to discussion, exceptions, a thousand uncertainties in the signs and various applications." *

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* Dictionnaire des Sciences Méd. t. xxxviii. p. 263.

If the reader will review what I have said against Camper's facial line, he will find a refutation of all this reasoning of Delpit; a proof that he defends it merely because it is in vogue. It is this very generality and fixedness, which render it, in almost all cases, inapplicable; this is the inherent defect in the supposed importance of Camper's facial angle. It is implicitly supposed, that no difference but that of degree, exists between the capacities of the different species and individuals of the human race, and the different species and individuals of the animal kindgom. Thus the intelligence of men and other animals would always be proportioned to the magnitude of the facial angle. This being premised, I ask, which, out of two, three, four, &c., has the most intelligence, the dog, ape, beaver, the ant, or the bee? Ants and bees live in an admirable republic, and form astonishing constructions, which they know how to modify according to circumstances. The beaver and penduline build with equally marvellous skill, and with a foresight which seldom errs; the dog and the ape have very little foresight, and are incapable of the most insignificant construction. Which has the greater intelligence, Voltaire or Descartes? Could the former have been a mathematician and the latter a poet? Which has the higher degree of intellect, Mozart or Lessing, who, with all his genius, detested music? In short, which has the most intelligence, my dog who retraces his steps through the most complicated routes, or myself, who am always going astray? Measure now the facial angle of the ant, bee, beaver, penduline, ape, my dog, and of myself, and estimate the result. Acknowledge, then, that your division, so definite, so easy to be apprehended, is absolutely useless, and that you are obliged to advert to divers instincts, propensities, faculties, and their different degrees of energy, to which your facial angle is wholly inapplicable. Your intelligence, instinct, address, are in reality mere abstractions, imaginary existences. Do you consider the propensity to procreation, the love of offspring, the carnivorous in-

stinct, the talent for music, poetry, &c. as imaginary existences? You see, then, that it is more convenient to tread the beaten path, than to verify observations. I pity students who are obliged to learn such errors in the elementary works of their professors, such as the *Nouveaux Elémens de Physiologie* of Richerand. See tom. ii. p. 119.

The occipital line of Daubenton.

Daubenton draws a base line from the inferior edge of the orbits to the inferior edge of the occipital hole; then another straight line through the condyles, which intersects the base transversely. Blumenbach has already observed, that, in all kinds of animals, without exception, these lines form an angle of from eighty to ninety degrees. The occipital line, therefore, does not even indicate the most striking differences between the brains of species the most diverse, and takes account neither of the superior, inferior, nor lateral parts; consequently, it is of no use.

It follows, from these fruitless attempts, that, until the present day, men have been too ignorant of the structure and functions of the brain, to advance any thing positive, either upon the nature of the qualities of animals, or the means of estimating the degree in which they are possessed.

It only remains for me to place the reader in a favorable point of view, for appreciating the advantages which my discoveries afford in both these respects.

Deductions from different forms of the head.

We have no concern with the different forms of the head, except so far as they denote the form of the brain. Those forms of the cranium, which are independent of the forms of the brain, have no signification in cerebral

physiology. Those, on the contrary, which are the results of cerebral influence, must, necessarily, have a precise signification, since they arise from the development either of the entire brain or of some of its integrant parts.

The art of interpreting the forms of the head, supposes, as will be easily conceived, a knowledge of the functions, both of the brain and its several parts: to satisfy, at this time, the curiosity of the reader, would invert the order of arrangement; therefore I shall here merely make a few general observations upon the form and dimensions of the brain and head, relative to mania, dementia and imbecility.

Many adversaries of cerebral physiology have an idea that *Cranioscopists*, as they please to call us, maintain the existence of an organ of mania, dementia, &c., in general, a form of the head, which enables us to foretell the existence of mania. Instead of studying the spirit of my doctrine, they exert themselves to refute the extravagant opinions, which they themselves impute to us.

Does there exist a form of the head from which the existence of mania can be inferred?

"The opinion is pretty general," says Pinel, "that mental alienation is to be attributed to defects in the brain, and especially to defects and disproportions in the cranium. It would doubtless be an important object in science, to show that fine proportions of the head are the exterior sign of distinguished faculties and superior understanding; so that, in the first place, we might take for our type the master-piece of ancient sculpture, the head of the Pythian Apollo; place in the second rank the heads of men most favorably organized for the fine arts and the sciences; then descend, through all the successive degress of disproportion in the head and intellectual capacity, to the man sunk in dementia and idiocy. But observation is far from confirming these specious conjectures; for we sometimes find the most beautiful

forms of the head, accompanying the most limited degree of intelligence, and even perfect mania; and, on the other hand, strange varieties of conformation co-exist with all the attributes of talent and genius."*

We can, without doubt, assign forms of the head, which denote intellectual faculties in general very distinguished, as well as those which result from the development of a particular organ, and which, consequently, indicate merely an isolated talent. But it would be a great error to consider, as the ideal of the intellectual faculties, the Apollo Belvidere, which the sculptor intended only as the ideal of the beautiful. Every one is aware, that beauty and mediocrity, as well as ugliness and genius, frequently co-exist in the same person. If Pinel knew upon what degree of development in the integrant parts of the brain, a particular great talent, such as that of the great musician, geometer, mechanician, &c., depended, he would be less astonished at the fantastical varieties of conformation, found in the heads of certain individuals.

Pinel endeavors to prove, that injuries and monstrosities rarely occur in the heads of deranged persons; "for," says he, "alienation is a very rare phenomena before the age of fifteen; and seldom takes place until that of twenty, at which time, the bones of the head are completely ossified; and the causes which, at a later period, produce mania, such as very strong moral affections, religious fanaticism, disappointed love, intense grief, inordinate ambition, cease to have any effect upon the form of the cranium."†

In treating of the influence of the brain upon the cranium, I shall prove that Pinel's assertion is erroneous: even if the exterior form of the cranium were invariable, the brain is not so, and, consequently, the internal surface of the cranium must be subject to variations. The

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* Sur l' aliénation mentale, 2d. edit. p. 459 et 460.
† Ibid. p. 455—458.

affections and passions spoken of by Pinel, principally affect the brain, and through this medium only can they react upon the rest of the body. This position is so evident, that details would seem to me superfluous.

Pinel cites, also, the observations of Greding, who, among a hundred insane, found three very large heads, two quite small, and a great number of craniums much thickened. Some of these heads, says Greding, were distinguished by a peculiar form of the frontal: this bone was sometimes smaller and narrower than usual, and contracted at the temples; in other instances it was very much rounded or elongated. As Pinel does not believe, (and in this he is correct,) that the cause of alienation depends upon the form of the head, but that this form has a merely accidental coincidence with alienation, he determined to measure these heads in all their dimensions, in order to form a correct idea of their internal capacity; but as the irregularity of the internal surface of the cranium presented too many difficulties, he was obliged to depend upon mechanical means.*

After having measured several heads, both of persons in the enjoyment of their reason, and of the insane, he became convinced, that a more or a less free exercise of the intellectual faculties can co-exist as well with a round head, as with an elongated one; and, consequently, that mania has no connection with either of these fundamental forms of the cranium, but that certain malformations of the head have a connection with certain kinds of alienation, especially with dementia and imbecility.

I have already spoken of Dr. Esquirol's measuring the heads and craniums of the insane.

From fourteen to sixteen years ago, measurements, in all their dimensions, were made at Vienna, of the craniums of persons who had died insane.

I ardently approve of all the means taken to detect the secret of nature, in regard to so important a point

* Sur l' aliénation mentale, 2d edit. p. 463.

as the exercise of the intellectual faculties, and the derangement of this exercise. If the object is not attained, much is already gained, by knowing what course will not conduct to it.

I have, however, always been persuaded, that the most accurate measures of the internal capacity, and even the most precise determinations of the cerebral form, can afford us no instruction in regard to mania, properly so called. Much less would I entertain the idea, that mania or dementia can ever be detected by the form of the cranium.

Mental disorders, so far as they constitute mania or dementia, are simply a derangement in the functions of the brain, in the same manner as other diseases are merely a derangement in the functions of other parts of the body. One can be affected with alienation, whatever be the form of the brain, just as one, with the best constitution, may become sick. Every brain, without regard to its form, is liable to become deranged, enfeebled or paralyzed, as well as any other part of the body, without regard to its conformation: every man, therefore, is liable to have his intellectual faculties deranged, or enfeebled; that is, to become alienated in mind, or fall into dementia.

It would be presumptuous, however, to maintain the non-existence of any exterior sign, indicative of a greater or less disposition to mental diseases. A physician, who has had any degree of experience, can generally perceive to what diseases a particular indiviual is subject. There are dispositions to mental as well as to other maladies, inasmuch as they are founded in the constitution: every body knows that a contracted, flat, narrow chest, is indicative of consumption; in like manner, exterior signs exist, which enable us to presume not only dispositions to alienation in general, but to a certain kind of alienation or to a particular partial alienation, especially monomania. But no one confounds a disposition to consumption with the disease itself; and to say that we recognize, by certain signs, a disposition to alien-

ation, is not boasting that, by these signs, we can recognize the alienation itself.

Suppose that the cerebral part, by means of which man is susceptible of moral and religious sentiments, is largely developed, the individual will seize with avidity every thing that relates to these ideas and sentiments. Suppose that the activity of this organ is not balanced by a suitable activity of the other faculties; that the individual happens to be violently affected; he will be threatened with alienation. Do you think him menaced with satyriasis? Do you apprehend that he will believe himself a king, an emperor? By no means. Every one would fear that he would become a prey to pious extravagances. But I abstain from entering into the details here, because, from their nature, they cannot be understood by the reader, until he perfectly comprehends my section upon the particular organs.*

I have observed, that persons, who have very large eyes, projecting even with the head, are generally disposed to some kind of alienation; this is not the case, however, except when such eyes indicate cerebral maladies which had occurred in infancy. Want of symmetry in the head is frequently a consequence of rickets, sometimes also of particular cerebral maladies, such as effusion of the cavities of the brain, &c. Hence in an equal number of heads not symmetrical and symmetrical, a larger proportion of the former will be found to have belonged to deranged persons. Haller and Bichat thought, that a want of symmetry in the two halves of the head, was one of the principal causes of mania.

But it must not be forgotten, that frequently the most healthy heads, I mean those whose form has not been in the least influenced by disease, have the two halves unequal. When children have been constantly accustomed to lie upon the same side, the forehead is often more

* See Section on predispositions to insanity.

prominent on that side than on the other, while the occiput is more flattened than on the opposite side. But such deformities have not the least influence upon the exercise of the intellectual faculties; besides, they frequently disappear at a more mature age. I have already spoken of a friend of mine, one side of whose forehead is half an inch lower than the other. Although he often complains that he cannot think on the less elevated side, nothing has yet manifested itself, which indicates the least trace of mania, or dementia. There was considerable inequality between the two halves of Bichat's head, as is shown by the cast taken after his death. Probably he himself was not aware of this deformity: but, who will maintain that Bichat was not a man of genius? Sometimes the want of symmetry in the head is hereditary, without exercising any influence upon the faculties. I know a family at Vienna, in which all the children, as well as the father, have distorted faces and deformed heads, yet they manifest no derangement of the intellectual faculties.

I am acquainted with other persons, still living, the diameter of whose head is much greater, from one temple to the other, than from the frontal to the occipital; nevertheless, their intellectual faculties do not suffer from this deformity. Galen thought that a child born with such a formed head could not live. I have a similar head in my collection; it is so irregular, that its diameter, from ear to ear, is more than an inch greater than that from the frontal to the occipital; pl. xxxi. and pl. xxxii. I have no knowledge that this head belonged to an insane person.

If the heads of the insane exhibit a part of the cranium, whose interior and exterior dimensions are less than those on the opposite side, and even one hemisphere of the brain smaller than the other; it is frequently the consequence of a long cerebral malady previously experienced; by reason of this disease, one of the hemispheres is considerably atrophied, and the cavity of the cranium on that side, contracted; sometimes

the cranium itself is diminished. Having pointed out the indications, which different forms of the head may give relative to mania, I am to determine the connection which a large or small brain, a large or small head, has with the intellectual faculties.

The influence of a large or small brain, of a large or small head upon the manifestation of the moral and intellectual powers.

The philosophers or physiologists, who, in their works, have discussed the question—Has the mass of brain any relation to the faculties of man; have delivered nothing but vague opinions upon the subject; and this will always be the case, until fixed principles shall have been established. In support of what I advance, I shall cite the most distinguished authors. Pinel, who is so often put upon the right track by his observing mind, wants the courage to persevere, as soon as the influence of the cerebral organization over the intellectual faculties becomes the subject of inquiry. It is, nevertheless, true, that his excellent observations, in connection with mine, would be sufficient to determine this question, so important both to physiology and pathology. If any thing vague is found in the opinions of Pinel, it arises principally from the fact that, in mental diseases, he does not always pay sufficient regard to the distinction between *mania, dementia, and imbecility*. Mania, dementia, and imbecility are mental diseases; but neither dementia nor imbecility is mania, nor is mania, dementia.

I have always regarded dementia and imbecility in the sense ultimately fixed by Esquirol.

"Dementia," says he, "differs essentially from mania, above all, from melancholia. In these last, the faculties of the understanding are affected by excess; maniacs and the melancholic rave on account of excitement; their delirium seems to depend upon a state of convul-

sion, or an increase of energy in the nervous and cerebral systems; they are misled by erroneous sensations, false perceptions, an exuberance or fixedness of ideas. He who is affected with dementia, imagines nothing supposes nothing; he has few, or scarcely any ideas; he has no determination; is passive; the brain is in a state of depression. Whilst in mania and melancholy, every thing indicates force, power, and effort; dementia, on the contrary, is characterized by laxness, impotence, and weakness.

"Dementia must not be confounded with imbecility, or idiocy. The imbecile has never had the faculties of the understanding sufficiently energetic, or sufficiently developed, to reason correctly. One who has fallen into dementia, has lost a great part of those faculties."*

Although this sketch is not at all applicable to partial imbecility, it is sufficient to show the difference between complete imbecility and dementia. Mania and dementia, as I have already observed, have no connection with any particular conformation of the head, or with its volume. It is very different with congenital imbecility, or superior genius. In Pinel's Traite de l'aliénation mentale, is an engraving, (plates ii. v. and vi.) of an extremely small brain, which must have occasioned complete imbecility. Upon this subject he thus expresses himself: "Still we cannot affirm, that this want of capacity is the sole and exclusive cause of the slight degree of development of the moral faculties."† True, the extreme smallness of the cranium, and the manifest want of cerebral development, are not the only reason that the intellectual faculties are so circumscribed; for, we meet with those born imbecile, the exterior conformation of whose heads by no means indicates their mental condition; yet, where this want of development exists, there is always imbecility more or less complete.

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* Dictionnaire des Sciences médicales, art. *Demence*, T. viii. p. 283.
† Page 474.

If Pinel, as we have seen above, asserts, "that there are certain malformations of the cranium, which are connected with a state of alienation, especially dementia, or congenial idiocy;" this is true of idiocy only.

Finally; Pinel compares the two very small heads of persons born imbecile, which he has figured, (plates i. ii. fig. 5 and 6,) with other heads of the insane, and with the head of a very talented child, seven years old. He is especially careful to evince the difference which exists, both in regard to form and volume, between the head of the imbecile and that of the child endued with superior talents.

He points out the thickness of the skull of a girl, eighteen years old, born imbecile, and the contraction of the cerebral cavity, which is a natural consequence of that thickness. He is astonished at the disproportion of this extremely small head, compared with the whole stature and the magnitude of the face.

Pinel, after having painted from nature, and in the most vivid colors, the highest degree of imbecility; after having evinced, in a precise manner, the singular diminutiveness of the heads of these imbeciles; in a word, after having discovered the truth, is yet too faint-hearted to embrace it. "But," says he, "I must beware of too precipitate inductions; I therefore confine myself to historical details, without pronouncing yet that there exists an immediate and necessary connection between the state of idiocy and the malformations which I have described."

And yet he contradicts himself, when, speaking of the small brain, pl. i. fig. 5 and 6, he says,—"I suppress the anatomical considerations which the examination of this head suggests, and which might indicate a kind of correspondence between certain physical injuries of the brain, and some remarkable changes, effected in the functions of the understanding."

He seems, in short, to have familiarized himself with this idea: he says, in the article *Alienation**—"Con-

* Dictionnaire des sciences médicales, T. i. p. 313.

genital idiocy appears almost always to be connected with an original defect in the brain; incapable of undergoing any kind of transformation, and as durable as the cause by which it is occasioned."

The brain represented in pl. xviii. fig. 11, from Willis, belonged to a young man imbecile from birth;* pl. xix. fig. 1, is the head of a man, aged twenty-six, who was born completely imbecile.

In the collection of the School of Medicine, is an equally small cranium, which belonged to a perfectly imbecile child.

The little cranium, pl. xviii. fig. 1, is that of a girl, seven years old, who was born in the same state. The cranium and head, pl. xx. fig. 1 and 2, belonged to a girl, twenty years old, also absolutely imbecile.

In our travels, we have had occasion to observe several individuals, totally imbecile from birth, who are still living, and remarkable for small heads. At Manheim, Professor Schüler showed us a family constituted as follows: the father has a head rather small, and squints; the mother is well organized. One of the boys, four years old, is affected with a kind of paralysis and marasmus; his head is remarkably small, and his face pretty large; his forehead is contracted, and very retreating; the occiput is entirely flattened, and the head generally is but a little larger than that presented to me by Professor Bonn, of Amsterdam. One side of the right parietal is sensibly higher than that of the other; the whole of the child's left side, also, is more completely paralyzed and atrophied than the right. The second boy, aged two years, has also an extremely small head; it is spherical: this child is constantly affected with convulsive motions: both are perfect idiots, and live entirely upon milk. A boy, four years old, in a similar state, was brought from Ghent to Paris: the form and dimensions of his head are the same as those

* Cerebri anatome, Amstelodami, 1667, in 12, p. 30.

of the cranium, pl. xx. fig. 1. A short time ago, a boy was shown to me, whose head has also the same form and dimensions: this child has never manifested the least degree of intellect. Dr. Spurzheim has sent me, from London, a drawing of the head of a complete imbecile, which perfectly resembles that shown on pl. xix. fig. 1.

Richerand mentions three idiots, the capacity of whose skulls is extremely small.*

Cabanis speaks of children, the state of whose brain utterly precludes the ability to think. He had occasion to examine one of these automata. "Its stupidity was occasioned by the extreme smallness and malformation of the head, which had never had any sutures. It was born deaf. Although its eyes were in a pretty good condition, and appeared to receive some impressions from the light, it had no idea of distances; yet, in other respects, it was quite healthy and strong, and ate with avidity. When eating, if it were not rapidly supplied with one morsel after another, it fell into violent agitations. It was fond of grasping whatever fell into its hand, particularly animated bodies, whose gentle warmth, and, I believe, whose emanations, appeared to give it pleasure. The organs of generation were in a precocious state of activity, and there were frequent proofs that they strongly attracted its attention."†

These heads, measured immediately above the superior arch of the orbit, and the most prominent part of the occipital, are from eleven to thirteen inches in circumference. They measure, from the origin of the nose to the posterior part of the occipital, from eight to nine inches; they consequently contain as much brain as the head of a new-born child, that is, a fourth, fifth, or sixth of the cerebral mass of an adult, in the full enjoyment of his faculties.

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* Nouveaux élémens de physiologie, 8th edit. t. ii. p. 194 and 195.
† Rapport du physique et du moral, t. i. p. 150.

The perfect exercise of the faculties is absolutely incompatible with a brain so small, and there always exists in such a case idiocy more or less complete: to this rule no exception has been or ever will be found. Why then shall we not render homage to truth? why not establish it as a principle, that there does exist a direct relation between imbecility and the mass of the brain? *

Fodéré attributes the intellectual deficiency of the Cretins (with small heads) to the unequal distribution of the *vital principle* accumulated towards the organs of vitality and generation, and withdrawn from those of feeling.†

Certainly experience by no means proves, that the organs of generation in this unfortunate class of beings are always very active. I know several individuals, of this class, who have not the slightest idea of the difference of the sexes.

It is not astonishing, that Fodéré does not invariably find imbecility connected with a small head. Observe the manner in which he expresses himself: "We might almost affirm that insanity would be general in hot and dry countries, and especially on the coast of the Mediterranean, if contraction of the cranium at the temples were a sign or cause of this disease. At Marseilles, August 15, 1814, I saw a procession of *St. Laurence*, composed of fishermen and sailors, all of whose craniums were small and very much contracted laterally. I had previously remarked the same thing in several villages in the maritime Alps, on the occasion of proces-

* The orang-outang has not quite the same quantity of brain as the imbeciles of whom we have been speaking; and this refutes Buffon, who maintains that the orang-outang has as great a cerebral mass as man; from which this author thinks the conclusion legitimate, that the brain is not essential to the exercise of the moral qualities and intellectual faculties.

† Du *Delire*, t. i. p. 316.

sions, ceremonies, which afford great opportunities to observers in the art of physiognomy." *

This law of nature, relative to heads from eleven to fourteen inches in circumference, becomes more fully confirmed by the examination of heads from complete imbecility, to the ordinary exercise of the intellectual faculties exclusively. The measure is comprehended between the following limits: the periphery above mentioned varies from fourteen to seventeen inches; and the arc between the origin of the nose and the occipital foramen, nearly twelve. These dimensions are accompanied with a greater or less degree of stupidity or fatuity, inability more or less complete of fixing the attention on a determinate object; vague sentiments, indeterminate and transitory affections and passions, an irregular train of ideas, speech consisting of broken phrases, or merely of substantives or verbs, as to eat, to walk, to play, &c. blind and irregular instincts, or an almost entire absence of them.

We had, at Paris, a very remarkable dwarf—Babet Schreier, born at Siegelsbach, a village near Manheim. This girl, when born, was six inches in length: at the age of seven years and one month, she had attained the height of twenty-three inches. At the time of her birth, she weighed a pound and a half; at this age, eight and one fourth pounds. A description of her has been published by Dr. Dornier.† Relative to the intellectual faculties of this child, he speaks in the following manner:

"The intellectual functions of this girl have been backward; they are very little developed for one of her age; she has scarcely more intelligence than children four years old; like them she is subject to little caprices, but this is to be imputed, in a great measure, to bad

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* Du *Delire*, t. ii. p. 88 and 89.

† Description d'une miniature humaine, ou tableau historique d' une fille naine; par A. M. Dornier. A Paris, de l'imprimerie de J. Smith, 1817.

education. She has hitherto been taught childish manners only; her disposition is naturally sweet, caressing, gay, lively, sportive; she is susceptible of affection and attachment to those who show her attention; she is fond of company, dress, toys, and pieces of money; is inquisitive, and has considerable power of imitation, which bespeaks perfectibility, and she repeats quite well what she is taught to say. If instructed in the principles of education, she would probably learn with ease; her intelligence and memory afford a presumption, that attempts to instruct her would not be unsuccessful; she never has a more pleasing appearance, than when one endeavors to fix her attention upon any thing, as in showing her how to read. If her attention were fixed for several hours each day, she would soon lose the habit of squinting and gesticulating, the effect of habitual absence of mind, and being left to herself, which diminish her natural charms. Her look would be very agreeable and expressive, if the motion of her eyes were properly directed. She is much more disposed to mirth and more docile, in the afternoon than in the morning; seems to feel flattered by the visits made her; testifies her satisfaction by a more joyful air, and greater pliancy of character; then her countenance lightens up, and her strength appears to increase with her gaiety; and if she runs, she manifestly wavers less when thus excited; she does not like to be severely reproved, and is much more docile when gentle means are used. Being unaccustomed to fix her attention, or to listen to what is said to her, she comprehends with some difficulty what is addressed to her, and her judgment, for want of exercise, is slow and perplexed. Nevertheless, having heard French spoken for two months, she understands nearly as well as a child, relative to things habitually spoken of.

"She did not begin to speak until four years of age; but she understood all that was said to her. She actually endeavors to express her ideas, which seem to flow in rapid succession, in a kind of German jargon to

which she is accustomed; she accompanies her attempt with many gestures, which indicate a perfect correspondence between the moral nature, and the animated precipitate movements of the physical. She does not speak German well enough to maintain continuous conversation; besides, her mind is too little cultivated to accomplish this; she speaks only a few French words; being accustomed to the German, she finds some difficulty in pronouncing French. I am convinced, by careful observation, that this little being enjoys the same natural moral sensibility as any other individual."*

This young girl is far from having *the intelligence of children four years old. She has hitherto been taught childish manners only*, for the very good reason that she is incapable of any others. *She has considerable power of imitation, which bespeaks perfectibility:* apes and idiots have also the power of imitation. Besides, Babet Schreier has this power in a very inconsiderable degree. She combs her head indeed, but very badly. With all her repeated attempts, she cannot put up her hair well in papers; she can never succeed in putting a band round her head; and, in attempting it she places it wrong side outwards, so that the pearls, with which it is decorated, are underneath. *She repeats quite well what she is taught to say.* So far from being able to repeat whole periods, she finds much difficulty in pronouncing intelligibly a few isolated words. *If instructed in the* PRINCIPLES OF EDUCATION, *she would probably learn with ease; her intelligence and memory afford a presumption that attempts to instruct her would not be unsuccessful.* She will never be susceptible of instruction; she will never have a distinct sentiment of her own existence; she will never have an idea of the difference between her own condition and that of a well-formed person; for she can never grasp a series of ideas expressed in a period. She is

* L. c. p. 18—21.

habitually absent in mind, and amuses herself whole hours with the same toy, not appearing to remember that she has already used it a hundred times in the same manner. How *can she be made to lose the habit of squinting?* By what means *can the motion of her eyes be properly directed? Being unaccustomed to fix her attention, or listen to what is said to her* (that is, incapable of doing so) is the very reason that her judgment is slow and perplexed. But it is by no means to *be imputed to want of exercise.* Has she not seen more of the world than children generally? But the fact is, *her judgment is not susceptible of being exercised.*

She actually endeavors to express her ideas, which seem to flow in rapid succession, in a kind of German jargon to which she is accustomed. It is true that she has sentiments and ideas, which rise suddenly and disappear in the same manner, and that almost all her gestures are in unison with these ideas and sentiments; very frequently, however, she makes grimaces which give her an air of imbecility: but she speaks German quite as little as French, and, as I have already said, is at most capable of repeating intelligibly a few isolated words. I have never heard her begin a sentence of her own accord. Dornier himself is compelled to acknowledge: *besides, her mind is too little cultivated to accomplish this;* her mind is little cultivated, because it is not susceptible of cultivation. She possesses moral sensibility, that is to say, is susceptible of joy, anger, &c.; but these affections are vague, transitory, and are excited by the most insignificant objects, as is the case with very young children, and the imbecile.

"The circumference of the head," says Dornier, "measured horizontally from the forehead to the occiput, is thirteen inches and four lines."* I have measured it, by carrying a thread over the most prominent

* L. c. page 25.

parts of the forehead and occupit, and found it thirteen inches and nine lines.

"The cranium exhibits no remarkable deformity, except that the forehead appears a little prominent near the middle, because the protuberances of this bone are not very projecting."* If *the protuberances of this bone were more projecting*, it would not prevent the forehead from being *prominent*, and I do not see why Dornier calls this prominence a *deformity*. This prominent and perpendicular forehead is indeed the physical cause of her possessing any faculties; for, in this region is placed the organ of educability, which implies the faculty of being instructed by means of external objects. If the forehead was as little developed as the rest of the head, this child would undoubtedly be as completely imbecile, as those individuals whose heads are represented in several plates of this work, as too diminutive.

I sometimes meet with children, ten or twelve years old, who have very large occiputs, but narrow and low foreheads: these children learn with extreme difficulty, what is taught them, although their *sensibility* is excessive.

Children from two to twelve years old generally have the periphery of their heads from eighteen to nineteen inches, and the arc, from the origin of the nose to the occipital foramen, twelve or thirteen inches. In many children of either sex, at the age of two years, the periphery is from eighteen to eighteen and a half inches, and the arc, above mentioned, twelve inches. In some individuals of remarkable talents, the periphery amounts, between the ages of eight and twelve years, to twenty inches; sometimes, but seldom, even to twenty inches and a half. We see, then, that the completely imbecile individuals of whom I have been speaking, even after having come to their growth, have a much less cerebral

* L. c. page 29.

mass, than well-formed children from two to twelve years old.

Those who are partially imbecile sometimes enjoy, in an eminent degree, the exercise of certain moral qualities and intellectual faculties. In the first volume, I have cited individuals remarkable for order; others who had an irresistible propensity to steal, burn, assassinate; others, still, who were excessively lascivious. A head which measures seventeen inches in circumference, and about eleven from the origin of the nose to the occipital foramen, contains half as much brain as that whose corresponding dimensions are twenty, and from thirteen to fourteen inches, and three times as much as an imbecile of the first class.*

Heads eighteen or eighteen and a half inches in circumference, are small, although not incompatible with the regular exercise of the intellectual faculties; they indicate a pitiful mediocrity, a slavish spirit of imitation, credulity, superstition, that species of sensibility, which, by a trifle, is raised to the height of joy, or plunged in an abyss of tears, a judgment rather fallible, an extreme difficulty in discerning the relation of cause and effect, a want of self-control, and frequently, what is a happy circumstance, few desires.

With this degree of development, however, there may already exist distinguished qualities and faculties, because several particular organs may have become highly developed, as sometimes happens in young children of either sex. This is the case with those, in whom we observe a striking contrast, between the prominence of one faculty and inconceivable mediocrity of all the others.

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* We may judge now, what a want of fidelity to nature, has been shown by artists, who, according to imaginary proportions of beauty, give to their statues, and especially to their Venus, so small a head. These artists, as well as their admirers, are utterly ignorant of the laws of the cerebral influence over the exercise of the intellectual faculties.

As we come to brains of greater magnitude, we perceive the intellectual faculties increase in extent, until we find heads twenty-one or two inches in circumference, a limit at which man attains his maximum of intelligence.*

Some ancient sculptors, as I have before remarked, appear to have been sensible of this truth; they gave to their philosophers, heroes, gods, and sovereign pontiffs much larger heads, than they did to their athletes and gladiators. Their Jupiter is particularly distinguished for the great dimensions of his head: what a difference, in this respect, between a Jupiter and a Bacchus!

Let it not be imputed to accident, that a head of considerable dimensions co-exists occasionally with distinguished talents. Notwithstanding the objections of self-love, the law is general. I have never found, either in ancient or modern times, any man of great genius, whose head would not be ranked in the last class that I have established, especially if regard be paid to the great development of the forehead. Let the reader examine the busts and engravings of Homer, Socrates, Plato, Demosthenes, Pliny, Bacon, Sully, Galileo, Montaigne, Corneille, Racine, Bossuet, Newton, Leibnitz, Locke, Pascal, Boerhave, Haller, Montesquieu, Voltaire, J. J. Rousseau, Franklin, Diderot, Stoll, Kant, Schiller, &c.

The objection has been made against us more than once, especially at Paris, that Voltaire, with all his vast genius, had a small head, and that we frequently see men of limited abilities with large heads.

Voltaire's skull, and especially the anterior part, has pretty large dimensions; but Voltaire had a small face, and this occasions the illusion. I met with the same objection at Vienna, in regard to the poet Blumauer.

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* The dimensions above, do not determine exactly the mass of the brain; for, in making the estimates by these measurements, we neglect the cerebral parts at the base of the cranium, the upper part of the forehead, and at the lateral-superior part of the head.

He had also a small face, but his cranium is one of the largest in my collection.

Other individuals have the bones of the face very large, which gives the head, in general, a larger appearance; but still the skull may be of very inconsiderable capacity.

Let me be permitted to show, that in animals, also, a large cerebral mass is singularly favorable to the manifestation of the instincts and faculties.

The mastiff, of a powerful breed, is the largest and least intelligent of all dogs. Although his head appears very voluminous, it does not contain more brain than that of many a pug-dog. It is remarkable, that many of the smaller species of dogs have generally almost as much brain as the larger, such as the mastiff, the great grey-hound, and bull-dog; and very frequently the former have a greater quantity than the latter. Among the large species, the spaniel, and the pointer, have the greatest cerebral mass, and heads the most prominent and arching in front. On examining different individuals of the same species, we shall always observe that the most intelligent, and those distinguished for a particular quality, or faculty, have larger heads than others. The dog Munito, which, under the direction of Castelli, attracted the attention of the curious, sprang from a bitch of the spaniel race, and a setter dog: he had not only a very arching, but also a very broad front.

The same distinction exists in horses, and to such a degree, that, in Swabia, the peasants know perfectly well the most intelligent horses, by their broader and more arching forehead. When they are to pass over dangerous roads, they put on the lead a horse or an ox distinguished by this conformation. I know a jockey, who, from long experience, can distinguish many qualities of horses, by the form and dimensions of the forehead. He prefers those in which this part is broad and strongly arched. For several years I have attended to this sign, and have never found it to fail. Franconi's

horses, whose intelligence every body admires, have uniformly heads of this form.

The grand duke of Baden abandoned to our use, at Carlsruhe, a very large and beautiful horse, but which was stupid, skittish, and absolutely useless. We found in him a much less cerebral mass than in other horses; the anterior lobes, in particular, were extremely small.

Compare, as to the height and breadth of the head, the two kinds of parrots, best known in France, viz. the gray and the green. These two species are of the same size, but, with a little attention, it will easily be perceived, that the head of the gray parrot, which is the most docile, is much broader and higher than that of the green.

This observation is confirmed in all known animals. The principles above established cannot be called in question, except by those who have never consulted nature, or who, from fear of being obliged to render homage to new truths, show an utter disregard to facts.

I have therefore determined, in a general manner, with respect to man, the amount of cerebral mass necessary to the manifestation of the intellectual faculties, in all their different degrees, from imbecility to the most universal genius.

Different degrees of the moral and intellectual dispositions, which co-exist with the same cerebral mass and the same dimensions of the cranium.

In spite of all the facts that I have cited, there is one circumstance, which will probably occasion my readers some embarrassment.

It is true, that, when imperfect development of the brain occasions imbecility more or less complete, there are, as I have already said, striking differences among the individuals of each class. Some commit to memory with great facility; others become dangerous to society, by an irresistible propensity to steal, burn, &c.

Some show an extraordinary love of order, a great ability to remember songs, imitate expressions of the countenance, gestures, &c.

Similar differences are observed among those, whose brains, as to mass, have attained the highest degree of development. The volume of the brain being the same, one individual manifests a poetical talent; another, heroic courage; a third, a talent for philosophy and observation; a fourth, artifice, cunning, a spirit of devastation, &c.

Here, all that can be said of the brain, considered merely in reference to its mass, must prove abortive. According to the physiologists whom I have cited above, and who measure the cerebral mass, either in reference to itself, or the other parts of the body, if the mass of brain be the same, we must expect not only the same faculties, but also that they will exhibit nearly the same degree of manifestation. But experience teaches us quite the reverse; with equal mass of brain, we find the most marked differences, both in regard to the moral and intellectual character. We do not here refer to those shades of difference, which might arise from the constitution of the body, &c. We speak of essential differences, the manifest work of nature, which, in these cases, triumphs over all external influences. In spite of outward obstacles, one devotes himself to mathematics; another to poetry; a third plunges into the abyss of pleasure; a fourth consecrates himself wholly to pious contemplations. How is this variety of propensities and faculties to be explained?

All these difficulties vanish before the eyes of one who has correct ideas in regard to the organization of the brain, and the functions of its different parts. Let the imbecile and the greatest geniuses be considered in reference to the structure of their heads. Each of these heads has a different form from the others; each has therefore different cerebral parts unequally developed; and to this very circumstance are to be ascribed the different species, both of imbecility and genius. All those

men whom I cited on a preceding page, and who, by their eminent talents, became benefactors to the human race, had broad and strongly arched foreheads, because the anterior-cerebral parts were highly developed. All those, on the other hand, who are remarkable for nothing but love of conquest, desire of ruling, love of destruction, inordinate vanity, a rage for combats, cruelty, an irresistible propensity to beastly pleasures, &c., have the superior-anterior part of their heads but slightly developed; other parts, on the contrary, are remarkably prominent, and simply because the cerebral parts, placed beneath these prominences of the cranium, have acquired a high degree of development. If there is a mixture of noble qualities with those of an inferior order, the form of the cranium is also of a mixed character.

It follows, that a particular moral character, or a particular genius, is not determined by the absolute mass of the brain alone; but that each particular cerebral part, according to its development, may modify, in some degree, the manifestation of a particular moral quality, or intellectual faculty.

And what is the result of all this? The necessary consequence is—that the different cerebral parts perform different functions; that the entire brain is not a single organ; that each of its integrant parts is a particular organ; and that there exist as many particular organs, as there are functions of the soul essentially distinct.

But this idea, so fruitful to the philosopher, the legislator, the physician, &c., still meets every where with opposers. I must therefore subject it to a detailed examination. I hope to establish the doctrine of the plurality of organs so firmly, that in future it will be proof against all objections.

SECTION III.

PLURALITY OF THE ORGANS OF THE MORAL QUALITIES AND INTELLECTUAL FACULTIES.

Opinions, upon the difference between the various moral qualities, as also between the various intellectual faculties;—relative to the plurality of the organs, and their situation.

By the word *soul*, the Greeks, according to the usage of Thales, designated the vital principle in general; hence, they spoke of the *soul of plants, the soul of animals, the human soul.* This common term *soul, applied to all that has life*, was found insufficient, and it became necessary to designate, by a particular name, that which elevates man above the brute; the term *mind*, therefore, was used to signify the superior faculties of man,—and *reason*, the most distinguished faculty of the mind. It was very natural to consider the powers of different living beings, as essentially distinct. For the *vegetable soul* may subsist without the *sensitive animal soul*, and this latter, without the *spiritual soul of man.*

The disciples of Pythagoras, Saint Paul, Galen, Gilbert, Gassendi, Bacon, Van Helmont, Wepfer, Willis, Leibnitz, Frederic Hoffmann, Haller, Messrs. Blumenbach, Barthez, Casimir Medicus, Reil, and many others, were equally in favor of different principles for the different functions, both of man and animals.

Saint Augustin, also, made a rigorous distinction between the qualities common to man, and other animals, and those which are peculiar to the former. The

ancients often speak of a *rational soul* and *a brute soul.* Some admit both to be material, and distinguish the rational soul simply by its greater degree of subtilty; others suppose that the brute soul is only corporeal, and that the rational soul is spiritual. Plato made a distinction, in the brute soul, between the *appetitive* and *perhorrescent faculties*, and regarded anger, courage, love, &c., as distinct powers. According to several ancient philosophers, the material soul was endowed with the faculty of receiving impressions, a faculty which they called *imagination;* they designated the power of retaining impressions, by the name of *memory.* Hence, until the present day, imagination and memory have been regarded as material qualities, dependent upon organization, and *reason*, on the contrary, as a faculty essentially spiritual, independent of all organization.

Those who, like Aristotle, Anaxagoras, Stahl, and others, admitted but one soul, one simple principle, the cause of both life and thought, were obliged to ascribe to it at least several powers totally distinct. Malebranche distinguished two fundamental powers of the soul, *the understanding* and *the will.* Condillac entirely separated the passions from reason. Ordinarily, the faculties of the soul are denominated the *intellectual* and the *appetitive.* The intellectual faculty is subdivided into the *perceptive faculty* or *attention, memory* and *judgment;* the appetitive faculty, into *propensities, affections* and *passions.* These subdivisions are also further subdivided. Thus, Vieussens admits, for example, two imaginations, the one capable of representing present objects only, whilst the other extends to absent ones, which however it represents in an isolated and confused manner: this faculty does not take the name of memory, except when order prevails among the objects represented. Some distinguish THE MEMORY into *local memory, memory of words*, and *memory of things;* others make four distinct species of memory: *Local memory, memory of words, memory of time*, and *memory of cause* and *effect*, or, *of causality.*

Nothing more remained, but to assign a seat, an organ to all these souls and all these powers.

If we call by the name of soul, the vivifying principle, each part has its particular soul, its own vivifying principle, its own organic and animal life; in other words, its own peculiar soul.

With the exception of Aristotle and the Perepatetics generally, all the philosophers placed the *rational soul* in the head, *the brute soul* in the trunk, and the *sensitive or vegetative soul* in all parts, without exception. Those who admitted but one soul, placed the *intellectual faculty* in the head, the *appetitive faculty* and the *passions* in the trunk, and each particular quality or affection, as hope, love, envy, courage, sorrow, &c. in some particular part.

The cerebral cavities have acted a distinguished part in all ages. The Arabs placed *common sense* in the anterior cavities, *imagination* in the second cavity, *judgment* in the third, and *memory* in the fourth. Others thought it more natural to look for the seat of certain faculties in the solid parts, rather than in the cavities. For several centuries, it was generally admitted, that the cerebrum was the seat of the *perceptive faculty*, and the cerebellum that of *memory;* for this reason, the occiput was called the mnemonic bone; and many learned men thought that a very prominent occiput was a sure sign of an excellent memory. The pedagogue Vockerodt thought he could determine with certainty the degree of memory, by feeling the posterior part of the head. Carpus places memory behind the ear.

Gregory, of Nice, compares the brain to a city, where the coming and going of the inhabitants occasion no confusion, because each one has his fixed point of departure and definite place of arrival.

Albertus Magnus, bishop of Ratisbon, in the thirteenth century, sketched a head, upon which he marked the seat of the different intellectual faculties. He placed in the anterior part of the forehead, or the first cerebral

cavity, *common sense* and imagination; in the second cavity, *understanding* and *judgment;* in the third, *memory* and the motive powers.*

Mundini of Luzzi, who lived in the fourteenth century, supposes that cellules exist in the brain, each of which is the seat of a particular intellectual faculty.

According to Servetto, the two anterior-cerebral cavities receive the images of external objects; the third is the seat of thought, what is called the aqueduct of Silvius, the seat of the soul; and the fourth cavity, that of memory.

In a work of Petrus Montagnana, published in 1491, is found an engraving, in which are represented *sensus communis, cellula imaginativa, cellula estimativa seu cogitativa, cellula memorativa et cellula rationalis.* Ludovico Dolci has furnished a similar plate; he places in front, *the common sense;* immediately behind, imagination; the understanding, in the cerebellum, and in its lowest part, *memory.*

Willis regarded the corpora striata as the seat of the perceptive faculty and the sensation; the medullary part of the brain, as that of *memory* and *imagination:* he placed *reflection* in the corpus callosum; and supposed that the cerebellum furnished the vital spirits necessary for voluntary motion.

Vieussens located the imagination in the centrum ovale; Lancisi and La Peyroney supposed all the senses lodged in the corpus callosum; Charles Bonnet attributes a peculiar function to each fibre of the brain.

Haller and Van Swieten thought that the internal senses occupied in the brain places as distinct as the nerves of the external senses. But they deemed it impossible to decipher the brain, and assign the origin of

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* Upon the authority of this, *Berard and De Montegre,* thus express themselves: "Albert the Great presented it in almost all the details into which it has been carried at the present day." Dictionnaire des Sciences Médicales *Cranioscopie,* t. iii. p. 304.

the nerves of sense, the seat of *memory, judgment,* &c.*

Cabanis expresses a similar opinion, when he says,—"A distinction having been made between impressions received through the external senses, those peculiar to internal organs, and those caused by a direct action in the heart of the sensitive organ, it might with some reason be asked, whether the division of the senses is complete, and whether there are really more than five in number. Surely, nothing is more certain, than that impressions referred to the organs of generation, for example, differ as much from those of taste, and impressions pertaining to the operations of the stomach, from those of hearing, as those peculiar to taste, and hearing differ from those of sight and smell. The effects produced by the direct action of different causes upon the nervous centres themselves, have also very peculiar characters; and the ideas and propensities resulting from these different orders of impressions, are necessarily characterized by their organ. However, as it seems impossible, as yet, to circumscribe them with sufficient precision, that is, to refer each product to its instrument, each result to its data, a rigid analysis rejects, as premature, the new divisions which present themselves; and as the sense of touch is a general one, which answers all purposes, these new divisions, perhaps, will always be regarded as useless.†

Mayer ‡ did not consider it by any means probable, that the soul performed these various functions, so different from each other, in one and the same region of the cerebrum. He was strongly tempted to consider the cortical substance as the seat of memory, and the cerebellum as that of *abstract ideas.*

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* *Van Swieten*, t. i. p. 454.

† *Cabanis*, Rapports du physique et de moral de l'homme, (2d edition,) t. i. p. 233 et 234.

‡ Anatomisch-physiologische Abhandlung vom Gehirn, Ruckenmark und Ursprung der Nerven Berlin, 1779, p. 58 et 59.

Prochaska, also, thinks it very probable, that a particular organ is assigned to each of the internal senses. He coincides with Boerhave in the supposition, that the seat of the *perceptive* faculty must be very remote from that of the *imagination;* because, during sleep, the imagination may be in a high state of activity, whilst the perceptive faculty is inactive. This is the reason, says he, that in sleep the ideas are so confused, and do not begin to recover their distinctness, until the perceptive faculty awakes.

Platner supposes the existence of a *superior* and an *inferior organ* of the soul.

Malacarne does not think the medullary substance of the cerebrum capable of receiving indiscriminately every species of impressions and sensations. He denies the existence of a point, in which all the nerves unite; he regards the cerebellum as the seat of the *superior intellectual* faculties, and thinks, that a measure for these faculties may be found in the number of folds, composing the cerebellum of any individual.

Chanet, Wrisberg, Tiedemann, Richerand, and most of the modern physiologists, think that nature must have had a determinate object in view, when she formed the integrant parts of the brain, so numerous and so diverse, and they suspect that each of these parts must have a peculiar function. Hence, Cuvier, who appears elsewhere * to express a different opinion, says, in his report upon the progress of science, that my doctrine upon the functions of the brain, contains nothing contradictory to the general notions of physiology.† After relating that Brousonnet had lost the memory of substantives and proper names, he proposes the following question: "Does memory, that incomprehensible power, reside in as many distinct habitations as there are

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*Leçons d'Anatomie comparée, t. ii.

†Rapport historique sus les progrès des sciences naturelles, depuis 1789, et sur leur état actuel, p. 193.

species of memory?" Previously, Cuvier had flattered himself with the idea of having found, in the different magnitude of the corpora quadrigemina of the frugiverous and carnivorous tribes, an explanation of the two instincts, by which the former are led to feed upon plants, and the latter upon animals.*

Degerando has quite as little expectation as Haller, Van Swieten and Prochaska, that we shall ever be able to determine, with certainty, the organs of the different intellectual faculties: he admits, however, an essential difference between the different functions, and explains the association of ideas in the following manner: "A vibration, says he, which takes place in one organ, is communicated to another or to several, and awakens the impressions deposited there."† consequently, this metaphysician admits different organs for the different intellectual faculties.

Sœmmering believes, indeed, that what has been said upon the seat of *perception*, *reflection*, *meditation*, *common sense*, the *instincts*, *passions*, *judgment*, &c., is in part mere hypothesis; but still, he thinks it probable, that certain kinds of ideas are treasured up in particular compartments of the brain; in a word, that *distinct faculties* occupy *distinct regions* in the brain.

All those, in short, who place the different intellectual faculties and moral qualities, the passions, propensities, instincts, &c., partly in the brain, partly in certain nerves or viscera, in the blood or the temperament, admit, by that very circumstance, a plurality of organs for the intellectual and moral faculties.

Ackermann, who attacks the plurality of organs with so much violence, endeavors, however, to prove, that there must exist certain regions of the brain, in which the impressions are treasured up; and he thinks that these parts are the optic thalami: besides this *inferior*

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* Leçons d' Anatomie comparée, t. ii.
† Des signes, ou l' art de penser, t. i. p. 57.

organ of the soul, he admits, with Platner, another of a *more elevated order*, in which thought and the comparison of impressions are carried on: this last organ, according to him, is the medullary part of the hemispheres. In the same passage, he attributes these very functions to his inferior organ, which renders the hemispheres useless.

"In our times," says Bérard and Montégre, "when experiment and observation are conducted so accurately, and hypothesis does not easily gain confidence, it is believed, that different organs exist in the brain: the fact is considered as demonstrated; but it is generally thought impossible to designate these organs individually: such is the opinion of the greatest physiologists in Europe; Sœmmering, Prochaska, Mayer, &c., all admit the reality of organology: they hesitate only in regard to designating the organs."*

But if all the physiologists admit the plurality of organs, why do the greater part of them, and particularly Bérard and Montégre, oppose the doctrine, which inculcates this plurality?

Since, as we have seen above,† daily phenomena have presented this plurality to the senses of the greatest physiologists, why has no one of them discovered any of these organs? Is this plurality chimerical, as some, deceived by the circumstance, that no physiologist has found these organs, and seduced by metaphysical reveries, have maintained? or, rather, have all learned men followed a devious course?

In the third volume of this work, I shall endeavor to prove, that, in fact, all the learned have mistaken the way, and I shall indicate, in a chapter specially appropriated, the means which I have used, not only to determine for which of the intellectual faculties and moral

* Dictionnaire des Sciences médicales, art. *Cranioscopie*, t. vii. p. 305 et 306.

† Page 358 and the following.

qualities, particular organs must be sought, but also to fix the seat of these organs. I shall not, like my predecessors, assert, upon the authority of vague glimpses and gratuitous hypotheses, that there may exist in the brain, organs for the different faculties, but I shall undertake to establish, by undeniable facts, gathered from the physiology and pathology, both of man and other animals, that a particular organ is to be found in the brain, for each essentially distinct intellectual faculty and moral quality.

Proofs of the plurality of the mental organs.

To make myself intelligible to all my readers, I am obliged to postpone many of my most important proofs, to the succeeding volumes, in which I shall treat of the primitive powers of the soul and of their organs, and to confine myself here to general points of view. I divide my proofs into *anatomical*, *physiological*, and *pathological*.

Anatomical proofs of plurality in the organs of the soul.

First Proof.

The faculties of animals are multiplied in proportion to the complexity of the brain.

The same progression, that exists in the gradual improvement of the animal organization, so far as vegetative life alone is concerned, is found also in the gradual improvement of the nervous system, and, consequently, of animal life. Comparative anatomy has traced the gradual improvement of animals, from the most simple absorbent vessels, to the most complex apparatus for masti-

cation, deglutition, digestion, and to the most perfect circulation. With each new viscus, each new provision for the senses, we discover a new function, which increases in complexity, with each progressive step towards perfection of the organization of its viscus or sense.

Thus, the stomach, kidneys, lungs, heart, eye, ear, &c. are as much more complicated, as their functions are so.

The same gradation may be demonstrated in the cerebral structure of the different species. In the preceding chapter, I have shown, that the existence of particular qualities, whether moral or intellectual, depends solely on the presence of certain cerebral parts, and not at all on the total mass of the brain. It therefore follows, that the number of the faculties is in a direct ratio with the number of its integral parts. The nervous matter, contained in the cerebral receptacle of insects, fishes, and amphibea, is likewise divided into many distinct masses, of which the greatest part are ganglia, giving origin to the olfactory, auditory, optic, and other nerves, and not integral parts of the brain, properly so called. The two proper hemispheres, whose complexity of structure is proportionate to the number of mechanical aptitudes, are situated behind the two ganglia of the olfactory nerves.

The cerebellum ordinarily forms a pouch, which is sometimes placed in a horizontal direction, and sometimes folded upon itself.

In birds, the two hemispheres are found to be much larger, although no distinct convolutions are yet perceptible. Here, the cerebellum consists solely of the middle or fundamental part, although apparently composed even now of many rings in juxtaposition.

No convolutions, indeed, are distinguishable even in the small mammifera, as, for instance, in the shrew-mouse, the mouse, the rat, the squirrel, the weasel, &c.; still, as they are distinctly formed in other rodentia of a

larger species, as in the beaver, the kangaroo, &c., their existence may be presumed in the smaller species just enumerated.

In the larger mammifera, as the cat, marten, pole-cat, fox, dog, monkey, &c., the convolutions are more numerous and distinct, though their form varies with the species.

The convolutions are still more numerous and deep in the dolphin, in the elephant, and in man, than in the beaver, kangaroo, cat, &c., with an entire difference in form and direction, according to the species.

In all mammiferous animals, the cerebellum has, besides its middle or fundamental part, two lateral parts, which are more or less compound, according to the species. The pons varolii, or the cerebral ganglion, is wanting in all ovipara, and is found in all the mammifera, because the transverse fasces of nervous matter thus styled, are nothing more than the commissure or junction of the two lateral parts of the cerebellum.

The number of integrant parts, or convolutions of the cerebrum, varies in a similar manner in the different species of mammiferous animals. In some of them the anterior lobes are flattened or compressed, in others, they are broader or higher; in others still, the inferior parts of these very lobes are almost entirely wanting. The middle lobes and other convolutions present similar variations.

In this manner, the integrant parts of the cerebrum progressively increase in number and development from a less to a more perfect animal, until we arrive at the brain of man, which, in the anterior-superior and superior regions of the frontal bone, is provided with parts not found in other animals, and to the possession of which man is indebted for faculties and qualities the most elevated, reason, sentiments of religion, and a knowledge of the existence of God.

When we see nature pursuing such a course, how can we continue to doubt, that each part of the brain has its appropriate function, and that the brain of man

and of animals ought, consequently, to be composed of as many particular organs, as man or animals have distinct moral or intellectual faculties, passions, or mechanical aptitudes?

Objection.

Some learned men maintain, that all the integrant parts of the brain of man can be found in the brain of any other mammiferous animal; that the brain of an orang-outang is absolutely similar to that of man; but, since neither the mammifera as a whole, nor the orang-outang, in particular, can compare with man in moral qualities and intellectual faculties, it is impossible to attribute to special cerebral parts, those faculties, to which man is indebted for his superiority over animals.

Answer.

This objection is fundamentally wrong, whether the brain be looked at from the point of view assumed by our predecessors, or from that of our own discoveries. By many anatomists, and, among others, Vicq d' Azir, a great difference had been observed, between the brains of animals and man. They had remarked, that, generally, the hemispheres are smaller, and the corpora quadrigemina larger in animals than in the human race; and also, that the proportion of nerves to the cerebral mass is commonly greater in animals than in man. Other anatomists, Cuvier, for instance, assert that the hemispheres are much larger, and the convolutions deeper in man than in animals; they even maintain that many parts, as, for example, the posterior lobes, are wanting in the brains of animals, the only exceptions to this rule being the monkey and the porpoise.

Vicq d' Azir was so convinced of the difference between the encephalon of man and that of animals,

he had so correct an idea of the successive steps of improvement, from one species to another, as to maintain, that by a consecutive and gradual addition of parts, the brain of a fish might be constructed out of the brain of an insect; that from the brain of a fish, the brain of a bird might be formed; from the brain of a bird, that of a mammiferous animal, and from that of a mammiferous animal, a human brain; and that, vice versâ, by the successive abstraction of parts, it was possible to reduce the human brain, first to that of a mammiferous animal, and ultimately to that of birds, fishes, and insects.

Buffon was induced, by the incorrect observations of Tyson, to regard the brain of the orang-outang as, in all respects, similar to that of man. Nevertheless, Tyson contradicted himself; for in one passage he states, that the conformation of the cranial bones of the orang-outang is exactly like that of man, whilst, in another place, he points out a great difference in the frontal bones and orbits. I have already remarked, in the preceding chapter, that the extreme dimensions of the brain of this animal do not exceed those of a new-born infant; whilst its difference, in outline and convolutions, from those of a human brain, is so great as to be immediately perceptible to the most common observer. Let the brain of the orang-outang (pl. xxxiv.) be compared with a human brain, (pl. iv. and viii.)

It may, however, easily be imagined, why superficial anatomists believed the brain of mammiferous animals composed of the same parts as the human brain; for in all, are found, according to the old nomenclature, a medulla oblongata, corpora olivaria, and pyramidalia, a pons varolii, crura, thalami optici, corpora striata, a corpus callosum, hemispheres, cavities, &c.

This resemblance, however, ceases the moment we take into consideration those cerebral parts, which constitute organs. These opinions have been corrected in the first volume of my large work, in the section on the structure of the brain; in that place, I have entered into

all the necessary details. Here I will merely recapitulate the principal points.

At the period, when the integral parts of the brain were designated by those inappropriate names, which I have rejected, the general law, relative to the origin of the nerves, their successive additions and final expansion into a nervous membrane, had not yet been discovered. The design of the ganglia, and of the nervous plexus, was still unknown; it was still a hidden truth, that no nervous system, as, for example, the auditory nerve, the optic nerve, the olfactory, the pairs from the medulla oblongata, &c., arises directly from a single origin, and that, consequently, no nerve is complete from the moment of its origin; it was yet unknown, that the first nervous fibrils of a sense, are strengthened by accessories arising in another place, and that this nerve of sense does not attain its perfection, until many similar additions have been received, and that not till then, does it expand in the form of a very delicate net-work, over the organ to which it is appropriated. Still less was it imagined, that the rudiments of the cerebral hemispheres, of which a faint commencement may be perceived in the medulla oblongata, are augmented by accessories from the pons, the optic thalami, and the striated bodies, are finally expanded into nervous couches and form convolutions, to which the gray substance, covering them, sends yet other nervous fibrils, giving to the hemispheres a much greater volume than they could possibly have had, were they an appendix only of the crura cerebri, of the optic thalami, of the corpora striata, &c. It is this very mass, which, on dissecting the brain, was cut transversely, and which was not considered as deserving any attention, or, at the best, was viewed merely as a secretory organ.

Of the parts just enumerated, and hitherto regarded exclusively as integral components of the brain, not one is a complete organ of any function whatever. They are merely the systems, which originate and strengthen

the nervous fibrils, whose final expansion forms a perfect organ. Thus, the layer of gray substance on the inferior-anterior surface of the brain is not, in itself, an organ, but it gives origin to many fibres of the olfactory nerve; neither is the bulb of gray substance seated over the cribriform bone, an organ; yet from it arise fibrils, which unite with and enlarge the olfactory nerve, until at last, diffusing itself over the pituitary membrane, it assumes the character of a complete olfactory organ.

The more complete an organ is intended by nature to be, the more important, numerous, and perfect are its systems of supply.

The gray substance on the anterior-inferior surface of the brain, is much thicker in most of the mammiferous animals than in man, and also of greater extent; for, it entirely covers the anterior-inferior portion of the middle lobes, and the inferior portion of the anterior lobes. The number of nervous fibrils, which arise from every point of this layer, is infinitely greater in the mammifera than in man. The bulb upon the cribriform bone, is likewise more voluminous in them; and hence the olfactory nerve, originally of greater size, receives from it more numerous filaments, and therefore becomes capable of wider diffusion over the pituitary membrane, that is to say, of constituting a much more perfect olfactory organ.

The fundamental and essential systems are, nevertheless, the same in the mammifera as in man. Consequently, we shall every where meet with a medulla oblongata, a cerebral ganglion, (pons varolii,) optic couches, corpora striata, corpus callosum, &c.; which are larger or smaller, more or less perfect, as they give origin to organs more or less perfect. Hence the cerebral ganglion, (pons varolii,) the optic couches, the striated bodies are much more voluminous in man than in the horse and the ox; hence the hemispheres, which are simply productions from the generating and accessory systems just enumerated, are much smaller in these animals than in the human species.

Whenever, then, the structure of the brain, as an assemblage of organs of intellectual faculties and moral qualities, is considered, we must take into account, not merely the systems generating the organs, but also the greater or less perfection of the organs themselves. Assuming this as a starting point, we shall be convinced how far the human brain exceeds, in perfection, that of animals, especially in those parts appropriated to the moral and intellectual faculties.

Objection.

Portal, to save himself from the necessity of recognizing even the cerebellum and cerebrum as distinct organs, and thereby acknowledging a plurality of the organs, asserts that both of them execute the same functions, and that, in disease, one may replace the other. "Are not both of them," he says, "provided with cortical substance and medullary substance? Are they not traversed and nourished by the same vessels?"

Answer.

The spinal marrow, and the nerves of sense, are composed of cortical and medullary substance (medullary or nervous fibrils;) as a consequence of their composition, neither of these systems should possess its appropriate and peculiar functions, and both might not only reciprocally replace each other, but might even serve as a substitute for the cerebrum and cerebellum. If, as admitted by Portal, the cerebellum replaces the cerebrum in disease, in health, what end do they both answer? True, the organs of animal life are double; that is to say, there are two parts having the same action, one on each side; there are two olfactory nerves; two auditory nerves, and the two hemispheres, both of the cerebrum and cerebellum, are of the same nature; but,

in no case do we see parts, not having the same action, replace each other in the execution of their respective functions.

Objection.

Buffon maintains, that no difference can be found between the brain of an imbecile and that of one in the enjoyment of all his intellectual faculties, and, consequently, that it is impossible to admit the dependence of intellectual excellence on the perfection of the brain.

Answer.

Buffon may, possibly, have observed some persons of deficient intellect, whose heads presented nothing extraordinary, either in shape or size. I have myself met with similar instances, in which the individuals have been idiots from birth, though most of them had become so accidentally, from cerebral diseases, which had terminated unfortunately from masturbation; and no one certainly will maintain the nonexistence of structural derangement in the brains of these individuals.

However, I advise the reader to reflect upon what I have said, (sect. ii.) on imbecility, and the condition of the brain and cranium of idiots: the statements there made, completely refute the opinion of Buffon. Malacarne, moreover, has observed, that all the cerebral parts are far more distinct in those who are possessed of superior powers, and that the intellectual faculties and moral qualities are uniformly found to be in proportion to the perfection of the brain. Let the brain, (pl. viii.) of which the convolutions are ample and well developed, be compared with that of pl. ix., where they are small and contracted.

Second Anatomical Proof.

The analogy between the organization of the brain, and that of the other nervous system, proves the brain to be composed of many organs.

The nervous system of vegetative or automatic life, the spinal marrow or the instruments of the nervous system of voluntary motion, the nervous systems of the organs of sense, are respectively composed of particular organs, presiding over a particular viscus, a particular voluntary motion, or a particular sense. Each one of these subdivisions has its special origin, its accessory system, and its final expansion in a viscus, in one or more muscles, and in an external organ of sense.* By means of this arrangement, each particular nervous system has its appropriate function, and no one of them can supply another's function.†

The same law presides over the arrangement of the brain. The convolutions are the expansion of the cerebral fibrils, and the fibrous fasces. The convolutions, so far as they constitute organs, receive fibrils from different regions and systems of supply, as, for example, from the optic couches and striated bodies, so styled, or from different points of these same parts.‡

In the first volume of my large work,§ I have indicated many of the nervous fasces, whose enlargement and expansion from the convolutions of the hemispheres, and of which, figures may be found, pl. iv. i. c. pl. iv. i. c. m. m. Moreover, as lesions of the brain do not uniformly exhibit their effects on the side opposite

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* Vid. the large work. T. I, p. 312 and seq. Description of the brain.

† Ibidem. On the difference of the nerves, p. 127.

‡ Ibidem.

§ P. 271.

to that on which the injury was inflicted, as is the case in injuries of those parts which form a continuation of the pyramidal bodies, the conclusion is inevitable, that all the encephalic parts do not have the same origin, or, in other words, that there are cerebral parts, whose fibrils intersect each other at their commencement, and others, whose fibrils continue distinct.

From this coincidence of structure between the brain and other nervous systems, it is clearly proved, that nature designed, in the formation of the former, to create many organs, just as much as she had this end in view in the subdivisions of the latter.

Objection.

"The cerebral parts," says Rudolphi, "are not sufficiently dissimilar, to allow them to be considered as distinct organs. They are all formed of the same substances, the distribution of which may vary somewhat; and all, even those situated in the interior of the brain, are intimately united. The pineal gland and the striated bodies, for example, differ very slightly. The same substances, though their proportions may vary somewhat, are invariably found. The form of the cerebral parts is not, in truth, uniform, but the number of exceptions is very limited. Setting aside the cerebellum, the pons, crura, striated bodies, pineal gland, corpora mammillaria, olivaria, and pyramidalia, what parts remain, which have any pretensions to be viewed as special organs?"

Answer.

How different is this language from that of other physiologists, who consider it as a demonstrated truth, that the brain is an assemblage of many organs; for, on the

contrary supposition, the necessity of so many parts, so various in configuration, is inconceivable!*

All these parts differ so much, both in form and structure, that it would be far more justifiable to consider them as special organs, than it is to regard as such, the nerves of each external sense.

But I have proved, elsewhere, that the functions can very rarely be inferred from the anatomical structure. I have, moreover, just shown, that all the parts enumerated by Rudolphi, are in fact merely apparatus, which give origin to organs, and aid in enlarging and completing them, and are by no means to be considered as organs, properly speaking. Nevertheless, in the actual state of our physiological knowledge, it was far more excusable to regard these cerebral parts as organs, than to fall into the error of Rudolphi and Dumas.

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* Richerand in his New Elements of Physiology, 8th ed. vol. ii. p. 166, says,—as many other anatomists have done,—"With much probability might it be conjectured, that each perception, each class of ideas, and each faculty of the understanding, has its appropriate part of the brain. It is, indeed, impossible for us to determine the special function of every part of the organ, to assign the object of the ventricles, the use of the commissures, the operations of the peduncles; but it is equally impossible to study an arrangement so systematic, without being impressed with the idea of design, and that this division of the cerebral mass, into so many distinct parcels so diversely conformed, is relative to the different part each is to perform in the composition of thought."

After such a passage, would it not be natural to expect from its author, an approval of my researches into the plurality of the organs? Observe, now, his conclusion: "What, then, are we to think of the system of Gall, this division of the exterior of the cranium into so many compartments, whose elevation or depression indicates the possession or deficiency of different faculties, both moral and intellectual? What, but that this physiological doctrine of the cerebral functions, which has been raised upon too small a number of carefully observed facts, is as frivolous, as his anatomical discoveries in the brain and nervous system generally, are useless and chimerical." Richerand is not only illogical in his conclusion, but he also appears desirous to conceal the fact, that I form no judgment of the different prominences on the cranium except when they are occasioned by the development of the subjacent cerebral parts.

But how can these professors of anatomy assert, that there is but little difference between the pineal gland and the striated bodies, when the former is not so large as a young pea, and the latter has such a complicated internal structure, and is of the size of a hen's egg? I could make allowances more easily for the error of Cabanis and Cuvier, who believed that the nerves differ from each other, neither in substance nor structure.*

Objection.

Bérard and de Montégre, the self-constituted expounders of Cuvier, go so far as to say,—"Is it, however, well ascertained, that the brain is really composed of independent parts? Certain anatomists, but little imbued with the spirit of philosophy, have, indeed, assigned to them distinct and separate names: common demonstrators describe them in this manner; but, if the brain be attentively studied, and if we apply to it the simple and luminous ideas for which we are indebted to our great physiologists, we shall soon be convinced, that these parts are not distinct and separate organs, but sinuosities and prominences diversifying the faces of the hemispheres. The brain is characterized every where by unity; no marked division can be observed: this anatomical disposition proves the impossibility of placing in it distinct organs. Shall we consider the convolutions as independent organs? Examine their number, and observe how their respective bases are united in a common base, and how by their two extremities they are blended and linked with each other. Penetrate into the interior of the brain, and you will every where find that anatomical unity, which rejects every kind of division into organs. We are indebted to the celebrated

* Rapport du Physique et du Moral, t. i. p. 209.

professor Chaussier, in particular, for our knowledge of this remarkable circumstance in cerebral organization: he has proved, in his description of the brain, that all parts of this viscus are blended together in a common union, and invariably tend towards unity.

These gentlemen were so apprehensive that, from their manner of expression, they might be supposed to disown the brain as the organ of the mind, a proposition which they openly scouted a few pages before, that they conclude in these terms: "This anatomical unity corresponds to the unity of the cerebral functions, but does not, as has been believed, produce it, though, as a condition, it is singularly favorable to such a result."

Answer.

Vieussens, Petit, Vicq d'Azir, Cuvier, and Chaussier, according to M. M. Bérard and de Montégre, are anatomists, but little imbued with the spirit of philosophy, ordinary demonstrators; for all of them have seen in the brain, parts distinct, both by form and composition, and to these different parts have assigned distinct names.

On more than one occasion I have called the reader's attention to the great misfortune of the gentlemen, in citing authorities for their opinions. Let us see, once more, how Chaussier, whom they quote, expresses himself on the subject in question.

"The soft and pulpy substance which composes it, [the brain] is not, as it appears to be, at first sight, a spongy, uniform, homogeneous mass, piled up, without order, in the cavity of the cranium, solely designed to support the vessels, and assist their divisions. Shades of color are distinguishable in it; moreover, on examining it more closely, and cutting into it at different levels and in different directions, it is observed to affect peculiar forms in many places: it presents an uniform arrangement, an extremely regular disposition of its parts. Thus we find in it *ventricles*, or internal cavities, lined

by a delicate membrane, and traversed by a larger or smaller number of vessels; *reliefs, protuberances, striæ, small bands, laminæ, partitions*, all differing in position, form, volume, color, and consistency. *Cords* and *fasces*, more or less large and fibrous, are also found, which pass from one side to the other, interlacing, prolonging, and directing themselves towards certain places, where they seem to unite with and be lost among others."*

In the same work, the author says,—"In fine, on reviewing all the appearances presented by the very complicated texture of the encephalic organ, it must be acknowledged, that, notwithstanding its fissures, its very numerous divisions, its varieties of form, color, and density, all the parts are intimately united; that all have a direction towards certain points, a termination at the origin of the nerves, and a tendency to form a common centre."†

If it be an honor to teach an error publicly, the honor of paternity, at least, does not belong to the distinguished Chaussier; for the opinion is as old as that of the mind's *singleness*, from which some have been willing to conclude, that the organ of the mind is also single. Chaussier, throughout his whole work, does not allege a single proof in support of this opinion. We, on the contrary, have proved, on the section upon the structure of the brain, not only that there is no common centre for all the cerebral fibres, but that there can be none; and that, to maintain the reunion of the whole cerebral mass, at the origin of the nerves, is to support a statement which contradicts every law of the nervous systems, and the laws pursued by nature herself, in the development of other parts of the body. We have demonstrated, that even the nerves of the senses originate in

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* Short exposition of the structure of the different parts of the encephalon, or brain, pp. 15 and 16.

† Ibid. p. 18.

places entirely different; that they may, indeed, by means of communicating branches, act upon the brain, and vice versâ; but do by no means arise, either from the proper white substance, or from the cerebral fibres; that most of the nerves of sense, as well as all the spinal nerves, derive no part of their origin from the brain itself, but from the layers of gray substance on its inferior surface; that is to say, from parts not appertaining to the proper hemispheres, as, for instance, from the corpora quadrigemina, or medulla oblongata.

The proofs, which we have advanced, are unanswerable, and, consequently, refute the idea of the unity of the mental organ; an idea, of which the full and exclusive enjoyment should be yielded up by anatomists to the metaphysicians. Is it not ridiculous, when anatomists, who find multiplicity every where, dream of an anatomical unity? They see two distinct hemispheres, both in the cerebrum and cerebellum: is there unity here? They see different voluminous parts of the brain, circumscribed by definite outlines: is there unity here? If the brain be an unit, how is it possible to determine that sometimes one cerebral part, and sometimes another, is wanting in a certain species of animals, in which, likewise, some one faculty or quality is deficient? On this supposition, what becomes of the pineal gland, corpora quadrigemina, corpora mammillaria, optic couches, crura, and pons varolii?

Such expressions as these, "all the parts are uniformly connected and blended together in common union," are equally far from representing what exists in nature. They are fragments of the doctrine which teaches, that the brain is merely a pultaceous mass. This hypothesis does not certainly presume the existence of independent parts, each having its appropriate function; though it would be just as inconceivable, how a single organ, absolutely homogeneous throughout, could present phenomena so different, and manifest moral qualities and intellectual faculties so various and so dissimilar.

The white substance of the brain, moreover, is far from

exhibiting such a commingling of its parts as is affirmed; no such blending exists: on the contrary, fibres and fibrous fasces are in every part very distinctly visible, the direction in which they run being invariably uniform, though different in each region; they form their own expansions and convolutions; they are developed at different periods of life; their number varies greatly in the various species of animals, &c. Vid. p. v. vi. x. xii. It is true, that all these parts are connected; but this connection does not prove the impossibility of each being an independent organ. "Between all the organs of the animal body," says Reil, "there is a sort of union; no one can exist alone; their preservation is a state of mutual dependence; this fact, however, should not lead us to the false conclusion, that the proximate cause of an organ's action can be found elsewhere than in itself. For, this is by no means the case; each organ is independent, acts of itself by virtue of its own powers, and contains directly within itself the proximate cause of its phenomena." The consequence of these objections is obvious: no organ of sense, no viscus, could be a special and appropriate organ; for all are connected with each other, and with the organization generally.

Objection.

"The organs of sense are distinct and separate; no parts are found in the brain thus separate."

Reply.

We acknowledge ourselves not yet in a condition to specify the precise limits of all the cerebral organs; but are anatomists able to state the precise limits of the motor and gustatory nerves of the tongue? How often would physiologists find themselves embarrassed, if, to

prove the appropriate functions of any one part, a nerve, for example, it were necessary to define its boundaries!

Nevertheless, we have exhibited a profusion of proof that the fibrous fasces are really distinct; that they arise and are augmented, indifferent places; and, finally, that there are different points of union between the congenerous fasces of the two hemispheres of the brain: it is the same with certain muscular masses, in which it is impossible to recognize the different muscles composing them, except from the different direction of the fasciculi of their fibres.

If it were allowable to hazard a supposition on subjects, of which we possess but little certain information, I should be induced to say, that nature may possibly have had her reason, for locating the instruments of the external senses, as well as their exterior apparatus, remote from each other, and approximating the internal senses. The internal senses and faculties were not designed to act independently, as the external senses do; but to react upon each other, to mutually excite each other's action, and lend reciprocal assistance: each of them was designed to aid in the association of the ideas and sentiments, whose progress, succession, and combination, and the acts of the judgment and will, resulting therefrom, would otherwise have been too slow.

Moreover, the spinal marrow, also, is an uninterrupted series of different origins of different pairs of nerves, each of which, has its distinct and independent function. Pl. i. and ii.

In accordance with the received opinion, the medulla oblongata and pons varolii are the reunion of all the nerves, which ought, of course, in these places, to be the most completely blended with each other, and yet, from these very places arise the fifth or mixed pair, the auditory nerves, the motores oculi, the accessory vocal nerve, &c.; but is that any obstacle to the possession by each of these nerves of its peculiar and independent function? Why, then, should a similar arrangement in the brain, prevent its integrant parts from having their

peculiar and independent functions? Finally, why do M. M. Bérard and de Montégre, so pertinaciously contest the plurality of the organs, when a few pages back* they class themselves among the writers, by whom it is admitted, grounding their opposition, not upon hypothesis, but upon those methods of experiment and observation, which, in modern times, have attained to such perfection, without stating, however, where they met with the particular cases to which this new method of observation was applied?

Objection.

"The analogy of the external senses, it is said, is inadmissible, for this reason, among others, that they have their external apparatus, whilst the brain has no mode of connection with the external world."

Reply.

Nature, having designed the external senses to place both man and animal in relation with the external world, was obliged to give them apparatus capable of receiving impressions from external objects. This objection would really have some weight, were it true that all our sentiments and ideas are products solely of the external world and the senses: even in this case, however, the cerebral, internal parts would require to be so disposed, as to receive different sorts of impressions,—in other words, to be specifically different; but in the first part of this volume, I have shown the brain to be a far more fruitful source of sentiments and ideas than the external senses; that its action is internal, and that, if it require the ministry of the external senses,

* P. 305.

the utmost it asks from them is a supply of material. The nerves of the five senses excepted, all the others receive their excitement from within, whether their action be or be not confined within. Even the nerves of sense sometimes exercise their activity without having received the slightest impression from without, of which we have instances in dreaming, mania, &c.

There is, then, no further obstacle to inferring, from the analogy which exists between the structure of the brain and that of the other nervous systems, that there is a plurality of cerebral organs.

Third Anatomical Proof.

The differences of structure in the encephalon of different animals, which are the most striking, correspond to decided differences in its functions.

The brain of animals is almost entirely formed of the parts, seated in the lateral and posterior regions of the cranium. This is the reason, why their heads retreat immediately above the eyes. Nature has bestowed on the more noble species only, the cerebral parts seated in the anterior-inferior part; hence these species, as certain monkeys and dogs, have more or less forehead. Man, being endowed with large anterior-superior, and anterior-inferior encephalic parts, his whole front is expanded; it swells immediately above the eyes, projects beyond them, and rises in a direction more or less perpendicular.

Now, the common qualities of man and animals are, unquestionably, seated in the lateral and posterior parts of the head; and, in proportion as animals have received a share of certain anterior-inferior encephalic parts, they enjoy certain intellectual faculties; but as there is no animal, which possesses all the cerebral parts situated in the anterior-superior and superior-posterior regions of the frontal bone, so there is not one endowed with the faculties attached to them; not one, which enjoys the

privilege of reason, and a susceptibility of religious impressions.

Whenever the two sexes of the same species, exhibit marked differences in their propensities and faculties, the form of their encephalon differs in a manner quite as remarkable. The brain of woman is, ordinarily, less developed in its anterior-superior parts; hence women commonly have the forehead narrower and less lofty than men. On the contrary, those cerebral parts, which determine love for children or young creatures of any kind, are ordinarily much more developed in women, and in females generally, than in man and male animals.

My proposition finds confirmation in the different species of animals. Compare the brain of the carnivorous with the brain of the frugivorous; in the former, in the middle lobes more especially, you will find large cerebral masses, which are wanting in the latter. Compare, again, the brain of a dog with that of the cat, marten, or otter; compare the brain of a stallion with that of the bull, stag, &c., and you will be perfectly convinced, that an essential difference in the composition of the brain, introduces with it a corresponding difference in the character of the animal. Further, compare the brains of different species of animals, whose cerebral mass is nearly the same, but whose habits are essentially different; for instance, the dog with the hog, she-goat, &c., you will be impressed with another very important truth; namely, that the volume of the brain may be the same, and yet its functions be entirely different, and even opposite; and that the instincts, propensities and peculiar characteristic talents are determined, not by the quantity or volume of the brain, but by the quality or selectness of the parts of which it is composed.

I challenge any one whatever, to examine a dozen brains only, of different species of animals, and not be

strongly impressed, that different cerebral parts are appropriated to distinct functions, and, consequently, that the brain is compounded of many organs.

Physiological Proofs.

First Physiological Proof.

In all organized beings, different phenomena suppose different apparatus; consequently, the various functions of the brain likewise suppose different organs.

The different properties of plants result from the difference, varying modes of combination, and diversified forms of their constituent parts; and the parts of a plant are as diverse and various as its functions.

The same law extends also to the animal kingdom. Here, likewise, each different phenomenon is produced through the medium of different material conditions. Nutrition, secretion, excretion, circulation, respiration, generation, in fact, all the functions are executed by instruments expressly adapted to the end in view. There can be no particular voluntary motion, no peculiar sensation, unless arising from a particular material condition.

Finally, nature found it necessary to form as many external senses, as there are essentially different species of impressions of the external world, of which animals or man were to be recipients.

Now, it is evident, that the qualities and faculties of which the brain is the organ, are no less essentially different in man, than in animals. The affective qualities and the intellectual faculties, are totally different in their nature; each propensity, sentiment and faculty, is dissimilar from another. The instinct of singing differs from the instinct of travelling and constructing; the propen-

sity to propagation, from the propensity to murder, and that of the love of children; the sentiments of pride and of devotion vary widely; and who could confound the talent of architecture with that of music, the talent for painting with that for poetry, or local memory with a talent for observation?

In our exposition of the opinions of a great number of philosophers, upon the plurality of the mental organs, it was seen, that, according to the old received system, they admitted an essential difference between the will and the understanding, between the moral qualities and the intellectual faculties; that they distinguished memory and perception, from judgment and understanding, &c.

Thus, whether my philosophy or that of my predecessors be adopted, it still remains unquestionable, that the functions of the brain are as diverse as the five senses, and, consequently, that they have a necessity as imperative for different organs.

Objection.

It is impossible to discover any analogy between matter and its mode of action, and mind and its functions; therefore, no induction, applicable to the mental functions, can be deduced from the corporeal world.

Reply.

Whatever difference may exist between matter and its mode of action, and mind and its functions, it is certain, as I have proved in the first volume, that no quality or faculty whatever, can be manifested without the existence of matter in a certain state, so long as mind is united to the body; consequently, so long as this union subsists, so long is mind subject to physical condition, that is to say, every manifestation of mind, whatever, supposes a particular apparatus in the brain.

Objection.

"Even supposing that the entity *I*, (*moi*) needs an instrument by which to act, still the act of the will, whatever it may be, must be admitted to precede the organic act; the one is cause, the other, effect; one is power, the other, the instrument; there is, therefore, a moment in which the entity *I*, acts by itself and modifies the organs, instead of being modified by them; so that by multiplying the organs, intermediate to the entity and the manifestation of its acts, the difficulty is merely thrown farther back, not resolved; instead of being simplified, it is complicated. We are finally reduced to return to the first action of the entity, anterior to any organic act. Why, then, not meet at once and without circumlocution, this proposition, which is so singular, but which, nevertheless, all facts confirm? It seems as if it would have saved many hypotheses, and prevented many disputes, had so easy and simple a reflection been made. Is it then so difficult to stop at truth, on a path which becomes impracticable, when we deviate from facts and the comparison of facts?

"It cannot be repeated too often, the animal wills, and action succeeds; he is supreme lord of the exercise of his animal functions: he owns no other cause of his acts, than the will to produce them. Inorganic matter, as well as that which is organized, is subject to fixed and immutable laws, of whose purpose it knows nothing; the intellectual and moral functions alone are free, voluntary, and accompanied by consciousness, and must always be referred to a principle of action, subject only to itself.

"If the intellectual and moral qualities were merely a result of the relative development of organs, appropriated to them, the individual would exert them, nearly like an automaton, or a machine, which goes as soon as it is wound up. There would be no relation between the exercise of the moral qualities and external causes;

the poet would always compose verses; the musician, music, &c.; on the other hand, education has a sovereign influence even on the greatest men; and moral motives are the causes of most actions; it must then be admitted, that the moral self often acts independently and without organs; what then is the necessity for this apparatus of distinct and separate organs? There appears to be a kind of contradiction here. There is no medium; it must either be allowed, that the moral acts are always involuntary, and therefore irresistible, an opinion which no one has ever dared to maintain,—or, that the entity, *I*, often acts independently without having any particular organs, as specific instruments of its different peculiar acts; and if it often act in this manner, why not always? The sum and substance of these facts is, that integrity of the organs, especially of the brain, is essential to integrity of the moral functions; that from the union existing between the moral and physical nature, lesions of the one induce lesions of the other, and vice versâ, in conformity to the original laws of organization; that the activity of the one in the vital function, sustains and animates the activity of the other in the animal functions; they are united, but not mingled, and have a reciprocal reaction."*

Reply.

Facts prove, then, that *integrity of the organs, especially of the brain, is essential to integrity of the moral functions.* An instant previous to this avowal, Bérard and de Montégre affirm, *that the moral functions are absolutely independent of any organ; that the entity, I, acts itself; that its action precedes organic action; that acts of the will are always independent, and uninfluenced by physical instruments, &c.*

* Dictionnaire des Sciences médicales, art. *Cranioscopie*, vii. 311. 313.

If activity of the entity, *I*, precede the development and activity of the organs, and if the entity possess an exclusive privilege of modifying the organs, why does not each entity constitute a perfect body? why does not the entity act in the new-born infant? why is its action dependent on development of the organs? and why does it sink into dotage, when age has brought decrepitude, and impaired the powers of the organs? If the functions of the sentient, *I*, be absolutely voluntary acts, and independent of organization, why do we not all become, what we often so ardently desire to be? What becomes of this free and independent will, in intoxication, in imbecility, in mania, apoplexy, in a swoon, sleep, in cerebral inflammation? If uninterrupted activity be necessary to constitute an innate faculty, why do not animals and man abandon themselves unrestrainedly to the delights of physical love, a propensity to which Bérard and de Montégre will not certainly be willing to deny an innate character? &c.

Objection.

"Let it be granted, say other physiologists, that analogy between the functions of the senses and the mind really exists, still it is none the less certain, that all the functions of the senses can be reduced to *one sensation:* in a similar manner, the mental functions are not near so numerous as, at the first glance, they would seem to be; one, or at most, two principles embrace them all, *perception* and *reflection;* the latter is, in fact, merely a modification of the former. Nature, they add, aims at unity every where, and not the brain only, but the whole animal is a single unit."

"Unity of the animal functions, say Bérard and de Montégre, is another objection to a multiplicity of organs. When anatomists and physiologists sought in the brain for a *common sensorium*, they were undoubtedly wrong; they pushed this idea too far; and though

they did not see that an anatomical centre always consisted of parts, still they felt, that the cerebral functions required union of the organs and concentration of their action. Further, this absolute unity of the moral phenomena proves, that the sentient *I*, wherein they originate, must have a real and positive existence."

Reply.

I have shown, that there can exist in the brain neither a mathematical point, nor even a physical point, wherein all the organs, or all the nerves are united, or towards which all the cerebral functions converge; they, therefore, who regard such a centre as indispensably necessary, grasp at a phantasm.

As there are so many of my adversaries, who study anatomy and physiology in the closet of the metaphysician,—to whom unity of the entity *I*, with plurality of the cerebral organs, is inconceivable; and as for this reason, they pertinaciously reject this plurality, I will submit to their ready understanding the following considerations: in an attack of gout, I experience a painful sensation in my joints; at the same time, I have a severe headache, pains in my bowels and uneasiness at my stomach, &c., &c.: thus at the same moment I am suffering disagreeable sensations, which are very different both in nature and seat. At the very same moment, likewise, I enjoy very pleasant sensations in eating an exquisitely cooked dish, in drinking a delicious draught, or in listening to a welcome piece of news. How will you make unity of the personal entity accord with sensations so diversified, so contrasted, and yet simultaneous?

Does unity of the entity *I*, subsist with so large a number of viscera; the five senses all different; the numerous instruments of voluntary motion; the double hemispheres of the brain, each of which executes the same functions?

Glance at the constructive capacities, the instincts, propensities, talents, and faculties, so varied, so opposite, so differently proportioned in the same individual, and each having its perception, consciousness, and, consequently, its peculiar personal entity. How can you suppose its unity here? How, when, in certain respects, the capacities are extremely limited, and in others, objects of admiration to the world; when the passions, that rule the riper years of manhood, never stirred with their faintest breath the bosom of infancy; when you so often complain of the twofold nature of man, lamenting the struggle between the desires and reason, the strife of propensity against propensity, and the contests waged by the intellectual faculties among themselves; when the faculties are deranged, on one side, by paralysis or irritation, and remain perfect on the other; when there is insanity in a certain train of ideas, and, in every other respect, entire possession of the understanding;—how, I say, in all these cases, can you imagine unity of the personal entity? I am apprehensive, that repeated observation will force you either to renounce this unity, which you so carefully cherish; or, to confess that, whether right or wrong, it is still very convenient, but likewise very illogical, to employ an argument, whose value is purely metaphysical, in opposition to the best ascertained facts.

Sensation accompanies activity of the functions of the senses; and the production of sensation is a function common to all the nerves indiscriminately. But are all sensations of precisely the same nature? When a person says, I have a sensation, does he intimate thereby, I see, I hear? When he wishes you to understand his words, is he not obliged to define the kind of sensation experienced? Has not nature contrived different external instruments, and different internal apparatus, as the media of different species of sensation?

It is precisely an analogous case to attempt to reduce the various intellectual faculties and moral qualities to the faculties of thought and perception. I think! I

feel! Do I experience desire, or aversion? And when I have told by which feeling I am actuated, will not further information be requisite? Am I not forced to specify my idea, my feeling? Who would be bold enough to maintain, that one sole external object can give birth to ideas and feelings of all kinds? And is it not sustaining the same thing, to pretend that a single internal organ is suited to the reception of all sorts of impressions, both external and internal? But such is not the case: to remain consistent and uniform in her course, nature created as many distinct internal organs, as there are different sentiments, propensities and faculties, whose manifestation she wished to render possible.*

Objection.

"With the five fingers, or with one hand," says Platner, "the most complicated pieces of music are executed; why, then, may not a single organ suffice to execute all the intellectual faculties?"

Reply.

Platner requires, for the execution of music, not only a hand and fingers, which are neither simple nor single, but also an instrument, composed of different parts, and, above all, a brain; and musicians not only perform music, but other acts essentially different. The opposition of Platner to plurality of the organs is the more astonishing, as he himself, in his Anthropology, admits several organs, a *superior*, and an *inferior organ of the mind.*

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* This answer may be applied to all those who wish to reduce the powers of the mind and soul to a few general ideas. We may here say, in the words of Locke—*The more general an idea, the more barren.*

The course pursued by nature, wherever she wishes to produce different results, affords, therefore, a sufficient assurance, that the brain contains a particular organ for each particular mental power.

Second Physiological Proof.

One species of animals is endowed with faculties and qualities, in which another is deficient, a fact that would be inexplicable, did not each particular cerebral function reside in a particular portion of the brain. Suppose I should inquire of my readers, how it happens, that certain species of animals are destitute of the sense of smell, or any other sense, whilst they are in full enjoyment of the others? They would find no difficulty in this phenomenon. The functions of each sense, I should be told, require a particular apparatus, and certain species may not possess one or the other of them. But, if they admitted one organ only, through whose medium all the senses executed their functions, the want of one or more, in any animal, would be inexplicable.

Now, let what I have said be applied to the faculties, whose manifestation depends on the brain. There is scarcely any species of animals, which does not enjoy certain faculties and qualities, not to be found in other species. The unwieldy beaver, and the nimble squirrel, are both admirable architects; the dog, the docile, intelligent, and unwearied companion of the sportsman, has no skill in building. The horse, fearless in fight,—the bull, so loving to his dames, so formidable to his rivals,—have not the blood-thirsty propensities of the weasel and falcon; the sparrow and the turtle-dove utter not the sweet notes of the nightingale. Sheep live in flocks; the rook, honey-bee and ant form communities; the fox, the eagle, and the magpie dislike the confinement imposed on them by the care of their young, to which they impatiently submit during some weeks only. The swallow, stork, fox, &c., are faithful in their attachment to a

single mate; the dog, so susceptible of affection, the stallion, the stag, gratify their desires with the first female of their species which they meet, &c.: and thus natural history, from beginning to end, exhibits to us, in each species of animals, different propensities, constructive instincts, and faculties. Ought not, then, the conclusion necessarily to follow, that the distinctive propensities and faculties of these animals are occasioned by different cerebral parts? If the brain were the single and universal organ of them all, each animal ought to possess them all indiscriminately. It would even be impossible, any longer, to conceive why man, aided by his organization, is raised by superior intellectual faculties, above all other animals, and forms a separate class. But, if it be supposed, that each fundamental faculty, like each particular sense, depends on a particular cerebral part, it is not only conceivable how any one animal may be destitute of a certain cerebral part possessed by another, but, also, how all animals generally may want certain encephalic parts, of which man is the sole possessor. In treating of the individual organs, I shall endeavor to prove, that this is actually the case in nature.

In the mean time, compare the brain and cranium of the monkey, (pl. xxxiv.) with those of man, (pl. viii.;) what a difference in the cerebral mass, in the height and convexity of the forehead! Let the brain and cranium of the carnivorous mammifera, and of birds, be compared with those of the frugivorous mammifera, and of birds. The carnivorous class have a voluminous and convex mass of brain, which, in most of the species, forms a prominence above the external auditory meatus. In the frugivora, this convexity of the cranium, and the cerebral portion corresponding to it, are totally wanting. This remark is sufficient to put the reader in the right path. Hereafter, I shall prove that the different animals, in which certain cerebral parts are wanting, are likewise deficient in all the fundamental faculties and qualities corresponding to these parts; whence the conclusion

necessarily follows, that the manifestation of each fundamental faculty or quality is dependent on some particular cerebral part.

Third Physiological Proof.

The qualities and faculties found in every individual of the same species, exist in very different degrees; a circumstance only to be explained by the different degree of activity of the various organs, through which these qualities or faculties are manifested.

Every one knows, that dogs, in general, possess the same qualities and faculties; and, likewise, that some particular quality or faculty may be met with, in very different degrees, not only in the different varieties of dogs, but also in different individuals of the same variety. The mastiff, bull-dog, beagle, stag-hound, water-dog, pug-dog, wolf-hound, and grey-hound, are distinguished from each other, not by their form only, but by also their individual character, though all have the character belonging to dogs in general.

Individuals of the same variety, likewise differ much from each other. No water-dog or pointer has exactly the same qualities and defects, as another water-dog or pointer. In the same litter may be found two pups, one of which exhibits from his very birth an extraordinary eagerness for hunting, which is confirmed at an after period by his extreme docility in the sportsman's hands, whilst the other cannot be broken in at all; the former being carried when very young to a considerable distance, finds his way back without difficulty; the latter loses himself in the very house in which he was littered. I knew a water-dog, which engaged in all the canine contests that took place, and sought every opportunity of making a fight; even punishment failed to correct him of this propensity. I, myself, owned a dog of the smallest species, which, although brought up by

a lady of very gentle disposition, would allow neither bird nor cat to be kept near him, he killed them all; for this reason he was given to me. I thought that, by severe punishment, I might break him of the habit; but chastisement was of no avail. *Not one of his pups exhibited the same passion* in a remarkable degree; many of them, indeed, had so little taste for the favorite amusement of their progenitor, as to permit small birds and mice to frolic unharmed within their reach. Some dogs have an extraordinary passion for stealing; others appear insensible to the most powerful propensity of their species, and look upon the female with the utmost indifference. In another place, I have quoted the story related by De Coste, the translator of Locke, of the dog which wished to obtain a warm place near the fire, and for this purpose set up a terrible howl; whilst the other dogs were running to the door, he settled himself to his satisfaction. This stratagem never failed of success with his comrades, less crafty than himself.

Who does not know that horses, oxen, asses, mules, and even sheep and goats, differ in individual character? I will merely mention here the cow of Dupont de Nemours; out of a whole herd, she was the only one able to raise with her horns the bars, which inclosed a field of wheat or maize.

He, who is an attentive observer of the habits of animals, will find the same differences in the most savage beasts. I have in my possession the cranium of a wolf; the whole litter, of which the animal in question was one, was taken from the dam, and brought up alike. All the others retained the ferocity of their character; but he was completely tamed, and felt for his master the attachment of a dog. Inquire of the keepers of lions, tigers, hyenas, &c., and any one may convince himself that a similar difference of character exists in the different individuals of all these species.

I have a hundred times brought up birds taken from the nest, and have uniformly noticed similar differences in their characters. One was very tame, and gave un-

interrupted attention to an air whistled in his presence; another constantly remained wild and inattentive; one loved the society of birds of any kind, and delighted in feeding their young; another attacked with all the fury of envy and jealousy those which appeared to love each other. Some, when liberated from their cages and allowed to fly in the room, suffered themselves to be caught repeatedly; others could not be induced, either by hunger or stratagem, to re-enter their prison.

Whence proceeds this dissimilarity among individuals in the faculties and qualities, essentially common to the species? No question can arise here, as to the influence of education or other accidental causes; for I have already refuted this objection in the section upon innate dispositions. Will these phenomena ever be explicable on the presumption of a single organ?

But every difficulty vanishes, the moment it is conceded, that each particular faculty or quality has its especial organ. It can then be conceived, that one organ may be more completely developed in one individual, than in another of the same species, and for this reason, the quality or faculty, dependent on it, may be more strikingly manifested.

In a future part of this work, I shall compare the rounded forehead of the intelligent water-dog, with the flattened forehead of the indocile greyhound; the broad cranium of the spirited sporting-dog, with the narrow, elongated head of a timid one; the forehead of docile horses, prominent and broad above the eyes, with the narrow and retreating forehead of the indocile and vicious; the brain and cranium of the male and female of those species, in which the two sexes are distinguished by greater or less development of certain qualities or faculties, as, for example, the brain and cranium of the bull and cow, the stud-horse and mare, the dog and bitch. As the passion of physical love is more energetic and lasting in the male, than in the female of these animals, the cerebral part, which determines the propensity, and the protuberance on the cranium corres-

ponding to it, are larger in the former than in the latter. In the female, on the contrary, the love of offspring has a preponderating activity; the organ, likewise, corresponding to this quality, is more developed.

Let us by repeated observations endeavor to understand nature, and then we shall be soon convinced, that the cause of this gradation of qualities may be found in the proportionate gradation of development in the organs, which, although in essentials common to all, are not developed in all in the same degree.

All the differences observed among individuals, in the different species of animals, are manifested in a still more striking manner in the human species.

Have not many distinguished naturalists sought for an explanation of the difference of national characters in the different structure of the cranium? Their inquiry related to the different degree of development of certain independent cerebral parts, which, whether it proceed from climate, or any other exterior cause, still does not alter the fact, that the general character of a nation corresponds to that form of the brain and cranium, which is most common among the individuals who compose it.

Whence proceeds the dissimilarity, in moral and intellectual character, of individuals of the same family? the great difference between scholars in the same class, and under the same control and guidance? the variety of propensities, talents, and behavior in the same class of the common people, whose education has this one point of resemblance, that, of the individuals who compose it, not one has ever received any, and, in which, uniformity of occupations and singleness of aim of all their toil, a livelihood, ought to produce uniformity, both in moral qualities and intellectual faculties? Why does the shape of the cranium and brain of a man of vast and elevated mind, differ so singularly from that of the brain and cranium of men of narrow, grovelling minds, or from that of the feeble and imbecile? Why does the head of a great mathematician differ, in its form, from that of a distinguished general, politician, or poet?

None of these phenomena are explicable on the hypothesis, that a single and uniform cerebral mass occasions not only the different propensities and faculties, but likewise all the shades of the various degrees in which these propensities and faculties are manifested.

But, if it be granted, that each cerebral part has its distinct function, then the moral and intellectual character of individuals, as well in animals as in the human species, must necessarily be susceptible of as many adventitious modifications as the cerebral organs—on which the qualities and faculties depend—are susceptible of different relative proportions;—proportions, which result from their different degree of development.

Fourth Physiological Proof.

The primitive or fundamental qualities exist in the same individual, in very different degrees; now this would be impossible, if each primitive quality were not dependent on a particular organ.

To support this position, I again adduce the analogy of the external senses. Even though anatomists had not proved them to be distinct and isolated, still it would have been inferred from the very moment, in which one or more of them were observed to be feeble, and the remainder very strong, in the same animal or the same man.

If, then, the same phenomenon be true, with respect to the moral qualities and intellectual faculties, may it not be reasonably inferred, that their internal instruments are equally distinct and independent?

No animal, as, for example, no horse, no dog, can be found possessing, in the same degree, all the qualities and faculties peculiar to its species. One of my dogs is extremely surly: he fondles no one; but he has not the slightest taste for hunting, nor the least inclination to kill any animal whatever. Another, of which I have already spoken, has no enjoyment greater than that of killing; but, except when attacked, he lives peaceably

with other dogs. A bitch that possesses neither courage, disposition for hunting, nor instinct of locality, caresses every one indifferently, and exhibits extreme fondness for her pups. Every judge of horses remarks similar differences in these animals; and persons, who have an opportunity of making observations on monkeys, birds, &c., will find, that each individual manifests, in different degrees, the qualities and faculties characteristic of its species.

As the qualities and faculties of man are very numerous, the different degrees, in which they are possessed by the same individual, are likewise more perceptible. Some children are imbecile in many respects; but, notwithstanding, possess great cunning, a decided taste for drawing, music, &c. Let the reader recall to his mind my previous remarks on partial imbecility. Individuals possessing first-rate talents of a certain order, are, I repeat it, perfectly insignificant, sometimes, in every other way; who does not know mathematicians, musicians, mechanicians, and poets, to whom this remark is applicable? Extraordinary memory and a talent for satire are found in individuals, who lack judgment and *kindliness of feeling*. Courageous men are frequently rash.

These different degrees of the primitive dispositions are observable, not in particular qualities or faculties only, but often in entire and voluminous divisions of the brain also, so far that these latter have acquired, generally, a beneficial or injurious development, whilst other principal divisions of the encephalon are found to be atrophied. In the first volume, I laid down five fundamental divisions of the moral qualities and intellectual faculties, which, whether common to man and some species of animals, or exclusively peculiar to man; whether sentiments or faculties; whether belonging to a superior or an inferior class—correspond to cerebral parts of a primary order; so that we can seek, without apprehension of mistake, for the faculties and qualities

common to animals and man, in the posterior-inferior and middle-lateral parts of the brain, and for those exclusively peculiar to man, in the anterior-superior cerebral regions. Hence it follows, that, when the organs of the posterior-inferior region of the head are eminently developed, and those of the anterior-superior region are stinted, the animal propensities will have the preponderance. The contrary is the case, when the anterior-superior cerebral parts have acquired a high degree of development, whilst the posterior-inferior parts are deficient. When both are strongly developed, the dispositions corresponding to them are nearly in equilibrio.

If the whole brain were a single homogeneous mass, would not every individual necessarily possess every quality, and every faculty in the same degree? If the brain be a single organ, and if the organic condition of each of these manifestations be consequently the same, how could the innate dispositions of man and animals possibly differ? But, if distinct sections of the brain be appropriated to different trains of sentiments and ideas; if each different cerebral part correspond to a distinct faculty, then every modification of character depends on the different degree of development attained by certain sections or particular parts of the brain, and their different degree of activity.

Objection.

"The modifications of the same faculty, it is said by Bérard and de Montégre, are infinite: will, therefore, such a number of organs be necessary? and, if certain shades of character are produced by slight modifications of the same organ, why may not all be explained in a similar manner? There is no alternative; the cases are identical.

"You believe that the difference of organs accounts

for the difference of minds; but, if each man has a mind peculiar to himself, where shall we stop?"*

Reply.

We must admit as many modifications of the same organs, as there are distinct modifications in its functions. Though there is a notable difference in the song of birds of different species, and in the melodies and harmonies composed by different authors, yet the varied song, melodies and harmonies owe their existence to organs of the same kind. But, because these different melodies and harmonies are produced by the same organ variously modified, it is by no means an allowable conclusion, that the instinct of perpetuating one's species, the love of young, the constructive instincts, the instinct which impels animals to form societies, are to be considered as simple modifications of the function of one and the same organ.

Bérard and de Montégre, on the principle of this same objection, would like to explain the different instincts of animals by *a general law of sensibility:* yet, in the same paragraph, they declare the impossibility of explaining instincts, because they are founded upon *a general law of sensibility!*

I believe that it is, in general, injudicious to undertake the explanation of any natural power whatever; but it is certain, that an instinct, no matter what the instinct be, can proceed only from an organ's activity; in other words, the moment an organ of any power becomes active, that moment the animal or man becomes conscious of its activity; the animal or man feels an impulse to sexual congress, an inclination to foster its young, to construct a habitation, to sing, or to travel.

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* Dictionnaire des Sciences médicales, art. *Cranioscopie*, T. vii. p. 308.

But it follows, thence, that there must be as many organs as there are instincts, essentially distinct. I refer the reader back to the second proof derived from physiology.

Bérard and de Montégre adduce the numerous relations between the stomach and food; but this proof is restricted to one function, digestion, which always remains the same. Similar modifications occur in all organs and their functions; the same music does not appear good to all musicians; the same woman does not please every man; the same odor is not agreeable to all; but, until these physiologists are able to make the stomach at once an organ of circulation, of secretion of bile, &c., they will be unable to make a single organ the instrument of the most dissimilar functions of animal life.*

Fifth Physiological Proof.

Those functions of the brain which are essentially different, are not simultaneous in their appearance, either in animals, or in man; some are constantly manifest, others appear or vanish, according to the age of the individual, or from the influence of season. Now, these phenomena could not occur, if all the functions proceeded from a single homogeneous organ.

Here, again, nature pursues an uniform course through the whole range of organized beings. In plants, parts are successively developed at different periods, as the end, that is to be obtained, changes; many years sometimes intervene between these different periods. Numerous insects, and amphibia pass through various transformations, before arriving at perfection,

* This objection was again brought forward in the Revué Medicale, v. vii. p. 342, March, 1822—and the same reply was made.

before the organs, needed in their perfect state, attain full development.

Even in the more perfect animals, the organs of nutrition, secretion, excretion, circulation, &c. are developed at different periods, according to the species; some parts, immediately after birth, undergo changes that divest them of the capacity to execute their primitive functions.

The case is precisely the same with the different nervous systems. At first, those of vegetative life are the most fully developed, and the most active. Then follows the spinal marrow, whose different pairs of nerves are developed, and become active at periods quite distinct and remote from each other.

The nerves of sense also are subject to the same law. Those of taste, and smell are ordinarily first developed; the acoustic and optic nerves not till afterwards, both in animals which are born deaf and blind, and in children.*

In most animals the instincts, whose seat I shall at a future period demonstrate to be the brain, are subject to the control of the seasons. The instincts of singing, of coupling, of building, of providing for the future, &c. are sometimes in a state of activity, and sometimes in a state of absolute repose. Some animals, on being carried from their native climate, kept in captivity, and compelled to feed on nutriment different from that of their natural state, either exhibit no indication of certain propensities, or manifest them more strikingly; whilst other propensities of the same individuals experience no change whatever.

What does our observation of man teach, relative to the successive development of different cerebral parts, and the manifestation of the faculties, which is successive also, and at the same rate of progression.

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* The gray substance in which the nervous fibres originate, (for this reason I denominate it the *matrix of the nerves*,) is much more abundant at the period of vegetative life, than when the nervous systems are in the full performance of all their functions.

In the new-born infant, the gelatinous substance (the cortical gray substance) is in much greater quantity than the whole nervous matter; the entire brain presents the aspect of a reddish, dirty white pulp. The nervous fibrils are first visible in the posterior and middle lobes, and only at a later period, in the anterior lobes. The superior-anterior cerebral parts placed against the forehead, are not developed till after the lapse of some months, when the infant is going to receive, retain and apply impressions from the external world. In infancy and adolescence, the cerebellum, compared with the hemispheres, is much smaller than at the age of virility, when it is capable of perfectly executing its functions. From the epoch of which I have just spoken, till the age of forty or thereabouts, each cerebral part acquires the degree of development of which it is capable. Then the brain having remained stationary during ten or twenty years, begins to decline and lose its fulness and turgescence, and in the same proportion its activity. But all the cerebral parts do not waste at the same rate. The anterior-inferior parts diminish sooner than the others; hence the faculties dependent on them, among others the memory of names, are first to fail. Successively, every cerebral part is more or less impaired; the power of combining a great number of ideas, of grasping the relations of objects, and the chain of cause and effect, is lost; new impressions slip, as it were, through the exhausted brain; and the old man, who can no longer recall the events of the preceding evening, delights in the prolix and oft-repeated recital of his youth's adventures; decay creeps on, till finally nought remains but a few inert cerebral fibres, and insensibility and dotage.*

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* "There is a very interesting fact, which has never attracted the attention of any anatomist," says M. Richerand, in his Elements of Physiology, 7th ed. vol. ii. p. 127, "which is, that the brain of the fœtus and of the newly born infant appears to consist almost entirely of a grayish pulp, so much so, that the medullary substance is scarcely perceptible. Would

This development of different cerebral parts at different times, is particularly visible in those individuals who form exceptions to the general rule, in whom certain faculties are developed much earlier, or much later than usual, whilst all the others appear in the order of succession. In treating of the primitive powers and of their organs, I shall give many instances of this kind; some I have already narrated in the section upon innate disposition.* The most striking circumstance of all is, I repeat it, that *prodigies*, in every thing but the talent which particularly distinguishes them, are just as childish as other children.

Were the brain merely a single organ, could all the phenomena of which I have just spoken, be satisfactorily explained? But on the other hand, they may easily be accounted for, the moment the organs are admitted to be plural. On this last supposition, there is no difficulty in conceiving, how the different cerebral parts are confined to a certain order of succession, both in their development and their diminution, nor how one organ may sometimes deviate from the common course, and, in its development, either outstrip or linger behind the others.

I have had opportunities of observing many children, some precocious, others backward. Two were boys, one of three, the other of five years of age; both were

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it be an absurdity to suppose, that the medullary portion of the brain does not acquire its complete organization till after birth, by the development of the fasces of medullary fibres in the midst of the grayish mass which should be regarded as the common source, as the *matrix*, to make use of a term employed by Dr. Gall, in which they originate? The state of the fœtal brain being one of almost absolute inactivity, and in a manner passive, the existence of the medullary apparatus—to which the most important operations of the intellect are confided—is unnecessary: its rudiments, however, are found in the fœtus arrived at its full term."

I pray the reader to compare with the preceding passage, my remarks upon this same subject, which may be found in the first volume of my large work, published in 1809, in order to judge whether Richerand has any claim upon the observation.

* See a great number of similar instances in *learned children*.

able to execute perfectly the sexual function. I found the cerebellum, the organ of physical love, completely developed in them, whilst the remainder of the brain had no more development than is usual at these ages. In the young American Colburn, distinguished by his precocious talent for calculation, and in two other boys who presented a similar anomaly, I likewise found the organ of the predominating faculty remarkably developed. Spurzheim has confirmed my experience by an observation made by himself on a young girl whom he saw in London: the remark indeed is applicable to all precocious children. The reverse is observable in those who are backward in any one faculty. It is my custom, when lecturing, to support, at the time, my sentiments, by presenting to my audience, either living subjects or casts.

Objection.

It is thought by Rudolphi, that the development of the faculties and qualities, at different periods, may be explained otherwise than by a coincidence of time between their appearance and the development of their organs. "The child," he says, "commences by receiving impressions; but he does not begin to compare and judge, before he has seen much, or read much; judgment, therefore, will be posterior to impressions, for it supposes acquisition of knowledge. It is thus with all the powers of the mind; they cannot be developed, until the necessary conditions of their existence are fulfilled."

Reply.

It is necessary, undoubtedly, to have experienced many sentiments, to have acquired many ideas, before being enabled to draw comparisons, or form opinions. But neither experience, nor any number whatever of

sentiments and ideas can invest man with the power of comparing, and forming opinions upon them. According to the ground assumed by Rudolphi, each intellectual faculty, as to the perfectness of its manifestation, must be in the ratio of the abundance of external materials. Thus the soldier, who has been present at the greatest number of battles, would make the best general; the literary man, who has studied rhetoric and the art of poetry the most carefully, and perused with the most diligence the works of orators and poets, would be the greatest orator and the best poet. The common people would rightly estimate, as an excellent physician, the ward attendant, who has passed his life in hospitals. We should have attained the art of forming, at will, great men in all professions.

Experience, however, disproves this supposition. Present to a child a thousand facts; he will, perhaps, readily understand them, and not forget even one; but will he, therefore, weigh them with the deliberate judgment of a man? Where are the great orators, and the sublime poets, who have been formed solely by the study of the principles of their art? Why do the intellectual faculties deteriorate in old age, although experience and the accumulation of subjects of comparison have been steadily on the increase.

Aided by external and internal instruments, animated beings are capable of receiving and reacting upon impressions from without; external objects are so far valuable, as being the source whence these impressions are derived; otherwise, they are useless; for, let a monkey live during ages in the midst of men, and he will still remain a monkey. Present facts to an imbecile, instruct him in the rules of the arts and sciences, assemble around him the best models; and, after all, it is labor wasted. The charms of Venus' self would fail to stir the passions of the beardless boy.

But, when the senses are perfect at birth, they need, for the manifestation of their functions, neither experience nor practice. The spider spins its web the

moment it burts the shell; and scarcely has the butterfly spread its wings to the breeze, before it extracts nectar from the flowers, and feels the imperious necessity of sexual union. The first cause then of an organ's action is, not the accidental influence of external objects, but the activity of the organ itself. Now, as the different organs do not all acquire their final development at the same period, in conformity to laws whose authority is eternal, the manifestation of their functions will commence, diminish, and terminate, at different epochs and periods, from which the inference necessarily arises of the plurality of the organs.

Sixth Physiological Proof.

Long-continued mental application does not fatigue all the intellectual faculties in an equal degree. The principal exhaustion is always partial, insomuch that rest may be obtained simply by changing the object of occupation. This would be an impossibility, if the whole brain were engaged in each exertion of the mental powers.

When wearied by standing still for a long time, walking is a relaxation; and, if the body be fatigued by continuance in any position whatever, a simple change to another brings relief. Satiated with the enjoyments of the banquet, we listen with pleasure to the charms of music. Now, if there were but a single instrument for the different functions of sense, the fatigues and satiety would be general; and one function could not by any possibility continue active, whilst others were inactive.

The same phenomena, precisely, are observable in the manifestation of the mental faculties. Thus, when too long sustained attention to the same subject has occasioned exhaustion, we recreate ourselves by a change of subject simply, the intensity of the mental exertion remaining the same; and there is no student who is not aware, that, by an occasional change of object, he

can continue his mental labors for a much longer time, than by confining himself steadily to the same object. Hence I conclude with Bonnet, "that, if fatigue ceases when the object of the mind's employment changes, the reason is, that other fibres (other organs) are called into action."

Objection.

Ackermann contends, that we obtain repose simply by passing from one occupation, which demands a certain degree of mental application, to another which needs less.

Reply.

I play various games at cards with much ease; but as I have little fondness for the amusement, it soon wearies me, and even brings on headache. If, in this state, I leave the card-table, and apply myself to some serious pursuit, which requires mental exertion, my fatigue goes off in the course of a few minutes. Who has not felt the irksomeness of the frivolities of certain circles of society, and the happiness, on escaping thence, of being able to occupy the mind with more important objects? It is an every-day fact, moreover, that, when fatigued by employment in our habitual occupations, we find repose or refreshment, by listening to music that touches our sensibilities, by gaming high, or by witnessing the representation of a highly wrought tragedy? In this case, the feeling of repose, experienced on a change of employment, cannot be attributed to a less degree of mental exertion.

Objection.

If this activity and repose, says Winckelmann, were alternate, there could be no such thing as absolute

fatigue; we should be able to toil without a moment's interruption.

Reply.

Neither in animals, nor in man, are all the instruments of voluntary motion, or of the senses, ever found simultaneously active; consequently, according to Winckelmann, neither animal, nor man, would ever need the restorative balm of sleep to dispel the fatigue of all these instruments. As Winckelmann, then, is entirely wrong, relative to the instruments of the senses and voluntary motion, it is not going too far to affirm, that his conclusion, as applied to the different organs of the intellectual faculties, is likewise erroneous.

Objection.

Rudolphi, Winckelmann, and Dumas think that the pretended state of alternate activity and repose of different cerebral parts, may be explained by the different manner in which the brain is affected by each idea and sentiment. It is so, they say, with other organs of the body: the same attitude soon becomes fatiguing; the same motion quickly exhausts; the slightest change brings ease, and absolute repose is followed by perfect relief; walking is grateful to one who is wearied by riding on horseback.

Reply.

The preceding examples justify my assertion; in every change of attitude, in every different motion, different muscles are brought into action. The physiologists, certainly, do not think that the same muscles are in action, when we are walking, as when riding on

horseback: they have, therefore, advanced nothing which favors the assertion, that the same part, the same organ, is always affected, its mode only of affection being different.

In proceeding to the proofs derived from pathology, I shall more fully develop this last physiological proof.

Pathological Proofs.

Further development of the sixth physiological, and first pathological proof.

The origin and method of cure of certain mental diseases, equally prove a plurality of the mental organs.

The organs of the moral qualities and intellectual faculties are, in certain respects, subject to the same derangements as other organs of the body. When a muscle, limb, the eye, ear, &c., are for a long time kept upon the stretch, their excitability is augmented; hence, spasms, convulsions, trembling; and these irregular movements are altogether beyond control by the will: we continue to see the spectres of the colors, which shortly before had attracted our notice, and to hear the delicious music, which has ceased to sound.

In the same manner, the sentiments and ideas which have engrossed our whole being, still continue to interest, though the objects which gave them birth, no longer immediately affect us. If we persist, and make an unreserved surrender of ourselves to these favorite sentiments and ideas, it becomes more and more difficult to emancipate ourselves from their control; for the organs, in activity, have acquired such a degree of excitability, as to become incapacitated for regular, voluntary action. It is in this manner, that a man is enslaved by a certain train of ideas or sentiments.

We here see the most frequent origin of partial mania,

(*monomania.*) If the brain be but a single organ, and an homogeneous mass, the whole of which acts on the manifestation of each of the moral qualities and intellectual faculties, I do not see the reason, why the mania, in these cases, is not general rather than partial; and yet most frequently it is partial, and, in its nature, analogous to that of the excited function.

What do the means, by which we are enabled to prevent or cure partial mania of this kind, prove?

The instant in which physicians find an individual threatened by partial mania, from the above-mentioned causes, he advises him to give up his accustomed occupations, to divert his mind, to travel, and to interest his feelings in a new employment. By this course of conduct, the organs, which are highly irritated, have an opportunity of recovering themselves, whilst other organs are executing their functions with increased activity. I have, at various times, repeated the experiment in my own person. In youth I was a somnambulist, and frequently saw visions, a certain proof of cerebral exaltation. At a later period, I became passionately attached to a certain course of study, but I soon perceived that the subjects on which I was occupied, turned my ideas exclusively in a certain direction; I was harassed by wakefulness, in spite of my fruitless efforts to get to sleep; although my eyes were closed, I still saw around me a light like that of mid-day. To extricate myself from this disagreeable state, I felt it necessary not to confine my attention so exclusively to the objects which interested me. I created another favorite occupation, became passionately fond of gardening, and soon succeeded in re-establishing the equilibrium of my intellectual powers. Even to the present time, I feel it imperatively necessary to vary my occupations, either to prevent the return of a similar state, or to retain that mental equality which is essential to my labors.

When the exaltation of an organ has reached a point at which its action is involuntary, all advice bestowed upon the patient is useless. It becomes the duty, then,

of his physicians and relatives, to transfer him into a new world of sentiments and ideas; and to excite the activity of organs which have hitherto remained almost entirely quiescent; to awaken new passions, to encourage a decided taste for occupations to which he has, as yet, been an entire stranger, and, by this means, enable the too highly irritated and enfeebled organs to recover their natural tone, and resume their healthful regularity of action.

A man of rank became insane; his mind had been intensely occupied on a single subject, for too great a length of time; he was cured by the removal of the object of his accustomed attention, and by amusements. Still he thought himself in danger of a relapse, and he assured me, that he had prevented it only by diversity of occupation.

A lady, fifty years of age, naturally of a thin habit, serious even to melancholy, and possessing from infancy a disposition of great unevenness, was deeply devoted to religion, and followed all its precepts literally. She became indifferent to her own affairs, and was constantly perusing devotional works, the sense of which she strangely misinterpreted. The confusion of her ideas continued to increase, and her thoughts constantly dwelling on eternal damnation, she believed herself irrevocably consigned to the flames of hell, although her moral conduct had always been exemplary. Nothing could withdraw her mind from the idea, and hope was annihilated in her heart. Her room was hung with pictures, that reminded her of the object of her melancholy; she saw no visitors but the ministers of religion, whose attempts to dispel her fears were perfectly fruitless. Whilst in this state, her books of devotion were taken from her, the pictures removed, and the visits interdicted; no argument, no conversation on religion was permitted; the greatest regularity was observed in her hours of rising, retiring, and eating; and she was induced to walk abroad every day, sometimes even to fatigue. At the end of some days there was a gratifying

improvement, and her mind could be occasionally withdrawn from the thought that engrossed it. A light diet, every possible means of diverting and interesting her, constant exercise, attention to overcome by uninterrupted occupation her natural propensity to indolence, and the repeated administration of mild laxatives to counteract habitual constipation, produced the desired effect: in a few weeks she was restored to perfect health.*

A rich merchant met with a loss, that might have been easily repaired, but his imagination was so powerfully affected by it, that he thought himself ruined. This happened about the period, when the disturbances, occasioned by the reformed religion, took place in Germany. The maniac embraced the cause of Romanism with extreme zeal; labored night and day, and his efforts by haranguing and writing, to defend the celebration of mass, were so excessive, that eventually he was cured of his melancholy.†

"It is observed in the Hospices, (houses of religion,)" says Pinel, "that those insane females who have learnt to sew in their youth, easily resume the practice on the decline of their disease, and can give their attention to those sedentary occupations, which only disgust the peasant women accustomed to hard work in the fields; the latter, therefore, remain apathetic and inactive, and either advance slowly towards convalescence, or remain incurable. Again, what numerous obstacles oppose the recovery of the rich, whose lives, from youth upwards, have been spent in the most frivolous pursuits, and whose minds are incapacitated for the culture of the fine arts, or the study of the physical sciences!"‡

The great point, therefore, always is, to divert the attention of the patient from the object of his insanity, by fixing it upon other objects.

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* An analysis of Insanity and its means of cure, by L. V. F. Amard.
† Ibidem, p. 72, Lyons, 1807, p. 70.
‡ On mental alienation, p. 83 and 84.

It is manifest, that, in all the cases referred to, the cure was entirely owing to bringing into activity certain cerebral parts, and giving repose to others, which were previously too much excited. Numerous instances, and, in particular, that of the merchant just quoted, prove that diminution in the degree of mental application is not the principal point, when we wish to recover the mind from excessive fatigue, or to cure it when morbidly irritated. Oftentimes, the rapidity of the cure is in proportion to the vividness of the impression created by another idea or sentiment: a certain proof, that the sole requisite here is alternate action of the cerebral parts, which are the organs of different moral and intellectual powers.

Second Pathological Proof.

Some of the moral qualities or intellectual faculties, in consequence of disease, stimulation, injury, &c. may be disordered, impaired, or exalted, whilst other mental functions are in an entirely different state, or indeed perfectly healthy; a phenomenon which it is impossible to conceive of, on the hypothesis, that the entire brain is but a single and homogeneous organ, by which all the qualities and faculties are manifested.

If there existed a single instrument only, of voluntary motions, one organ only for all the functions of the senses, both motions and functions must necessarily experience at the same time similar derangements. In like manner, all the moral qualities and intellectual faculties would be disturbed, at the same time, if their manifestation were dependent on a single organ. But what does experience teach us in this respect? A man being about to seat himself, the chair was withdrawn from under him. The shock of his fall deprived him completely of the memory of names. A distinguished surgeon at Paris suffered in the same way from a ner-

vous fever. Broussonnet, by a fall, lost the memory of nouns.

The gradual diminution of the faculties, produced by age, is also confirmatory of the successive loss of the faculties. This circumstance is the more striking, because we occasionally see certain faculties retaining all their energy even in advanced age, whilst, as respects others, their possessor is in complete dotage. The famous Sagny, when lying on his death-bed, incapable of recognizing any one, was asked by Maupertuis, "what is the square of twelve?" "One hundred and forty-four," was the unhesitating answer. An octogenarian of my acquaintance, who had always been characterized by a very satirical turn of mind, has now lost his memory entirely, and has become absolutely demented; yet occasional sarcasms still indicate his natural talent. Who does not know of similar instances in the biographies of many distinguished men? And it will be remarked, in every case, that those qualities or faculties which were the most prominent in the vigor of life, are precisely those which retain most energy in its decrepitude.

There is no case more common, than for a quality or faculty to be developed in consequence of a wound, or poisoning, or an inflammatory fever, at a degree never manifested in health. I have quoted, in another place, the case of a boy, who, having received a wound on the side of his head, was completely mastered by an incorrigible propensity to steal. I knew a young physician, who had contracted the unfortunate habit of intemperance, and who, whenever he was intoxicated, improvised Latin speeches, as remarkable for refinement of thought as elegance of diction. A dress-maker, in access of fever began to make verses, though in health she had never thought of such a thing.* A lady, who rarely sung, having become maniacal after childbirth, sang uninter-

* Van Swieten.

ruptedly for many days. Tasso composed his finest lines during his accesses of mania; and Pinel quotes from M. Perfect, the case of a young female, of very delicate constitution, and subject to nervous affections, who became insane: during the continuance of her disease, she composed with facility, in English, very sweet verses, although she had never previously shown any fondness for poetry.* "In another case of insanity those ideas and sentiments which are connected with the feeling of pride had acquired an extraordinary exaltation: during the accesses, the patient thought himself the prophet Mahomet; he then assumed the attitude of command, and the tone of the Almighty; his features glowed, and his step was replete with majesty, &c."† "Many, who in health, or during their lucid intervals, are examples of the strictest uprightness, cannot, whilst the paroxysms continue, restrain their inclination to steal and cheat."‡ "A man, whose natural character is peaceable and mild, seems, during the access, to be urged on by the very demon of mischief, &c."§

Every one is acquainted with the species of alienation, in which the patients are deranged on one point only, and rational in every other respect. A few examples of this kind will be sufficient.

An officer, whose ambition had never been gratified, imagined himself a general; placing himself in an attitude of command, he conversed with me very sensibly on many scientific subjects, and, the stiffness of his carriage excepted, I noticed not the slightest deviation. Pinel has related many similar facts. I once saw a female, the turn of whose mind was naturally devout, who thought herself possessed. On every other subject she

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* Pinel on mental alienation, pp. 112 and 125.
† Ibidem, 111, § 124.
‡ Ibidem, p. 125, § 132.
§ Ibidem, p. 101, § 116.

exhibited extraordinary quickness of apprehension, insomuch that it was difficult for myself and companions to maintain our ground against her sophisms. I attended a very learned, and apparently very rational ecclesiastic, who asserted, that he was damned past forgiveness. A rich man, having been compelled to devote some time to a very complicated business, became melancholy. During the accesses, he saw, in every event, a misfortune and calamity: he lamented and wept like a woman: in his agitation he traversed his spacious chamber, one moment determined to end his life by suicide, and the next abandoning the design. If, at this very instant, a subject of conversation were introduced, no ways connected with his wealth, a veil appeared to drop suddenly from his understanding; he conversed most charmingly, and the acuteness of his remarks astonished all present. A teacher of languages got an idea into his head, that the police were every where in pursuit of him, insomuch that he sometimes endeavored to throw himself out of a window, yet, during all the time, he had never ceased to teach the English language with the greatest success.

This species of mania is so common, that it has been denominated *reasoning mania*, because those who are affected by it, perceive and combine their ideas exactly like rational persons, except on one or two points, where their ideas are positively deranged.

Cases are very frequently observed, in which, according to the expression of Pinel, and other writers, the *affective qualities* are especially disturbed, whilst the *intellectual faculties* remain unaffected. In the first volume, I mentioned the case of a man, who felt himself, from time to time, violently impelled to commit homicide, but who always retained sufficient presence of mind, during his paroxysms, to place himself under the superintendence of his friends. I have also narrated the case of a soldier, who was subject to similar paroxysms of blood-thirsty fury, and who caused him-

self to be chained on the approach of each access. Pinel has recorded similar facts,* and I have myself related an analogous case of frenzy, in which the intellectual faculties did not undergo the slightest alteration.

Even in congenital idiocy, all the moral qualities and intellectual faculties are not paralyzed to the same extent. In the majority of cases, as I have many times remarked, some of the faculties still enjoy a considerable degree of activity. I saw at Paris two idiot girls, who understood very well the songs which they heard, and, after a long interval, sang them very correctly, and repeated them as often as desired. The wild man of Aveyron, so called, placed in the institution of the deaf and dumb at Paris, exhibits a love of order which rises even to a passion, although all his faculties are extremely limited. If the most trifling article, a brush, for instance, be displaced, he immediately runs and replaces it. Pinel relates a very similar case. Sometimes, idiots, who, in every other respect, are excessively stupid and apathetic, have an irresistible inclination to physical love; others are unable to restrain their propensity to steal; others again, as I have already observed, are dangerous, from a sort of fury, which impels them to murder, to set fire to buildings, &c.

An explanation of these facts, I consider as impossible, unless a plurality of the cerebral organs be admitted. But, whilst the antiquity of prejudices invests them, in the eyes of some, with an holiness, that sets at defiance the most evident truths; others are satisfied by sophisms, which prescription has consecrated, and find the task of tracking nature into the recesses of her sanctuary, too difficult. My readers, therefore, will not be astonished that the plurality of the organs is the point, which has been most vigorously assaulted by those, who are inimical to the physiology of the brain. But, as this is a subject of the deepest interest to the philosophical physician, and

* On mental alienation, p. 102, § 1117.

as the objections brought forward may give rise to investigations of the utmost importance, I shall examine it with particular attention, both in a medical and philosophical point of view.

Objection.

According to Rudolphi, there is no particular cerebral part known, whose lesion or destruction occasions the loss of the mental faculties, so called. "Every kind of injury, every degree of compression of any part of the brain, whatever, occasions this loss." Neither, according to him, is there any known cerebral part, which can be regarded, exclusively, as the point of union of all the nerves. "If," he continues, "there were many special organs in action in the brain, how could the slightest lesion possible suspend or destroy, at once, all the powers of the *sensorium?* If these organs be independent of each other, as Gall is compelled to admit, it is difficult to conceive of complete insanity, an absolute cessation of consciousness, &c."

Reply.

On the hypothesis of a single organ, I would entreat Rudolphi to explain to me, how certain faculties can exist in an isolated manner, and how they can be destroyed without involving others; how can they be deranged alone, the remainder being unaffected? It is, precisely, because there is no part, whose lesion or privation necessarily involves the lesion or privation of all the qualities and faculties; because there is no point of union for all the nerves, that the existence of a single organ of the mind, a common seat of all the qualities and faculties, is an impossibility. If all the integral parts of the brain composed but a single organ, all the qualities and faculties would be disturbed in the same manner, and at the same

instant of time, in which one of the component parts was injured.

I have already stated, in what manner we should judge of lesions of the brain, and of the independence of the organs.

If Rudolphi cannot form an idea of total alienation, on the supposition of the plurality and duplicity of the organs, how can he understand a general disease of the body, with its plurality of viscera, and multitude of constituent parts? If he cannot imagine how a slight lesion can at once suspend or destroy all the powers of the *sensorium*, he will be still less able to comprehend how an inconsiderable lesion, or compression of a cerebral part, sometimes suspends or annihilates the manifestation of the functions of the five senses, each of which has its distinct and independent instrument.

Objection.

"Experience proves," says Dumas, "that an individual may possess, at one moment, a quality or faculty, of which he might be deprived the next; and that diseases, no ways connected with the brain, sometimes destroy, and sometimes bring its faculties into activity. Hence, it follows, that it is impossible to attribute the exercise of the faculties to a development of the cerebral organs, their pretended seat; for, in this case, it would be necessary to maintain, that they experience the same changes as the faculties; that their form varies, from time to time; that they are developed and obliterated; that they are present and absent. Although this is the inference from the facts enunciated, it by no means harmonizes with the delicate structure of these organs."

Reply.

Since a single quality or faculty may be lost and regained, without being followed by privation or recovery of

other qualities or faculties; since certain qualities or faculties may be debilitated or exalted by disease of other than cerebral parts, but whose influence, nevertheless, on the brain, is undoubted; the conclusion necessarily and strictly follows, precisely from these circumstances, that each particular quality or faculty is dependent on a particular organ. It is quite an original idea, that these organs disappear when their functions cease, and reappear when the functions resume their activity. Do the instruments of the senses, the organs of voluntary motion, and the whole brain disappear, during sleep or a swoon, when all their functions are suspended? Does the eye vanish during the temporary blindness occasioned by worms? There is no doubt, that changes are going on in the organs, when the activity of their functions is diminished by disease, at the epoch of the climacteric years, by the variation of the seasons, and some external influences: I have, elsewhere, demonstrated this to be the case; yet it is no evidence against their plurality.

Objection.

"If," says Bérard and Montégre,* "we pursue the reasoning of Gall into all its consequences, the multiplication of organs will be infinite, because the ideas of the insane are so. Did Malebranche, who saw a shoulder of mutton hanging from his nose, and who, in other respects, possessed a superior understanding, have an organ corresponding to this idea? Do those who believe themselves changed into worms, or an animal, have special organs for these ideas?

"Partial mania is frequently occasioned by a moral idea assuming a morbid fixedness, and is cured by interesting the mind in such ideas as may antagonize its influ-

* Dictionnaire des Sciences Médicales, T. vii. pp. 310 and 311.

ence: now, this fact, which is so common, by no means harmonizes with the theory of different organs. Finally, there are facts, which demonstrate its unsoundness. Each sense is subject to a particular kind of hallucination, to partial mania: will any one say, that there are different organs of sense in a single one? In pica, the stomach is affected by particular cravings, by partially insane ideas, (if we may so express ourselves:) shall we, therefore, admit the organ of taste to have one organ for fruit, another for animal or vegetable substances, and their innumerable subdivisions? When a woman in childbed, or other peculiar states, ardently craves green apples or pears, shall we allow an organ of taste for each of these objects? Did the female, who was possessed by the singular desire of biting a morsel out of her neighbor's shoulder, have an analogous deranged organ? The consideration of all these facts combined, is sufficient, we think, to show that their anomalous character is to be referred, not to a difference in the organs, but to an essential law of the sensibility which can assume a thousand different forms in the same organ."

Reply.

All the truth contained in this objection is entirely in favor of the plurality of the organs. Bérard and Montégre compare the functions of the senses to those of the brain. *All the senses*, they say, *are subject to particular kinds of hallucination, and to partial mania;* they speak of *the peculiar tastes, and partially insane ideas of a diseased stomach, and of the longings of pregnant women.* They allow, at the same time, that *these varieties in the functions of the senses are infinite;* but they do by no means draw the conclusion therefrom, that the instruments of these senses ought, therefore, to be innumerable also. By what right, then, do they impute to my doctrine the forced deduction, that the *organs of the brain will be as innumerable as the varieties of*

mania? If they perceive no difficulty in referring to five principal sources the numberless illusions and exhaustless variety of the functions of the senses, why should they see any insuperable obstacle in the innumerable varieties of mania, or the functions of the mental organs?

It is, in fact, with the mental organs, as with all the other integral parts of our organization. The deviations from a normal state are infinite. The eye sees objects double, or half only, inverted, misty, pierced in the middle, misplaced; all these innumerable and anomalous varieties of vision are the result of functional lesions of one and the same organ. In like manner, all the deviations from the regular function of a mental organ are owing to the same number of modifications in the organ itself. Do not ostentation, devotion, and sensuality, assume a thousand different forms, even in health? In what a variety of garbs, then, may we not expect disease to invest them? It would require folios to contain a description of all the diversities of a single species of mania; as, for instance, that species of which pride constitutes the source and essence.

Mania is often of a mixed character; that is to say, it results from an injury to the functions of one or more fundamental qualities or faculties. When pride and love, pride and devotion, pride and a propensity to destroy, act in combination, its forms will be more varied than when either of these qualities acts singly.

Finally; what a state of confusion, will there not prevail in that species of mania, which springs from general derangement of all the cerebral organs?

It would not always be so difficult to find a key to the fantastic ideas, the reveries and ravings of the insane, if we knew how they had been educated, the events by which they had been influenced, their impressions from accidental, external objects, their sensations and peculiar modes of association, the channel in which their ideas loved best to run, their predominating moral and intellectual character, &c. A female peasant will never

have a longing for pine-apples; neither will any one, who has never seen a camel-leopard, imagine himself transformed into such an animal. But the fevered patient, who feels the compression of his bandages, dreams of brigands and murderers, who are binding him with chains; he hears a buzzing, and strange voices ring in his ears. Does a soldier suffer from inflammation in the vicinity of the optic nerves; he sees the cannonier, with a lighted match in his hand, standing at his gun; the abscess bursts, and it is the explosion which follows. Does a hunter, in a severe attack of fever, feel pain in his intestines; he hears the howlings of wolves preying upon his entrails. Does a nervous and superstitious female labor under periodical stricture in the throat; it is the devil endeavoring to wring her neck. The tragedian Kruys, of Amsterdam, in his paroxysms of mania, believes himself the most atrocious of miscreants, and, foaming with fury, beats his head incessantly with his fist.

Thus, then, every thing may become the subject of mania; for, it is incorrect to maintain, with Esquirol, that illusions of the senses are the most frequent cause of mental alienation or insanity. These illusions, in fact, are never the subject of mania, unless the internal organs are diseased; so long as the internal man, that is to say, the brain, is sound, all illusions of the senses are recognized by it to be such; a buzzing in the ears is only a buzzing; a convulsive stricture of the throat is nothing more than a convulsive stricture, until some derangement of the internal organs transforms them into strange voices and devil's claws.* Since, then, accidental, exterior objects do not constitute the essence of mania, it is a waste of time to draw up descriptions,

* "Aconite and the extract of hemp," says Cabanis in his 'Relations between the physical and moral constitution of man,' Ed. 2d, vol. ii. p. 442, "can totally pervert the sensations of sight and touch, and yet leave the judgment sufficiently unaffected to appreciate this extraordinary effect, and refer it to its true cause."

minutely detailed, of its most singular and extravagant varieties, and to allow the classification of the disease to be influenced by these elaborate minutiæ. The true physician penetrates more deeply into its real nature, and establishes its differences on characteristics, which are permanent and unchangeable.

Pinel has already censured those writers, who fondly indulge in descriptions of the frequent laughable extravagances of the insane, and who present a picture fully as confused and irregular as the Hospice itself would be in description. Having acquired a knowledge of the symptoms peculiar to mania, there will be no difficulty in embracing all its varieties in a very limited number of classes. Let the principle, on which the classification is based, be fundamental lesions of the faculties and propensities, paying but secondary attention to the varieties: since, although a countless multitude, they may actually be arranged under a very small number of species.

Hence, the doctrine, which teaches the plurality of the organs, does not authorize the deduction—that numberless varieties of mania require numberless sources of alienation, or, which amounts to the same thing, numberless cerebral organs,—any more than the observations of the most distinguished physicians. But does this justify Bérard and de Montégre in referring all the fundamental species of alienation to a single organ, to *a general law of the sensibility*? Can they refer to a single sense, the illusions of all the senses, which are much less numerous? Have they yet to learn, that each illusion of the senses bears the manifest impress of the instrument, on whose lesion it depends? Will they ever attribute to illusions of the hearing, *the longings* which are subordinate to the taste?

It is precisely so with the false ideas, the perverted sentiments, which are produced by the organs of the brain. Those writers, who have made insanity a practical study, have been compelled to establish two principal divisions, at least, of the disease; all mention lesions *of the affective qualities, of the intellectual faculties*,

lesions *of the understanding* and *of the will;* all adduce, in their support, facts, which exhibit injury of the *intellectual* faculties solely, the *affective* qualities being untouched, or, in other words, which evince lesion of the understanding, whilst the will remains unaffected, or *vice versâ.*

I have already quoted many facts, observed either by Pinel or by myself; I will add one more only. "A man, whose occupation had been that of a mechanic, and who was afterwards confined in the Bicêtre, experienced, at irregular intervals, paroxysms of fury accompanied by the following symptoms; at first, a sensation of burning heat in the intestines, with intense thirst, and obstinate constipation; the heat extended by degrees to the chest, neck and face, which became flushed; until, having reached the temples, its violence increased, producing here very strong and frequent pulsations in the arteries, which seemed as though about to burst; the nervous affection finally reached the brain, and then the patient felt himself impelled by an irresistible propensity to commit murder, and, if he could have obtained a sharp weapon, would undoubtedly have slain, in a sort of phrenzy, the first person that met his sight. Yet, in other respects, he enjoyed the unimpaired use of his reason, even during the paroxysms; he answered all questions correctly, and no incoherence of ideas, no delirium was perceptible; he even had a sense of horror of his situation, and was deeply affected with remorse, as though this furious propensity were a crime."*

I have myself observed a similar fact. The subject of it was a corpulent man, who, from inertia in the intestines, was disposed to melancholy. He saw a criminal, a former acquaintance of his, broken upon the wheel, for an assassination attended by aggravating circumstances; so terrible an impression was occasioned by the sight of this spectacle, that, from that moment he

* On Insanity, p. 157 and 8, § 160.

thought himself possessed by the devil, who was urging him irresistibly on to commit murder; having returned home, he called out, with furious gestures, to his sisters to flee, for he could not resist his headstrong impulse to destroy them. He then run to my house, rushed precipitately into my study, and, in accents of despair, begged me to fly before him. "If you advance another step, I exclaimed, I will dash out your brains against the wall." My firmness brought him suddenly to himself. "How happy I am," he said to me, "at having met with one able to save me from perpetrating a horrible crime." And then he proceeded to give me an account of his lamentable state, in a confiding tone, but at the same time wringing his hands with anguish.

If we be compelled by similar facts to allow at least two sources of mania, it is necessary to suppose two organs also of different kinds, and then this single organ, this law of the singleness of the sensibility, is again at fault.

These two principal divisions, however, are far from sufficient to explain satisfactorily the different phenomena presented by mania. The various alterations, which the moral qualities and intellectual faculties undergo, are clothed in forms so diversified, that the subdivisions of the classifications would be as remote, and as distinct from each other, as the two great divisions themselves.

The warrior in his mania commands the elements: with the breath of his mouth, he threatens destruction to earth and sea; with a powerful hand, he strikes his muscular thighs, to teach the nations that the universe reposes upon immovable pillars; with the might of his arm, he arrests worlds in their revolution, and his eye, glancing from beneath its divine lids, pierces beyond the stars. The melancholic, despite his Herculean stature, trembles at his shadow, sees himself overwhelmed by calamity and sorrow, and, in the midst of abundance, the thought of want coming upon himself and family, terrifies him: this earth he regards as no other than a val-

ley of tears, and, by night and by day, his own self-slaughter, and the destruction of those most dear to him, form the subject of his meditations. The voluptuary, abandoning himself to an intemperate imagination, passes whole days in the intoxication of sensual enjoyments; even of the angels of heaven he creates the beauties who inhabit the seraglio devoted to his pleasures, and finds no happiness but in brutal self-abuse.

What is there in common between those three series of extravagant sentiments and false ideas? Who will ever be able to refer them to one and the same class?

The aggregate of the facts collected by Pinel, should, in despite of ideology, have induced this friend to truth to acknowledge the insufficiency of the two divisions, which he establishes. "Are not the words, human understanding, and will," he says, "generic and abstract, comprehending different intellectual or affective operations, whose isolated or united aberrations form the different species of insanity, and whose true characters, it is important, should be carefully determined." *

But, wherefore does he reject the doctrine of the plurality of the organs? Its true and only object is to determine the fundamental powers of the soul and mind, and to erect immutable principles upon the functions of the brain, whether healthy or diseased.

Finally; I ask the adversaries of the plurality of the organs of the cerebral functions, how a single and homogeneous organ can be at the same time in the most opposite states? I ask them, if the eye, when it sees objects double or reversed, can see them single and erect also? and yet, there is something absolutely similar in every case of mania, in which the affective qualities are deranged, and the intellectual faculties perfect, at the same moment; there is something absolutely similar, in every case, in which particular functions only, or some of the functions belonging to one of the

* On Insanity, p. 55, § 63.

principal divisions are deranged; partial imbecility would be analogous to it in every respect. No! it is impossible that the aversion to the plurality of the organs can go so far, as to sustain the most apparent contradiction to affirm that an organ is healthy and morbid, in a normal, and an anormal state, at one and the same instant.

Continuation of objections to the second pathological proof. Examination of the received ideas respecting derangement of the faculties of the soul and mind.

Objection.

M. M. Bérard and de Montégre adduce, on the one hand, cases from Pinel, and on the other, my own doctrine of the moral qualities and intellectual faculties, for the purpose of finding new proof against the plurality of the organs, in the apparent contradiction, between my doctrine, and the facts observed by the above-mentioned author. "On the other hand," they say, "Pinel has proved, by an immense number of facts, that mania almost always follows the grand divisions of the faculties admitted by all metaphysicians, (attention, memory, judgment, imagination;) that very frequently one of them is impaired, whilst the others retain their integrity perfectly; on the other hand, Gall himself, by an acute and profound metaphysical argument, demonstrates that these general faculties cannot have any peculiar organs. It must, therefore, be concluded from these two indisputable truths, that partial *circumscription* of the faculties by no means proves the existence of the separate organs." *

* Dict. des Sciences médicales. Art. Cranioscopie, T. vii. p. 310.

Reply.

It is true, that Pinel, in pages 58 and following, of his work, retaining the received division of the qualities and faculties, cites cases, in which, as he thinks, each of them is independently deranged. If, then, qualities and faculties be in reality isolated, as Pinel endeavors to prove, it is a matter of absolute necessity, that each one have its peculiar and appropriate organ. But are they really independent? and is it proved, by a single fact, of all those reported by this distinguished scholar? The observations of Pinel are accurate; therefore, it only remains for me to prove, that *not* one of his cases exhibits a disordered state of one quality or faculty only, whilst the others remained unaltered. The examination, which I am about to commence, will prove, in how much need medicine stands of a better philosophy of man, of a philosophy based upon facts.

*Lesions of physical sensibility in insanity.**

Pinel, § 68—§ 81, includes in the term, *physical sensibility*, the different impressions, which can be received by the nerves of internal parts, as the heart, lungs, intestines, kidneys, womb, &c.; as, for instance, the symptoms of stupor, of nervous irritation, which are occasionally precursors of mania, an extraordinary internal heat, felt by maniacs, their insensibility to cold, their absolute rejection of all nutriment, or their voracious appetite. In the same place, he also speaks of idiocy, both complete and partial, of furor uterinus, of that physical excitement of the generative organs of

* On Insanity, p. 58—70.

both sexes, which often forms one of the distinctive characters of insanity. All this, however, has nothing to do with the disputed division of the mental faculties.

*Lesions of the perception of external objects in insanity.**

The topic of § 82 is merely an inquiry, into what is passing in a patient's mind under access of mania, independently of the external world.

In § 83, Pinel gives a picture of an insane person, so entirely wrapped up within himself, as not to perceive external objects. But who does not see, that the perceptive faculty is not impaired in this case, that the patient has simply lost the power of directing it to external objects, for no other reason, than great derangement in the brain, occasioned by its state of extreme and irregular irritation, or rather of complete apathy.

§ 84 contains cases of idiocy more or less complete. Here, not only the perceptive faculty is impaired, but all the faculties of the mind are more or less enfeebled.

In § 85, Pinel speaks of the extreme sensibility of sight and hearing in maniacs.

In § 86 and 87, mention is again made of idiots, as enjoying their hearing at certain times, and being deaf at others.

§ 88. Childish insanity, though it may be more properly termed idiocy, in which the patient, about twenty-two years of age, passes from one extravagance to another, with the mobility of a child. In this instance, also, there is not only lesion of the perceptive faculty, but feebleness and versatility of all the faculties.

§ 89. Another case of partial mania and dementia. In this case of partial mania, the perceptive faculty remained unimpaired. In dementia, when all the facul-

* On Insanity, p. 70 & suivan.

ties are deficient, the perceptive faculties must also be deficient. What should we say of one, who maintained, that the oyster possessed every faculty, except that of perception.

§ 90. Progressive course of insanity. Passage from the period of excitement to that of apathy or dementia. The inquiry here does not, in the slightest degree, concern any lesion of the perceptive faculty.

Pinel, as is seen, does not relate a single case, in which the alienation consists solely of lesion of the perceptive faculty, and in which the other faculties remain unimpaired.

Lesions of the attention in insanity.[*]

Pinel thus commences his § 92,—"At the highest degree of intensity of mania, when the understanding is thronged by a rapid succession of the most incoherent and disorderly ideas, the attention, as well as the judgment, and the internal feeling of self-existence is totally obliterated. Thus, then, we have general derangement, and by no means absence of the attention alone.

§ 93. A case of partial mania, in which the attention as well as the other faculties, hitherto admitted by ideologists, are unaffected in certain respects, and impaired in others.

§ 94, the same case as § 3. Profound melancholy, with lesion of the judgment and imagination. Therefore by no means lesion of the attention alone.

§ 95 & 96. Partial imbecility and incapability of attention, both in dementia and idiocy. But what faculty is not deficient in such a state?

§ 97. Partial mania;—convalescence;—a state, indeed, in which the exercise of the attention becomes gradually

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[*] Page 76 & suiv.

possible; its restoration being coincident with that of the intellectual faculties, generally, to their natural condition. But there is nothing here about the attention alone.

Thus, in all the paragraphs just examined, there is not a single case, in which *lesion* of the attention is found to be the sole cause of mania, dementia, or idiocy.

Lesions of the memory, or the principle of association.

§§ 99 and 100. Incomplete mania. There is not a word in reference to integrity or lesion of the memory alone.

§ 101. Complete mania, in which all the faculties are impaired, consequently the faculty of association, as well as the others. Pinel thus commences paragraph 102:—"*Memory, like the rest of the intellectual functions*, appears to be suspended during the violence of certain paroxysms of mania." This general suspension has actually occurred in all the cases reported here.

§ 103. Partial mania, in which a moral quality appears to have been violently affected, and where, not only the memory, but all the intellectual faculties remained undisturbed.

§ 104. In all the cases quoted by Pinel from his own experience, and from Willis, all the intellectual faculties, and by no means memory alone, are found in a high state of excitement.

§ 105. A notary, having had an attack of apoplexy, forgot his own name, that of his wife, children, and friends, and yet he remembered many other things.

Here, then, there is no loss of general memory, but merely of the *memory of names*, which is, in fact, a peculiar primitive power, as I shall demonstrate when treating of the fundamental qualities and their organs.

§ 106. Pinel speaks of an idiot, who could not retain a single perception—who was totally unable to fix his attention on any thing, or to compare two ideas. Thus,

we have, again, a general lesion of the faculties. Therefore, in none of the cases adduced, is there *lesion or integrity, of memory alone.*

*Lesions of the judgment in insanity.**

In paragraph 108, Pinel speaks of the great confusion often observed at the commencement, and even during the course of mania, in the language, ideas, gestures, features and moral affections; a disorder which announces a subversion not of the judgment only, but of all the intellectual faculties; therefore, the cases seen by him, are cases of general mania, and by no means lesion of the judgment alone.

§ 109. Mania originating from pride, attended by lesions of memory, judgment and imagination.

§ 110. Mania from partial lesion, or exaltation of a propensity of an inferior order, the superior faculties remaining sound. By no means accompanied with integrity of the judgment only, but with a simultaneous integrity of perception, attention, memory, &c. also,

§ 111. Mania arising principally from ambition; but nothing to warrant the conclusion, that the judgment alone is deranged.

In paragraph 112, Pinel says,—"It is impossible to conceive the nature of a certain kind of alienation, which appears to be a mixture of reason and extravagance, of judgment and true delirium—states which seem to exclude each other reciprocally."

When this medley occurs at intervals only, it is a mania, which, like certain fevers, has its periods of intermission and access. When, on the contrary, the confusion is continuous, it is certainly inconceivable, on the philosophical doctrines hitherto received. But, take the theory of the primitive powers as the point of view whence to

* On Insanity, p. 92, and suiv.

make observations, and it will be easy to understand how one primitive power may be deranged conjointly with all its attributes, memory, judgment, imagination, &c., whilst another primitive power with all its attributes, memory, judgment, &c., retains its entire integrity. There are other similar phenomena, which should have made men of observation aware long ago, that their philosophy of the mental powers was erroneous; for truth is never found in contradiction with even a single fact. Besides, even looking at the subject as Pinel does, the judgment alone is not disordered in the cases presented; perception, attention, memory, imagination, are equally deranged.

§ 113. Pinel commences this paragraph thus: "The faculty of judging, an author has ingeniously remarked, is the same in the insane, as in the sane." When an insane person judges that the government of the world is in his hands, that the seasons obey his voice, that at his pleasure he can dry up the waters of the Ganges, &c., he judges so, because the perceptions which are present in his mind, force him to such conclusions. His errors of judgment spring solely from the materials on which the faculty is exercised.

But, if the faculty of judging be the same in the insane as in the sane, wherefore does Pinel undertake to adduce instances of insanity, in which this faculty is deranged?

Moreover, such reasoning is but mere sophistry. Who will ever allow that an individual judges correctly in the impetuosity of passion, in imbecility, in dementia, in alienation of the superior intellectual faculties, in cerebral inflammation, at that period of nervous fever when the irritation is at its height, because his actions are conformable to his impressions? The judgment is always wrong, whenever the true relations of things, the real connection between several ideas and sentiments, are misunderstood. Who will allow a sound judgment to the patient who cannot rectify his idea, that the elements are submissive to him, or, to him who fears

that on the least motion his legs will break, like glass? Can an individual be said to judge, when he allows himself to be blindly swayed by external or internal impressions? If so, then the wild boar judges, when he precipitates himself upon the boar-spear.

§ 114. Pinel says,—"On the decline of mania, or when it threatens to terminate in dementia, a feebleness of the judgment, depending upon a greater or less obliteration of the memory, is observable." In such case all the faculties are obliterated.

§ 115. Imbecility, in which the subjects possessed a very decided faculty of imitation, which, certainly, cannot be a derivative from the judgment.

Where, I now ask, in the whole ground which we have just surveyed, is there an instance of lesion of the judgment, and of the judgment alone?

Errors, or extravagances of the imagination in mental alienation.[*]

§ 120. "I consider the imagination," says Pinel, "as the complement of all the functions of the understanding, because it seems to dispose of the anterior perceptions of memory, judgment, moral affections; and forms them, as it pleases, into pictures of more or less regularity." If this be the case, how will he ever be able to prove that the imagination alone is deranged?

§ 121. Sudden excitement of the intellectual faculties, occasioning an entire subversion of all ideas.

§ 122. Examples of exaltation in partial, religious mania: in this paragraph Pinel renounces the definition of imagination given above, § 120. "Here it is not a reminiscence, but intuitive knowledge, a true internal illusion, analogous in its effect to that which might be excited by a vivid impression on the organ of sight." Thus he returns to my view of imagination, although in the preceding page he had rejected it.

[*] On Insanity, p. 106 and suiv.

§ 123. Vanity exalted; with entire loss of reason.

§ 124. Pride and vanity predominant; with exaltation of all the superior faculties.

§ 125. In this paragraph Pinel again rejects recollection, in the two last cases which he quotes: the young insane, who, during her accesses, composed harmonious verse, and the woman who displayed, in her's, a rare facility of versification, had never made any previous attempts at poetical composition. Here then is exaltation of a primitive faculty, but by no means lesion of the imagination, as understood by our author.

§ 127, 8, 9, 130. Examples of hypochondrium and melancholy, with exaltation of certain trains of sentiments and ideas; for instance, of caution, pride, devotion, propensity to murder; all these sentiments and ideas may be reduced to their fundamental powers, to caution, to the feeling of elevation or pride, to the sense of right and wrong, and to the sentiment of destruction. Here, then, there is not the least question with respect to the imagination, whether morbid or healthy.

To what, finally, do the observations of Pinel amount, if the mental faculties hitherto received are not what they were supposed to be; if, as some modern philosophers teach, they can all be reduced to *the understanding and volition, attention, comparison, reasoning, desire, judgment, liberty;* or otherwise, to a simple modification *of the sensations?*[*]

Further on, Pinel treats of the passions, of the shocks experienced by the moral character, and of the changes which may happen to it in alienation.

In §§ 116—119 and 131—134, he proves, anew, how distinct lesions of *volition* may be, from those of the *understanding*, although these two faculties are oftentimes simultaneously deranged.

Moreover, he adduces instances of exaltation in organs, whose excessive involuntary activity disturbs the

[*] Dictionnaire des Sciences Médicales, t. xiv. p. 401.

good order of society; as for instance, when certain fundamental faculties degenerate into propensities to steal, quarrel, murder, of unbridled laciviousness, &c. Some of the cases in question depend upon general feebleness of all the faculties, and irregularity in the alternate action of the superior and inferior faculties.

Pinel, then, unintentionally indeed, does but furnish corroborative proofs that the phenomena of alienation, when compared with the ideas entertained of the insane by Locke and Condillac, do really appear, as he himself says, somewhat enigmatical.*

Observations on the mode in which individual lesions of the intellectual faculties, hitherto admitted by philosophers, are considered by Esquirol.

Esquirol has undertaken, in imitation of his master, to furnish cases, exhibiting independent lesion of the attention, of the association of ideas, of memory, of judgment, &c.; but his philosophic method is so singular, that I shall not take upon myself to detain the reader a long time: a few examples will be sufficient.

"If the capability of attention be impaired, as in dementia, by an internal diseased state....."† But dementia, according to Esquirol himself, is an extinction of all the faculties:‡ consequently the attention alone is not enfeebled.

"How can the judgment be in relation with the ideas, when those supplied by the *imagination* are so numerous, that they come in throngs, with eager haste, precipitating themselves confusedly forward?"§

Here, again, all the faculties are deranged, and by no means the imagination alone, to which Esquirol

* On Insanity, p. 102, § 117.
† Dict. des Sciences Méd. t. viii. p. 252, art. Delire.
‡ Dict. des Sciences Médicales, t. viii. p. 280 and suiv. Art. Démence.
§ Ibid. p. 251—252.

assigns the character of an imaginary being, which transmits confused ideas to the judgment.

In a similar manner, Esquirol personifies, as it were, the faculty of the association of ideas, a faculty, whose exaltation, according to him, disturbs the judgment.*

"Memory is sometimes so enfeebled, that it no longer possesses the power of uniting actual sensations, either with the perceptions arising therefrom, or with ideas previously acquired; it no longer grasps the mutual relations of objects or ideas; it has ceased to supply ideas of intercommunication; insomuch that *the patient reasons wrongly, simply because he has not sufficient strength to reason rightly.*"†

"Delirium, particularly in vesania, always perverts the moral affections."‡

I conclude, by observing that I have been unable to find in the compilations of Esquirol, the slightest ground for suspecting the existence of cases, in which only one of the mental faculties, hitherto received among metaphysicians, was individually and exclusively deranged.

Continuations and conclusions of the objections.

Rullier, after having stated the opinions of many philosophers as to the number of the intellectual faculties and propensities, thus continues: "Shall we take this occasion to remark, that such a disagreement is scarcely fitted to confirm the peculiar doctrine of Gall, which allows of special organs of the *intellectual faculties and properties?* Before determining these particular instruments, however, it would, unquestionably, be necessary to have a clear knowledge of the number and species of the fundamental *propensities*, as

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* Dict. des Sciences Médicales, p 252.
† Ibid. p. 252.
‡ Ibid. p. 253.

Gall terms them. Now, in a theory of this kind, it is scarcely to be expected that Gall will be more fortunate in ascertaining the organs of the faculties, than his predecessors were in determining the faculties themselves. Without pretending, however, to prejudge the question, in this respect, let me add, that various objections have been offered by my estimable friend, M. Séné, to the speciality of organs of the faculties admitted by Gall and Spurzheim. M. Séné very honestly believes, with almost the whole body of physiologists and philosophers, that the entire brain represents, by the mass of *its* material parts, the universal instrument of the mind. He maintains, that, by recurring to the idea of special organs appropriated to the exercise of certain *faculties* or certain *propensities*, we inconveniently and unnecessarily multiply the wheels of the animal machine; moreover, it is a contrivance, of which we have no satisfactory proofs. The admirable remarks of M. Séné on this subject will be consulted with pleasure by my readers; they form a sequel to his analysis of the large work of Gall and Spurzheim, as far as it has been published. See Bibl. médicale, t. xliii. p. 165 and suiv." *

A knowledge of all the primitive powers and their organs, is by no means requisite in order to determine a certain number of them. Naturalists find no inconvenience in establishing many classes, genera, and species of animals, previously to an acquaintance with each individual animal. The inquiry, whether I have been more fortunate than my predecessors in settling the primitive powers, as well in man as in animals, is partly answered by what has been said in the preceding sections, and will be completely solved in the discussion of the fundamental powers and their special organs. I am now going to submit to my readers the *excellent remarks* of M. Séné, in order to satisfy fully both them and the adversaries of organology.

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* Dict. des Sciences Médicales, t. xiv. p. 403.

Objection.

M. Séné observes: "An invariable result of the want of exercise is organic atrophy and future functional inability. How have the organs of the propensities and inclinations, which, since the creation of man, have slumbered in absolute repose, because the things to which they are applicable have been known but a short time, or even yet remain undiscovered—how, I say, have these organs escaped the dominion of the universal law?" *

Reply.

When organs remain for a long time inactive, I agree that they are less developed, that they acquire less vigor, and possess less aptitude for action, than if they had been kept in a state of activity; but there is not a single instance in nature, in which, under similar circumstances, they have totally wasted and become absolutely incapable of action. Again; What propensities or inclinations have reposed in perfect inaction since the creation? Is there any quality of the mind, any passion, affection, or faculty whatever, to which this remark is applicable? Is it the propensity to physical love, the love of offspring, friendship, pugnacity, the propensity to rob, murder, or deceive; vanity, pride, jealousy, revenge, sadness, joy, anger, or fear? When, since the days of Moses or Homer, have we been enriched with a new intellectual faculty? In the most remote period of antiquity, the club inspired fear; in our days, the bullet does the same; but has the nature of fear changed? The child is proud because he has gained the prize at school; will he need a new organ to enable him to be proud of having gained a victory on the field of battle? The physician observes the symptoms of disease, and the philosopher, the

* Bibl. Med. xi. year, No. 128, t. xliii. Feb. 1814, p. 166.

different forms in which the folly of mankind displays itself; but does the physician require one spirit of observation, and the philosopher another? Does nature keep a stock of stomachs in reserve, till sensuality invents new delicacies? or new eyes, for shades of color as yet unknown?

Objection.

"If, notwithstanding the labors of Gall and Spurzheim, and their predecessors, the number of faculties of the soul and of the mind, of the inclinations and propensities, yet remains undetermined, which we very much fear, new organs will have to be discovered, in proportion as more severe analysis renders the admission of the new faculties necessary." *

Reply.

Something, much indeed, has been done, when deeply-rooted errors are eradicated, and even a small number of the primitive mental powers have been ascertained beyond doubt. Those, by whom the voids which we leave behind shall be filled up, will have a claim upon the gratitude of every enlightened mind.

Objection.

Gall and Spurzheim, for the purpose of limiting the number of the organs of the faculties and propensities, probably consider many dispositions as simple modifications of the *properties* of the soul admitted by them. But, may not this hypothesis be advantageously used to sup-

* Bibl. Med. xi. year, No. 128, t. xliii. Feb. 1814, p. 166.

port the unity of the mental organ, by applying to its faculties, what they concede to the modifications, of which the organ of each faculty or propensity may be susceptible? This difficulty, it strikes us, can be removed only by devoting a special organ to each modification of the faculties and propensities; but this will precipitate us anew into the obscurity of the infinite.

In fact, a throng of sciences and arts, of which, at present, we can form no idea, new tastes and novel propensities will demand appropriate organs in the brain. Will their material points, however numerous we may suppose them, be sufficient for the establishment of all the *properties* or dispositions, whose development, after the lapse of many ages, shall meet the wondering gaze of the observer?" *

Reply.

We are far from regarding any particular propensity as a simple variety of a mental faculty, though we think it susceptible of many modifications, of numberless shades, either originating within itself, or produced by the influence of other organs or other faculties. The organ of singing is the same organ in the lark, the tomtit, and the nightingale, although differently modified in each individual of each of the feathered species. In the same manner, the organ of music is differently modified in Handel, Gluck, Mozart, Haydn, &c. The love of glory, united with a propensity to murder or highway robbery, acts far differently from what it does when accompanied by philanthropy or a talent for poetry, &c. Thus there are infinite modifications of the same quality or faculty; the number of the letters of the alphabet is determinate, although the words and

* Bibl. Med. xi. year, No. 128, t. xliii. Feb. 1814, p. 166 and 167.

phrases which can be formed from them are innumerable.

If M. Séné required a new cerebral organ for each new science, art, or taste, he must also ask for a new nose for each new odor; new legs for each new dance. If this take place, *what an extensive field* will be opened, after some thousand years, to the wondering gaze of the observer!

Objection.

"Gall and Spurzheim think that the *properties* of a superior order modify those of an inferior one, and vice versâ. Now, in each property, as simple tendency to action cannot, as our authors suppose, produce this effect, it would, at the utmost, cause a simultaneous action of two or more *properties*, more or less opposed, but could not rectify one by means of another. Such a result would rather depend on the influence, exerted by the organs of one order, over those of another. Now, on this hypothesis, there should be a central organ, a medium of union and relation between all the special organs of the properties. Then, why may not this organ, which would, as it were, maintain the balance between all the others, why may it not, itself, be the sole essential condition of the mind?" *

Reply.

It is a general law of nature, that superior powers rule those of an inferior order. The laws of chemistry, control the laws which regulate moving powers, and, in their turn, are controlled by the laws of animated organism. Crystals form in spite of the laws of gravity; life

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* Bibl. Med. xi. year, No. 128, t. xliii. Feb. 1814, p. 167 and 168.

prevents fermentation and putrefaction, and raises the heavy arm.

The same law holds good in the moral world, also. The feeble-minded succumb beneath each of their propensities; the judicious tranquillize theirs, or assign to them time and place when to appear. But are these phenomena, therefore, identical, and the result of one and the same cause? Because, by superior powers, we can arrest and modify the action of the instruments of our external senses, does it follow, that there is a central power for these instruments, these senses—a single power, whose modifications give birth to the different functions of the senses and the other instruments? It has, indeed, been proved that the entity, *I*, (*moi*,) exists, notwithstanding the great diversity of instruments of the sensations of faculties: I say, its existence has been proved, but the mode of proof I shall never attempt to explain.

Objection.

"But what utility is there in multiplying, unnecessarily, and especially without decisive proof, the wheels of the animal machine? If the organs of more material functions be susceptible of very striking changes within a very limited time, in their mode of feeling and acting, why should it not be so with the brain, considered, in its essential parts, as an indivisible organ, and the principal condition of the exercise of the intellectual faculties? Primitive differences in temperament, whether general or partial, inducing infinite varieties from the influence, exerted by each organ of the animal economy over the others, and consequently over the brain, enable us to conceive (as far as it is possible) of the primitive differences of the mental *properties*, without having recourse to the existence of a special organ for each faculty or propensity."*

* Bibl. Med. xi. year, No. 128, t. xliii. Feb. 1814, p. 168.

Reply.

In this work, I have proved, generally, the necessity of conceding the plurality of the organs: in speaking of the fundamental faculties, I shall demonstrate the necessity of allowing a special organ for each of them. All organs, whether of vegetative or animal life, may experience alterations from disease, time, &c.; but not one of them can be converted into another. The heart will never be transformed into a stomach, nor the liver into an intestinal canal. The functions of one sense will never be exchanged for those of another. Neither are the propensities or faculties generally, nor the passion of physical love, and vanity, the memory of names, and a talent for poetry, in particular, reasonably deducible from the same source. "What is the utility of unnecessarily multiplying the wheels of the animal machine?" This incessantly repeated objection is the offspring of vanity and presumption. Such was the language used towards the discoveries of physicians, who lived at the time when all the phenomena of nature were explained by means of the four elements. The natural philosopher seeks for facts, and troubles himself but little about what appears necessary or superfluous, to the indolent sophist.

I have already demonstrated,* that the doctrine, which teaches that the moral qualities and intellectual faculties are determined by temperament, has no place, except among by-gone prejudices.

The remarks of M. Séné, in opposition to the plurality of the organs, are, therefore, absolutely insignificant.

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* P. 140, & suiv.

*State of Waking, Sleep, Dreams, and Somnambulism, so far as these different states are confirmatory of the plurality of the organs.**

Wakefulness.

In order to leave nothing obscure, I am compelled to repeat at this time, what I have said elsewhere,† respecting the difference of vegetative and animal life. The vegetative life, both of animals and man, perfectly resembles the life of plants. All its functions are involuntary and unconscious. All the functions of animal life, on the contrary, are accompanied by consciousness, by perceptions, and both animal and man enjoy the power of acting voluntarily upon its organs.

The question now arises—What is wakefulness? It is that state in which impressions, either proceeding from without, or originating within, are perceived; in which the animal can act voluntarily upon the organs of animal life. I do not say that, during wakefulness, all the organs of animal life are, of necessity, active; but only, that animals or man, as long as they continue in health, and awake, possess the power of making each of these organs act in obedience to the will.

When all, or part of these organs, are in involuntary activity, the individual is said, according to its degree or duration, to be in a state of intoxication, delirium, exaltation; to be more or less insane, a complete or partial maniac; or else, that he is in a reverie.

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* Some of my readers, perhaps, will find this chapter too short, but they will have the goodness to remember, that I here treat of the various topics which it contains, only so far as they furnish proofs in support of a plurality of the organs.

† Vol. i. 1st Sect.

Sleep.

From the moment of conception, or the first instant of existence, until death, the organs of vegetative life act uninterruptedly, and with varying energy. They find within themselves means of renewing the strength which their own action exhausts. Not so with animal life, whose organs, fatigued and exhausted by the exercise of their functions, require intervals of repose to enable them to recover the vigor necessary for continuance of action. Now, when in health, all the organs of animal life are sunk in such repose, that impressions, whether external or internal, are unperceived, and the will can no longer exert any control over them; then, the individual is said to *sleep*, to be sunk in *deep* and *perfect sleep*.

Sleep is not uniformly needed to recruit exhausted energy. The animal life, may in some way or other, become habitually and completely inactive; then, one sleeps from ennui, &c.

When the action of animal life is interrupted by disease, its state of inaction is denominated *catalepsy*, *lethargy*, *asphyxia*, &c.

There has been much dispute on the question, whether the mind can ever exist, as for instance, in sleep, without sentiments, without ideas? If we set aside idle metaphysical refinements, its solution is very easy. In this life, the mind receives its sentiments and ideas through the cerebral organs; when, therefore, they are completely inactive, it can be possessed neither of sentiments nor ideas. Deep and perfect sleep is a temporary suspension of the existence of the sentient, *I*, (*moi*:) the essence of the mind consists neither in thought nor volition, which, as has been happily observed by Locke, are modifications only of the mind.

Dreams.

Almost all physiologists unite in saying, that in dreaming, animal life is partially active. They are right; and yet they deny the plurality of the organs! It is impossible, however, to conceive of dreams, except by supposing the existence of this plurality. When certain organs of animal life become active during sleep, the sentiments and ideas, dependent on them, must of necessity be awake; but in this case the activity is involuntary.

When one organ, only, is active, the dream is simple; she whom we love is folded in our arms; delicious music is sounding in our ears, or we are engaged in contest with enemies, as the functions of one or another organ are active.

The greater the number of organs simultaneously active, the more complicated, confused, and incongruous will be the action which the dream represents.

Ordinarily, when the organs are exhausted by wakefulness and exertion, no dreams appear during the first hours of sleep, unless the brain be extremely irritable. But, as their fatigue passes off, they are more disposed to activity, and hence, on the approach of morning, dreams are more frequent and more vivid. Dreaming, then, is, in reality, only a state of partial wakefulness of animal life, or, in other terms, an involuntary activity of certain organs only, during the repose of the remainder. Thus the phenomenon, dreaming, forces us to admit the plurality of organs for the moral qualities and intellectual faculties.

How happens it, that certain faculties display more energy in a dream, than in wakefulness? What precaution do we take, when wishing to think profoundly on a subject? We exclude all external impressions, we cover our eyes with our hands, shut ourselves up, in order to consecrate our entire attention upon a single

point. So it is in dreams. The whole vital strength is concentrated in a single organ or a small number of organs, whilst the others sleep; hence their action must of necessity be more energetic. The sentiments and ideas awakened in dreams are, sometimes, perfectly free from every thing irrelevant. It should, therefore no longer be matter of astonishment, if, like Augustus Lafontaine, we occasionally compose exquisite poetry in sleep, or, like Alexander, sketch the plan of a battle, or, like Condillac, solve difficult problems, or, like Franklin, we find furnished in the morning, a plan designed the preceding eve; or, if we discover during sleep, the true relations of those things, which, amid the confusion of sentiments and ideas, had defied our penetration.

It is a mistake, to believe that dreams are always a recurrence of sentiments and ideas, previously entertained. Man may invent in his sleeping, as he does in his waking hours; for, the internal sources, whence the sentiments and ideas flow, are the same in sleep as in wakefulness.

Somnambulism.

Somnambulism is distinguished from dreaming, simply thus; dreaming consists merely of sentiments and internal ideas; while in somnambulism, one or more senses become susceptible of external impressions, and one or more instruments of voluntary motion are thrown into action. It exists in various degrees, an examination of which, commencing with the feeblest, will quickly enable us to understand the most astonishing phenomena presented by it.

When, in spite of every exertion to keep awake, we find it impossible to resist the overpowering tendency to sleep, such sleep is partial only, that is to say, that, though asleep, in certain respects, we still remain awake in others; *we slumber*, we still continue to hear what is

passing around us: in this way persons dose on horseback, or, when marching, but suddenly start up, from time, to to time completely awake.

Generally, in the morning we do not get thoroughly awake all at once; we still slumber, but we hear the cocks crowing, and the rumbling of wagons, a proof that certain organs may be independently active, not only in the stir of internal sentiments and ideas, but likewise in their susceptibility of external impressions.

A very vivid dream often throws into action many parts, which are subservient to voluntary motion: we make exertions to escape a danger, &c., we scream, talk, laugh; even animals make similar movements in their dreams; the dog barks, and stirs his legs, &c. In these instances, the activity (or wakefulness) has extended even to the organs of the voice, and to the extremities. Occasionally the sleeper during his dream, hears so as to allow of conversation with him: in this case, both the external and internal instruments of hearing are awake. Here is a new confirmation of what I affirm, that certain organs or senses may be independently active, whilst the remainder are buried in deep sleep.

No one doubts the possibility of hearing during a dream. Is it possible to see? Facts will decide this question.

A young man of Berlin, sixteen years of age, experienced, from time to time, paroxysms of a very extraordinary nature; he tossed about in his bed, unconsciously; his motions and his gestures evinced a great activity of many of the internal organs; he was unconscious of every thing done to him; at length, he leaped from his bed, and with hurried steps traversed the ward; at this time his eyes were open and motionless. I set different obstacles in his way, which he either put aside, or else carefully avoided; he, then, suddenly threw himself upon his bed again; again tumbled about for some time, and ended by awaking with a start, not a little astonished at the number of curious observers, by whom he was surrounded.

M. Joseph de Roggenbach, of Fribourg, in Brisgau, stated to me, in presence of many witnesses, that in his youth he had been a somnambulist. During his state of somnambulism, his tutor often made him read; he was made to look after places on the map, and he found them more readily than when awake; his eyes were always open and motionless, the whole head turning where a movement of the eyes would have answered. Frequently he was prevented from moving, but he was conscious of the restraint, endeavored to free himself, and begged to be released, but still he did not awake. Sometimes, he said that it would awake him, if he were led into the garden, and this never failed to happen.

I, also, knew an instance of a miller, who, while dreaming with his eyes open, went into his mill, occupied himself there, as he usually did in the day-time, and then returned to the side of his wife, without having the faintest recollection, in the morning, of his night's work.

There are, then, some somnambulists who see; and the opinion of certain visionaries, who think that the perception of external objects, by somnambulists, is through the internal senses only, is refuted.

It is proved by experiment, that those somnambulists who keep their eyes closed, strike against obstacles put intentionally in their way, tumble into holes, &c. When having their eyes shut, they come to a familiar spot, they recognize where they are, as the blind do, by means of the sense of local memory.

Just as the ears and eyes may be awake during a dream, so may other external senses. The odors around are perceptible to the smell; the taste recognizes a bitterness or sweetness in the saliva, after bad digestion; heat, cold, &c., are sensible.

There are some, who think somnambulism a state altogether extraordinary, because its subjects execute, during their sleep, things in which they would have failed when awake; they climb trees, mount upon housetops, &c.

But the whole wonder disappears, the moment we reflect upon the circumstances under which the most daring feats may be accomplished, and upon those in which they are impossible. There is one, who, when standing on a balcony surrounded by a balustrade, at the top of a very lofty tower, can turn his eyes downwards without seeking security from the balustrade. Every one can walk, without wavering, upon a very narrow lath laid along the floor. What perils are there, to which boys do not accustom themselves in their venturous sports? What is there left unexecuted by the rope-dancer, mountebank, and the mountaineer, who hunts the chamois? But remove the balustrade from the balcony, open an abyss on each side of the lath, and destruction follows. And why? Is it that we are unable to walk on the lath? By no means; but fear has paralyzed our confidence in our powers.

Now let us analyze the somnambulist. "He sees clearly what is to be done, but the organs, which should warn him of his danger, are locked in sleep; he is, therefore, fearless, and executes successfully whatever his corporeal activity will permit him to undertake. Awaken him, and that instant he sees his danger, and is lost.

Recapitulation.

Having endeavored to prove, in the preceding volume, that the moral and intellectual dispositions are innate, and that the manifestation of the moral qualities and intellectual faculties is possible, in this life, only by the aid of material instruments, I have endeavored, in this volume, to determine the material conditions essential to this manifestation, abstaining from all discussion on the nature and seat of the mind. I have shown the importance of studying the structure and functions of the brain—have made a division of the functions of animal life into two classes, the first of which includes the sensitive faculty, voluntary motions, and the functions of the senses; the second, the moral qualities, and intellectual

faculties, the propensities and sentiments—have determined the brain to be the exclusive organ of the functions of animal life of the second class—have demonstrated, that the instincts, propensities, constructive instincts, sentiments and faculties, are seated neither in the viscera, nervous plexus, and ganglia of the chest or abdomen, nor in the nerves of the senses; and that they are not determined either by temperament or general constitution of the body—have, on the contrary, demonstrated, not only by the aid of comparative anatomy, but by that of physiology and pathology also, that the brain must be recognized as the exclusive organ of the moral qualities and intellectual faculties—and, finally, have refuted the objections to my doctrine, derived from cases in which it was averred, that the action of the moral qualities and intellectual faculties continued, though the brain was dissolved or disorganized, by water, annihilated, ossified, petrified.

I have noticed the attempts hitherto made, to find a measure of the moral qualities and intellectual faculties, applicable both to man and animals—have demonstrated that this measure is to be found neither in the absolute volume of the brain, nor in the proportion between the volume of the encephalon and the size of the body, nor in the proportion between the brain and the nerves, nor in that between the brain and the face, nor between the brain and the neck, nor, finally, in the relative proportions of the cerebral parts to each other—have shown that neither the facial angle of Camper, nor the occipital line of Daubenton, furnish this rule—have resolved the question: Is there a form of the head, from which the existence of mania or dementia may be inferred?—have examined the influence of a large and a small brain, of a large and a small head, over the manifestation of the intellectual faculties—have observed, finally, that with an equal quantity of encephalon, with equal dimensions of the head, the instincts, propensities, constructive aptitudes, sentiments and faculties, may not only be different, but also manifest themselves in very different degrees; that

with an equal encephalic mass, the same qualities or the same faculties may be very active in one individual, and very dull in another. I find an explanation of this phenomenon in the circumstance, that certain parts are eminently developed in the brain of one of these individuals, which, in the brain of the other, are only moderately so. From these facts I conclude, that different cerebral parts execute totally distinct functions; whence I am naturally led to admit the plurality of the organs.

In the third section of this volume, I have demonstrated the plurality of the organs by numerous anatomical, physiological and pathological proofs; and have refuted objections, emanating from the humblest as well as the most distinguished writers. Finally, somnambulism, and the phenomena of dreams, have confirmed my doctrine on this point.

In order to remove all obstacles to the discussion of the fundamental powers themselves, their organs, and the locality of the organs, it still remains for me to show the possibility of determining from the shape of the cranium, or of the head, not only the form of the brain, but also the degree of individual development of each of its integrant parts, and to point out the means which I have employed, to discover the functions of determinate cerebral parts; in other words, the seat of the organs. These two points will be the subjects of the third volume. In the following volume, I shall treat of the fundamental powers and their organs, and of many very important general results, which are immediate deductions from the physiology of the brain.

THE

INFLUENCE OF THE BRAIN

ON THE

FORM OF THE HEAD:

THE DIFFICULTIES AND MEANS

OF DETERMINING THE FUNDAMENTAL QUALITIES AND FACULTIES, AND OF DISCOVERING THE SEAT OF THEIR ORGANS:

EXPOSITION

OF THE FUNDAMENTAL QUALITIES AND FACULTIES, AND THEIR SEAT, OR ORGANOLOGY.

By FRANÇOIS JOSEPH GALL, M.D.

TRANSLATED FROM THE FRENCH

By WINSLOW LEWIS, Jr., M.D., M.M.S.S.

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CONTENTS.

SECTION I.

SECTION II.

SECTION III.

FUNCTIONS OF THE BRAIN.

SECTION I.

ON THE INFLUENCE OF THE BRAIN ON THE FORM OF THE CRANIUM, OR AN EXAMINATION OF THE QUESTION, — IN WHAT CIRCUMSTANCES CAN WE DERIVE, FROM THE EXTERNAL FORM OF THE CRANIUM OR HEAD, INDUCTIONS RELATIVE TO THE DEGREE OF DEVELOPMENT OF THE BRAIN, AS A WHOLE, OR TO THAT OF ANY OF ITS PARTS, — AND CONSEQUENTLY FORM A JUDGMENT OF THE DEGREE OF THE MORAL AND INTELLECTUAL DISPOSITIONS, BY THE EXAMINATION OF THE EXTERNAL FORM OF THE CRANIUM OR HEAD?

In the first volume of this work I have proved, that the instincts, propensities, and faculties are innate, in animals, as well as in man, and that, in this life, the manifestation of none of these dispositions is possible, without the aid of material instruments.

In the second volume, I have shown, that, of all the parts which constitute animal organization, the brain is the only one, which can be exclusively regarded as the instrument, by which the moral qualities and intellectual faculties are exercised.

Finally, I have proved that the brain is composed of several organs, constituting as many particular material instruments, as there are moral qualities and intellectual faculties, essentially distinct.

Now the question arises, whether, in the doctrine of the cerebral functions, we should adhere to general

principles, or whether there are any means by which we can determine the functions of each part of the brain, and establish the seat of each of the organs of the fundamental moral qualities and intellectual faculties.

All my predecessors, even those who admit the existence of a plurality of mental organs, have failed in their attempts to determine the seat of each of them; and it is by an examination of the form of the crania and heads, and comparing this with the moral qualities and the intellectual faculties, with which such individuals are endowed, that I have finally succeeded.

How is it possible to do this? Does there exist, then, a relation or an exact correspondence between the brain, the cranium, and the head? The possibility of resolving this question, supposes that the organs of the mind are situated on the surface of the brain; that they are more or less depressed, more or less flattened, more or less elevated, larger or smaller, according as the exercise of their functions is susceptible of more or less energy; that these varieties of form of the particular cerebral parts are developed on the surface of the cranium and head; propositions which require a rigorous demonstration.

I have proved, in the second volume, that the disposition to functional action is as much more energetic, as the sound organ, other things being equal, has received a more considerable development; and as it respects this, I have entered into all the necessary details. The following observations will constitute an answer to the question, — How far does truth bear us out in saying, that the organs of the soul are situated on the surface of the brain?

We must recollect, that each nerve, after being sufficiently increased, is ramified and spread out in that part where it is destined to act. The nerves of sensibility and motion are distributed to the skin and muscles; the nerves of the senses are each ramified

on the external organ to which they belong. For example, the olfactory nerve is spread out upon the pituitary membrane of the nose; the nerve of taste terminates in minute branches in the tongue; the expansion of the optic nerve forms the retina.

The part in which the nerve is thus spread out, is not, in fact, the whole of the organ, but, from the extent of the expansion, we may infer the size of the nerve itself. The surface on which the olfactory nerve is spread out in the dog and horse, is much greater than in man. Hence, from its origin to its minute ramifications, this nerve is larger in these animals than in our species.

Nature follows precisely the same law in the brain. The different cerebral parts arise and increase in different places; they form larger or smaller fibrous bundles, which terminate in ramifications. All these ramifications of the different fibrous bundles, when re-united, form the hemispheres of the brain.

These hemispheres are simply a nervous membrane, one or two lines in thickness, covered, on the whole of its external surface, with a greyish, pulpy, or gelatinous substance.

Let us imagine this great nervous membrane, as we see it in large dropsies of the brain, folded like a furbelow, so that each fold shall be twelve or sixteen lines in depth, (more or less,) we shall then have their convolutions, the intervals of which have received from anatomists the name of anfractuosities, and we shall have also the two hemispheres, such as nature has placed them in their folded state in the cranium. The ramification of the olfactory nerve forms analogous folds in the alæ of the nose.

A small nervous bundle can form only a small ramification, and consequently but minute folds; and but one or more small convolutions. A considerable nervous bundle, on the contrary, forms an extensive and thick ramification, and consequently, folds and convolutions of much greater volume.

Thus, then, although all the integral parts of any one cerebral organ, from their origin to their termination, are not situated on the surface of the brain, nevertheless, we can deduce from the size of the fold, or convolution, positive inferences as to the volume of the whole organ. The longer, deeper, and broader the convolutions are, the more space do they occupy, and the more are they elevated above those that are shorter, narrower, and more superficial; so that a brain, the integrant parts of which have acquired an unequal development, exhibits on its surface depressions, level parts, and eminences.

In some cases, the ramification of a nervous bundle or organ, is folded into a single convolution; in others it forms many.

The folds or convolutions do not all assume the same direction. Some run straight from before backwards; others go transversely from above laterally; others again take an oblique direction; almost all go somewhat in a serpentine course. Some form pyramids; others run spirally, &c.

The fundamental forms of these convolutions are the same in all human brains, and they correspond in the two hemispheres of the same brain; in a word, they are symmetrical.

In small brains, as those of the dog, horse, ox, sheep, &c., this symmetry is perfect; in man, small divisions vary in their forms. (Pl. III. and XIV.)

All the forms of the principal divisions, when these last have acquired a great development, are manifested on the cranium under the same type. Hence result the different forms and directions of the organs, which I have delineated on the surface of crania and busts.

This explains the relation or correspondence that exists between craniology and organology, or the doctrine of the functions of the different parts of the brain, (cerebral physiology,) — the sole object of my researches.

How can it be proved that the external surface, as well as the internal surface of the cranium affords a faithful impression of the external surface of the brain, and consequently, becomes the principal means, not only of discovering the original powers of the mind, but further — the means of determining the seat of their organs?

For more than twenty years that I have taught this truth, with the exception of some of my auditors who have published my lectures, few authors have paid any attention to it. Galen long since said that the cranium is moulded on the brain, and not the brain on the cranium.* Du Laurens† and Diemerbroek‡ taught the same thing in the seventeenth century. In 1743, Fischer wrote a particular treatise on this subject.§ Lavater‖ and Blumenbach, from whom I have borrowed these observations, were equally convinced of the truth of this. M. Spurzheim has proved it at length in his work,¶ and we have also inserted in the Dictionary of Medical Sciences a short article on the same subject.**

As this object is not only of the greatest importance in the science of Organology, but is even absolutely essential to the existence of the doctrine, I shall treat it more in detail than it has heretofore been done, and shall consider it under all the points of view, offered both in health and in disease.

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* De usu partium, lib. viii.
† Hist. Anat. p. 139.
‡ Anat. Corp. human. p. 554.
§ Dis. de modo quo ossa se vicinis accommodant partibus. Lug. Bat. 1743.
‖ Phys. frag. t. ii. p. 165.
¶ Physiognom. Sys. p. 217 et suiv.
** Med. Sci. t. vii. p. 260 et suiv.

A View of the Osteology of the Cranium, so far as is necessary to enable us to understand the Influence that the Brain exercises on this osseous Structure.

In the examination of the forms of the cranium, the organologist has no other object in view, than to determine the degree of development of the cerebral parts; consequently only those parts of the cranium, whose form depends upon the brain, have an interest for him.

The jaws, the mastoid processes, and all the other bony prominences, have nothing in common with the brain, and consequently do not contribute in the least degree to the development of the form of the cranium. We have only to concern ourselves therefore with the osseous box of the brain.

This box is composed of eight bones, viz., 1. the sphenoidal; 2. the frontal, which at the period of birth is in two parts, which are afterwards united together, and in the adult constitute but one bone; 3. the two temporal; 4. the occipital; 5. the two parietal; 6. the ethmoidal.

These bones are united together by sutures in such a manner as to form one great cavity, which contains the brain and some other nerves. On this account it is called the cerebral cavity, or the bony box of the brain.

PLATE VIII. represents the brain seen in profile, in its natural situation in the cranium. PLATE IX. represents the same seen from above. PLATE XI. represents a vertical section which divides the whole brain into its two symmetrical halves. PLATES X. and XII. also represent the brain seen in profile, and exposing a part of its internal structure. PLATE IV. shows the whole brain as seen from its base. PLATE XIII. also represents the brain seen by its base, situated in the cranium, some of its parts being prepared. In all these brains, the convolutions are exposed, the vascu-

lar membrane, which follows them in all their anfractuosities, and which furnishes sanguineous vessels to all the nervous fibrils, having been removed.

It will be seen by these engravings, all of which represent the brain in its natural dimensions, that the whole cavity of the cranium is filled by the brain; and that throughout it is in contact with the internal surface of the cranium.*

I shall hereafter give a more detailed description of the bones of the cranium, so far as their form varies, and where this variety of form has a bearing on Organology. Now we proceed to the examination of the question — whether the internal as well as the external surface of the cranium, manifests the impress of the surface of the brain? In this inquiry, I shall commence with examining these organs in the healthy condition, and conclude with remarks upon them in a state of disease.

The Influence of the Brain on the Cranium previous to Birth.

In the first few weeks after conception, the brain is not yet surrounded by any osseous substance. It is covered by four membranes; the pia-mater or vascular membrane; the arachnoid; the dura-mater, composed of two layers; and a transparent cartilaginous membrane. All these membranes exactly envelope the surface of the brain; they ought then to represent with exactness its convolutions externally.

About the seventh or eighth week, there is formed in the cartilaginous membrane as many points of ossification as there exist bones in the cranium. To these points new bony molecules are gradually add-

* I need not observe to anatomists, that the regions of the internal surface of the cranium, corresponding to the longitudinal and lateral sinuses, are an exception.

ed; and in this way diverging rays are formed from a central point of ossification. (Pl. xxxvi. fig. 1.) The intervals of these radii are by degrees filled up with bony matter. In this manner osseous plates are formed, which soon meet each other at their edges.

Sometimes we can distinguish the traces of this radiated crystallization, even many years after birth. The place where each of the bones of the child is hardest, was in the fœtus the point of ossification. It is found near the middle of each bone.

Now, as the deposition of the bony matter follows the direction of the cartilaginous membrane, and as this is moulded upon the brain, it follows necessarily that the cranium is moulded upon the brain.

So far no one has contradicted me, in what I have advanced on this subject. Never has a child been born with a head of a shape similar to that, which it assumes in the adult age. Among the heads of new-born infants we do not observe near so great a difference, as between those of adults. Does not this lead to the presumption, that the form of the head is determined by external and accidental circumstances?

The Forms of the Crania and Brains differ originally.

Hereditary resemblances in the countenance, as well as in the forms of the other parts of the body, prove abundantly that future forms are determined at the moment of conception. I mean by future forms, the tendency to those forms which the parts afterwards assume. A child is never born with an aquiline nose, but the nose of such a new-born child, as well as all its other parts, have a tendency to adopt certain forms.

This is the reason why the forms of the different parts differ originally in different infants, to so great a degree that an attentive observer, who would de-

vote the necessary time to this study, might determine from the forms of the fœtus, what would be the forms of the adult.

Sœmmerring, and many accoucheurs, as well as myself, have constantly found varieties of forms in different heads of new-born children. It may then be admitted that the future form of the head is originally impressed upon it. It is reasonable, however, that we should except from this law those cases, where the *nisus formativus* is opposed by external violence.

Can the Form of the Head be modified, either during the Birth of the Child, or by Compression or Maluxation?

Some physiologists seriously pretend, as M. Fodéré,* and others maintain ironically, that, as a consequence of cranology, all our dispositions and talents would depend upon the form of the pelvis, the action of the forceps, or the dexterity of the midwife. Even in common accouchements, children come into the world with heads very much deformed; but this malformation does not concern the brain, nor the osseous box that encloses it. It only takes place in the soft parts. The compression that the head undergoes in its passage through the pelvis, causes a stagnation in the fluids, which makes a tumor between the top of the head and the occiput. Consequently the head acquires an elongated form. But the circulation is soon reëstablished, and the head of the child resumes the *form which it had in the womb of its mother.*†

* Traité du Delire, tom. ii. p. 128.

† In the books of physiology and midwifery, we read: "The head (of the fœtus) will separate easily from the body, if the lower jaw is caught over the junction of the pelvis; because the base of the cranium and this jaw resist in their whole extent, and together present an extensive surface incapable of yielding, as the top of the head does in common accouchements, where the bones, slipping in part over each other, form a conical figure, which facilitates delivery." — (Levret on Difficult Parturition.)

If there are midwives so inconsiderate as to undertake to give fanciful forms to the heads of children, by pressing and moulding them, at least they do not

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"When the head is elongated in parturition, it is always in the direction of its oblique diameter, so that the point of the cone, which it then represents, is above the posterior angle of the parietal bones. But it cannot undergo this change without diminishing in thickness from side to side, and often from the summit to the base." — (Baudeloque, Accouchements.)

"As in the fœtus, the osseous pieces of the cranium are numerous, thin, flexible, and united together only by extensible membranes, the head, either by the efforts of expulsion, or by pressure, can elongate from the occiput to the chin, at the same time that it is flattened from one parietal bone to the other; and we have seen the parietal diameter reduced to two inches and seven lines." — (Chaussier.)

"Ut idem caput nixibus, ac pelvis renisu, ossiumque bregmatis precipue mollitie, mobilitate, eorumque reciproca susceptione in acumen desinat, atque, ut in omni pelvis regione opportet fieri, ab una ad aliam plagam informam cogatur minorem, aliaque extenuetur in majus." (*Doctoris Lucæ Johannis Boëri naturalis medicinæ obstetriciæ Libri septem.* Viennæ, 1812: p. 441.)

"Nature, in forming the head of the fœtus of flexible pieces, intended to facilitate parturition. These pieces, being separated by unossified and membranous intervals, allow the bones to slide over each other, and thus the whole head is in a measure reduced, and slides through the narrow outlet of the pelvis." — (Richerand, Physiology.)

In order to fix my ideas on the changes, which the head of the infant is susceptible of experiencing by compression, caused either by the pelvis or the forceps, I have, as I am always accustomed to do, shut up my books and consulted nature. In presence of M. Dannecy and others, we made experiments on the heads of new-born infants that were well formed. After having removed the hairy scalp, we compressed them in every direction, with a very considerable force. Finally, we compressed the cranium with so much force by means of forceps, that the blood transuded through the pores of the bones.

In eight heads submitted to our experiments, seven exhibited not the least trace of overlapping. One only manifested the following phenomena: —

When the forceps was applied in the longest diameter, that is to say, from the forehead to the occiput, and when a strong effort was made, the superior part of the os occipitis glided under the posterior borders of the parietal bones to the extent of nearly two lines. This certainly is not the *overlapping* of which accoucheurs speak.

The greatest diameter of almost all the heads of new-born children is not in the protuberances or points of ossification of the parietal bones which do not yield to any force, but below and a little in front of these protuberances, nearly in the inferior part of these bones. Now, when we applied force to this part, it became depressed. The same thing happened when force was applied to the superior part of the frontal bone, or on the anterior superior part of the parietal bones. A depression of the interior middle part of the parietal bones pro-

succeed. The entire form of the head results from the form of each of the bones of the cranium; and the form of these bones cannot be altered by compression or malaxation.

If, however, the violence that is used be too great, the osseous laminæ might be bent and depressed, and in this case, the child will be destroyed, or remain imbecile during life. But all the cranial bones are still very elastic in the new-born child. The moment the pressure ceases, they resume their original form. In those cases even, where they have been so pressed that their proper elasticity is not sufficient to restore them to their first form, the brain re-acts upon them; and when this has not been essentially injured, their primitive form is reëstablished at the end of a certain period, sometimes only after many years. The same thing happens, when the bones of the cranium are depressed by the narrowness of the pelvis, or, by the application of instruments.

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duced a swelling of the superior parts of the head, and *vice versâ*, but in no instance did the head assume a pointed form. If the pressure, in whatever region applied, is too strong, the brain is crushed, and extravasations of blood take place, especially from the great sinuses.

There is a great difference between the trifling *overlaying* which I have just described, and that extreme sliding of the bones over each other, which causes the head to assume a pointed form, and glide in a manner across the narrow passage of the pelvis; which necessarily supposes a considerable reduction.

In the whole length of the suture of the parietal bones, the edges of these two bones are not in the same plane, but one rises above the other. In touching the head, this anatomical configuration might be easily mistaken for an *overlaying*. Hence, I believe, arises in part the mistake of the accoucheurs.

In those cases, where a violent pressure is occasioned, either by the use of instruments, or by the narrowness of the pelvis, certain regions of the head may be considerably depressed; but then greater or less injury happens to the child.

I have further observed, that very small heads, where the bones are extremely flexible, sometimes suffer the most, so much so, that occasionally even the death of the child ensues. This is an important circumstance in legal medicine; and those who have to decide on presumed infanticide, cannot bestow too much attention upon it.

The Influence of the Brain upon the Cranium from Birth to adult Age.

A short time after birth the bones of the cranium grow hard; they lose their flexibility, unite by their edges; the membranous intervals, the *fontanelles* ossify. Is it possible, in these circumstances, that the brain should be able to imprint its form on those bones which have become hard? Let us first examine what happens to the cerebral mass, as a whole, and to the cavity of the cranium. After this examination we will pass to the consideration of the development of the cerebral parts, in particular, and of the changes which this development produces on the cranium.

The brain of a child two years of age evidently has more volume, than that of an infant just born or even a year old.

Compare the head of a new-born child (Pl. XII.) with the head of a boy of two years (Pl. XXXVII.), and that of a little girl of six years (Pl. XXXVIII.), and these two last with heads (Pl. XXXIX. XL.) of adults. The head of a new-born child is from thirteen to fourteen inches in circumference; those of adults are from twenty to twenty-one inches and a half. The brain of a boy or girl is larger at ten years, than it was at two or six, &c. The cerebral cavity, and consequently the whole contour of the head, enlarges in the same proportion as the brain increases in size; and this simultaneous enlargement continues so long as the head grows. This fact sufficiently shows that the cranium yields constantly to the brain, which augments in volume; and, as the bones of the cranium are very thin until the age of puberty, hardly half a line in thickness, it follows of course, that the external outline of the cranium is precisely similar to the surface of the brain.

The thickness of the cranium represented in Plates IX. and XII. is the ordinary thickness in adult age, that is to say, from one to two lines. We see farther in these same plates, and by Plates VIII. X. and XI. that the brain, in the whole of its outline, is exactly applied against the internal surface of the cranium; for, in a state of health, the intervening membranes are not to be considered.

In examining the internal surface of the cranium of a subject, who has not died of a chronic cerebral disease, we shall observe that the great blood vessels of the dura-mater are very exactly impressed upon it; we see also there the impressions of the pretended glands of Pacchioni, and the returning sinuses. Even at this age the convolutions are found very distinctly impressed on the inferior table of the orbitar plate, the inferior anterior part of the frontal bone, and in the temporal bones. When from any cause the membranes of the brain become thinner than natural, we then distinguish the impression of the convolutions on the whole internal surface of the cranium. I make one observation, in passing, that in the majority of hydrocephalic subjects we find the hairy part of the head covered with a furfuraceous exanthema. For example, in the hog, goat, roebuck, stag, sheep, ox, cat, dog, marten, polecat, the smaller phoca, ape, &c.

Some physiologists have thought, that the enlargement of the osseous box was caused by the pressure, which the brain exercises on the internal surface of the cranium; but there does not exist in living organization any like mechanical action. There is continual absorption, secretion, nutrition, decomposition, and new formation. The osseous molecules are absorbed, and others are secreted in their place; and so long as the brain and the cranium have not acquired their maximum of growth, secretion is more considerable than absorption. New juxtapositions take place in consequence of the same laws, that were fol-

lowed in the formation of the bony osseous laminæ in the fœtus, that is to say, that the contours of the brain constantly follow.

Hufeland and Fodéré set out from this same mechanical point of view, when they say, that in countries where the inhabitants carry considerable weights upon the head, the cranium ought to be compressed inward, and consequently the organs situated at the superior part of the head, depressed.

But, supposing even that the brain exercises a mechanical pressure against the internal surface of the cranium, as may really happen in the case of hydrocephalic patients, who grow rapidly, we must not forget that the brain acts on the concavity of the vault, and the compressing weight of the convexity; but every one, who has the least idea of the theory of the arch, or even any person who has only attempted to crush an egg in the hollow of his hands when joined together, it being placed in the direction of its longest diameter, can easily conceive what resistance the arch of the cranium is capable of opposing.

I pass over in silence the objections, that others have urged against the idea of Hufeland and Fodéré. For the rest, we have found in the form of the head of the inhabitants of these countries, as great diversities as in that of other men. We have found in them the organs of firmness, of pride, &c., placed near the top of the head, as strongly developed as in other people.

We are told that certain savages of America apply to the forehead of their children little flat plates, by means of which they depress the superior part of the frontal bone.* As M. Spurzheim has had better opportunities than myself of making observation on this subject, I will transcribe here what he says in relation to it.

"I have seen seven crania of Caribs; they have

* Dict. des. Sci. Med. tom. xxi. p. 268 et suiv.

very little elevation, and are particularly expanded in the temporal region, but on comparing one with another, I find as great a difference as is usually observed in comparing an equal number of European crania.

"I have seen European crania much less elevated; consequently the want of elevation in question cannot be owing to mechanical depression alone. The surface of the crania of the Caribs, was even more or less developed, and consequently manifested in no part the impression of a plate. It seems to me, that all that is related of the method of flattening heads, refutes itself. It would require a very considerable force to compress the cranium and brain; but this force cannot act from above downwards, unless it is opposed by an equal resistance from below upwards, or in some other direction; but, if the pressure from above downwards produced any effect whatever, the resistance from below upwards, or in any other direction, ought to produce an equal effect."

Since the publication of the first edition of my work, I have conversed with many people who have been at the island of St. Vincent; but their reports are contradictory, and do not clear up my doubts. "Some say that they leave this plate on the head of the infant six weeks; others pretend that it is left there, six months; and others say, two years," &c.*

In those Caribean crania, that we saw in the possession of M. Blumenbach, where the anterior part of the forehead is forcibly depressed, the orbits have the same depressed form, which they assume in hydrocephalic subjects from the pressure of the water.

Is the brain of the Carib more naturally developed in the temporal region, and towards the base of the brain, or is this form artificial? This, according to the observations of M. Spurzheim, can hardly be admitted. There must have been then, in this case, permanent action by a hard and inflexible body; an ac-

* Phys. Sys. p. 220.

tion which cannot be compared to any other influence from without. After all, we are very far from applying craniology to deformities resulting from violence.

Up to this point I have heretofore left the question undecided. But I have since found in Lafitean, a passage which appears to me conclusive; it is this: "Some tribes in the vicinity of Louisiana, who are called by the French, Flat-heads, because they deem a flat forehead a mark of beauty, and have the summit of the head terminating in a point like a mitre, have cradles nearly similar to those I have just described, but besides this have something particular to cause them to assume this form, which they find so agreeable. It is a hole made in the cradle, in which the mother places the head of the child, applying to its forehead and the top of the head, a mass of clay, which she presses with all her strength. She repeats this application to the child's head every night, until the bones of the cranium have acquired sufficient consistence. Children suffer extremely in the first attempts of this violent operation, which causes them to turn black, and there runs out from the nose, the eyes, and the ears, a white and viscous fluid. They afterwards suffer much from the uncomfortable situation, in which they are obliged to pass every night of the first months of their infancy. But this must always happen to those who would be beautiful by art, and who wish to have charms that nature has denied them.

"The Caribs, and most of the southern savages, have the forehead flattened, and the head pointed. Their mothers take care to press it in with little flat plates, and small cushions of cotton firmly bound to the back of the head. But the children have no other cradle but little hammocks, proportioned to their size, which their mothers can suspend, and carry very conveniently, and in which the infants are placed entirely naked without any constraint. The savages, who are called in Canada, 'People of the earth,'

or the *Parhagonronnon*, have quite a different taste, for they consider beauty as consisting in a round head. On this account they are called 'Roundheads.'" *Customs of the American Savages*, &c., by Father Lafitean, Vol. I.

The Influence of the Development of individual cerebral Parts on the Form of the Head.

It has been demonstrated, in another place, that the development of the different cerebral parts is not simultaneous. Now, if it be true that the cranium is moulded upon the brain, I ought to be prepared to follow the successive developments of the cerebral parts, by means of the changes which take place in the cranium. Let us see if experience will still confirm my doctrine. The new-born infant remains, for some time, a stranger to the external world. Its life is scarcely more than vegetative, he passes it in sleeping and sucking. The part of the brain, situated in the anterior superior regions of the forehead, appears to the eye a mere reddish pulp.* But, at the end of some weeks, the nervous fibres are more and more apparent. The child begins to be a citizen of the world. At the end of nearly three months the middle and anterior superior parts of the forehead, until now perpendicular, or flattened backwards, begin to swell out. (Pl. XLI.) From this period, the child observes and regards with attention all objects in his way; he compares them with each other; the extent of his knowledge, acquired in a few years in relation to the world without him, is enormous, and he astonishes us with his questions and observations. But later, these frontal parts, in most individuals, put

* I only speak here of a brain that has undergone no preparation. I am not ignorant, that when it has been macerated in spirits of wine it manifests a fibrous structure.

themselves in a sort of equilibrium with the other parts of the brain, and the little prodigy resumes his place among ordinary people.

Let any one compare the forehead of a new-born child, with that of one from one to ten years of age; provided the individual that is observed, is not condemned by nature to a lamentable mediocrity, he will find that in the early months the forehead is small, narrow, short, and nearly perpendicular; but departing from this epoch, it dilates in all directions, and especially forwards; at a later period still, it loses its convexity, so much so as to recede in many subjects. Then it follows, that the form of the head undergoes the same changes, as the cerebral parts situated against the forehead.

The inferior part of the occipital bone undergoes also the most marked changes. The cerebellum is placed in the two occipital fossæ. In the new-born infant it is very slightly developed, in comparison with the rest of the brain; the cranium is contracted in this region, resembling a truncated cone; the external prominences, corresponding to the occipital fossæ, are small, flat, and almost imperceptible; the two mastoid processes are still very near each other, &c. (Pl. XLI. fig. 3.)

But mark the difference in the boy of twelve years! The occipital fossæ are distinctly observed externally by their protuberances; the mastoid processes are much further separated; the posterior base is much larger, &c., and this because the cerebellum is now much more developed in comparison with the other parts of the brain. (Pl. XLII.)

Finally, in more mature age, when the cerebellum has acquired all its development, the prominences, corresponding to the occipital fossæ, are much larger still, so that, in this state of things, the base of the cranium, taken from one temporal bone to the other, almost equals its diameter. (Pl. XLIII.)

But that which takes place in respect to the cere-

bral parts, of which we have just spoken, and their corresponding regions on the cranium, takes place also in the same manner, at the time of the marked development of the other cerebral parts, and as, at the age in question, the cranium is still sufficiently thin, hardly a line in thickness, and in many places much less, we can recognise, with certainty, the form of the brain by the external form of the cranium.*

Coincidence of the Surface of the Brain with the external Surface of the Cranium, in mature Age, as far as Organology is concerned.

It is hardly possible to determine with exactness, either the period of maturity, or the duration of the mature state of the brain. There are some individuals who arrive much sooner to this state than others. The brain of most men hardly acquires its ultimate development till the age of thirty, often even not till forty. After the definitive development of the brain, the cranium thickens by degrees, and in the following manner.

The bones of the cranium are composed of two solid osseous laminæ. One of these laminæ covers all the external surface; the other forms all the internal surface; the interval between the two laminæ is filled with a cellular substance (the diploe); this substance is not of a uniform thickness throughout, so that the two tables are more separated from each other at certain places, than in others. (Pl. VIII. X. XI. XII. XIII.)

Thus then, although the internal surface of the cranium is exactly moulded on the surface of the brain, from the moment when the cranium has acquired a certain thickness, it cannot be asserted without quali-

* All that I have just said of the development of the brain and cranium in our own species, equally takes place in the mammalia and birds.

fication that its external surface exactly represents the convolutions of the brain. For, if we take a cast both of the internal surface of the cranium and its external surface, we shall see that the first does not correspond exactly to the second; hence, the inference that is drawn from the external surface of the cranium, as determining the form of the brain, must be false, and consequently cranioscopy would be, at least in the mature age, a very precarious means for determining with exactness the degree of development of the cerebral organs. (Pl. VIII. X. XI. XII.)

Hufeland, Walter* of Berlin, Rudolphi, and a host of writers who have copied these learned men, have seized upon this fact to prove the fallacy of cranioscopy. Walter even flatters himself with the idea that by this argument, he has destroyed the doctrine of the functions of the different cerebral parts.

In order to show my readers how little solidity this objection possesses, I shall give here the view taken of it by MM. Berard and De Montégre. "Is the cranium the exact and faithful image of the external figuration of the brain, and can we always, in the most rigorous and precise manner, deduce the form of the one from that of the other? If we examine the relation of the cranium to the brain, in all vertebrated animals, especially in man, as affected by differences of national character, as well as by those equally certain, but more delicate ones of age, sex, individual peculiarity, &c., we shall be easily convinced that the cranium generally represents the brain. This opinion, incontestable in this point of view, if it be taken in its details and in its minute application, ought to be limited by the following considerations, the most of which are admitted by cranioscopists."

"1. The frontal sinus, in certain animals, as the carnivorous, swine, some of the ruminating, especially

* Et was über die Schædellehre, that is to say, a treatise on cranioscopy.

the elephant, &c., so bulges out the anterior wall of the cranium, that here we cannot judge of the brain by the cranium. Further, in individuals of the same species these sinuses may be more or less capacious. 2. The orbits which correspond in part to the brain may be more or less deep, more or less open in the same individuals. 3. The base of the cranium may be more or less projecting, more or less flattened. 4. The walls of the cranium may be more or less thick. The Egyptians, according to Herodotus, had much thicker crania than the Persians. Haller has seen a woman whose cranium was so thick, that it required eight minutes to open it in the operation of trepanning. M. Gall believes he has observed that suicides, and other maniacs, often present this peculiarity of organization. The same observer has seen that, in old age, the external table maintains its previous configuration, while the internal one follows the diminution of the brain. 5. The cranium is not uniform in its thickness, its walls are enlarged in certain points, and are raised into eminences; these eminences may vary according to the species and the individuals, even according to the exercise of muscles that are attached to them; although we should not give to this last circumstance too great a latitude, nor understand it in such a mechanical manner as some physiologists have done."*

The circumstance that the two tables of the cranium are not parallel in their whole circumference, and at all periods of life, would certainly be of the greatest importance if I had ever pretended to judge of all the minute shades of difference that exist in the convolutions of the brain, as well as of the differences of detail, which result from these in the exercise of the cerebral functions. But, on the contrary, I have endeavoured to render my hearers and readers acquainted with all the circumstances in question.

* Dictionary of Medical Science, vol. vii. p. 30.

Have I not spoken of the frontal sinus, as well in man as in animals, for instance, in the elephant and the swine; of the separation of the two tables of the cranium in owls, or rather in nocturnal birds; and in general, of the causes of the different forms of the orbits? I have, in my public lectures, insisted on all these points. My pupils, in their writings which they have published in relation to my doctrine, have also insisted upon it. I have insisted upon it in my article *Cranium* in the Dictionary of Medical Science. I was the first to maintain, that it was impossible for us to determine with exactness the development of certain convolutions, by the inspection of the external surface of the cranium. I was the first to treat in detail of the variations in the thickness of the cranium which happen in old age, in insanity, &c. I was the first who remarked, with extreme care, that in certain cases the external table of the cranium is not parallel to the internal one. I have called the attention of anatomists to all these circumstances. What is it then that has incited Messieurs Berard and De Montégre to turn these facts into weapons against craniology? Why had they not the frankness to instruct their readers by what means I have been enabled to remove many of these difficulties, and how I have derived advantage from others? Ought they not to have borne me testimony, that I pursued my researches with as much candor as coolness; that I considered my subject, in all its aspects, with impartiality?

Messieurs Berard and De Montégre thus continue: "6. The arteries, the veins, and especially the sinuses form, between the cranium and brain, a sort of layer sufficiently extensive to separate the one from the other, and prevent their reciprocally moulding themselves on each other, at least in the ultimate details of organization. These vessels cause the grooves and all the impressions, which mark the internal face of

the cranium, and which have been improperly referred to the cerebral convolutions; since a more attentive examination has demonstrated that the former do not correspond to the latter. Thus, the external face of the cranium does not represent the internal in its details, and this does not represent the brain, strictly speaking. The vascular layer, interposed between the brain and the cranium, would tend, on the contrary, to act on the two parts in an inverse sense; so that an elevation on the cranium would correspond to a depression in the brain, if the external face of the osseous envelope followed the internal with more precision."*

I have never before heard of a single anatomist, who has confounded the impressions of the sanguineous vessels upon the internal surface of the cranium, with the impressions of the convolutions of the brain. The marks of the large sinuses, for instance, behind the petrous portion of the temporal bone, those at the superior part of the falciform process, &c., have never been represented by any one as the impressions of convolutions.

But, on the other hand, there never has existed either anatomist or physiologist, who has not recognised the impressions called *digital* on the superior face of the orbital plate, as well as those in the inferior anterior part of the frontal bone, those in the temporal bones, &c., for true impressions of convolutions. I have been tempted many times to believe, that Messieurs Berard and De Montégre have never had either a cranium or a brain in their hands.

"7. When," they add, "after having removed the cranium, we examine the brain covered by its membranes, we see that its surface is smooth and uniform, the dura-mater not following the sinuosities of the convolutions, which is another proof that the cranium does not in all its parts receive the impressions of the brain.

* Dictionary of Medical Science, vol. vii.

It is in fact incontestable, that the cranium does not follow the brain in these deep sinuosities; that we are obliged to remove the membrane before we discover it. The cranium then only receives the impressions of the great eminences of the brain, which are well expressed in the frontal and occipital projections, &c. But as to details, and especially such minute ones as those that cranioscopy supposes, it appears to us that the cranium cannot express them."

It is true, that, after the cranium is removed, the prominences of certain cerebral parts do not appear such as they are impressed on the cranium. Is it astonishing that the brain, so long as it is covered by its osseous box, sustained and supported on all sides, should sink down and flatten in some measure when this support is removed? But it is by no means true to say, that in this case, the great protuberances flatten entirely. Messieurs Berard and De Montégre, while making the following observation, ("It is, in fine, incontestable that the cranium does not follow the brain in these deep sinuosities, which cannot be seen but by removing the membrane,") seem to give the reader to understand, that I have maintained, that the cranium does follow it; but I have never maintained any thing like it; and this exact opposition of the cranium to the brain is entirely indifferent, as far as craniology is concerned. Have I not, on the contrary, at all times declared myself the opponent of those who admit an indefinite number of organs, and who are afraid of finding the cranium too small to contain them?

As to the "minute details that the cranium cannot express," I have to observe, that these gentlemen were present at many of my public lectures, where I established what we were enabled to astertain by the cranium; but I will hereafter return to this subject. A critic, who, in order to combat his adversary, is obliged to attribute to him opinions contrary to those which he professes, betrays the weakness of his

own arguments. "The Cranioscopists," add these gentlemen, "should follow in the brain, the organ which they believe they see in the cranium." Wisdom herself could not give better advice; but have we not followed it a long time, before MM. Berard and Montégre have given it to us? Those who have been present at our lectures, can recollect that we have repeatedly shown our auditors, in the brain, an organ which was designated on the cranium. They cannot be ignorant that at Paris, we have, in the presence of many witnesses, made researches on the brains of some men of eminent talents. But I could wish that they were ignorant of this. By what right do they suggest to their readers, the idea that men, who, during a long series of years, have devoted themselves to the study of the functions of the brain, with an indefatigable zeal and a love of truth, superior to all obstacles, have neglected to observe so necessary a condition? How many times have I repeated to them, that, after having ascertained the place of an organ on the cranium, we have followed this organ in the brain; and that we have found the forms of the cerebral convolutions corresponding to the protuberances of the surface of the cranium?

"Finally, we shall remark," conclude MM. Berard and De Montégre, "that had cranioscopy a much greater extension, than we believe ought to be allowed it, it would require a very delicate and practised tact; that there would be very few competent judges in this matter, and, at the same time, error would easily enter into all considerations on the subject."

I am convinced, that, to speak correctly of organology and cranioscopy, it is necessary to acquire a knowledge of it by a long and practical study. But it is not less certain, that those only who have fulfilled this condition, have the right to establish themselves as judges with the public. I shall attempt now to answer the objection of the want of parallelism between the two tables of the cranium.

I have never pretended to distinguish the influence, which modifications of the forms of the cranium, slightly marked, may have on the character, or how its corresponding shades may be traced.

My first observations have only been made upon persons, who were distinguished from other men, by some eminent quality or faculty. I easily perceived that it was only in such individuals, that I could find striking differences of the head, and that I could distinguish well-marked protuberances. I had not then, in the examination of heads and crania, any other object than to discover the external marks, which indicate qualities or faculties eminently distinguished.

But, it is certain, that the want of parallelism in the two osseous tables of the cranium is not, in the state of health, or previous to old age, an obstacle which prevents the observing of the marked development of certain cerebral parts. To convince my hearers, I showed them crania sufficiently thick; for example, those represented, Plates VIII. X. XI. XII; then I directed their attention to the cerebellum, and I caused them to observe its slight development, as in Plate X. fig. 47, 48; its moderate development, as in Plate XI. fig. 47, 48; and its very great development, as in Plate VIII. fig. 47, 48. I demonstrated also the greater or less development of the posterior lobes of the brain, immediately above the cerebellum. These posterior lobes are, for instance, much less developed, Pl. XI. fig. 48, 49, and Pl. VIII. fig. 48, 49, than in Pl. X. fig. 48, 49, and Pl. IV. ii. fig. 28.

Who will venture to assert, that, with similar organs, the want of parallelism of the tables can lead to error? Generally, I demonstrated the same thing in regard to the two organs situated on the superior part of the head; that of benevolence, and that of firmness. I commonly demonstrate the same thing also with regard to the organs of architecture * and number, when

* Constructiveness.

they have acquired a marked development; but these two last are among the smallest. These demonstrations convinced all my auditors, that the want of parallelism in the two tables, when it occurs, does not in the least degree invalidate cranioscopic examination. In treating of the fundamental powers and their organs, I shall apply these considerations to each organ in particular.

For want of a sufficient number of facts, I cannot decide the question, whether, among certain races, the crania are thicker than in others. The crania of Negroes are often thick and heavy, but I have some in my collection that are thin and light. The crania of the Greenlanders and the Esquimaux, which are in the collection of M. Blumenbach, are thin and light. According to Herodotus, the crania of the Egyptians were thicker than those of the Persians. Sometimes the crania of men of very limited capacity are exceedingly thick, even when this condition is not the result of advanced age or mental disease. Similar crania are useful for physiology generally, but they are of no service in craniology. M. Hufeland fears, that by and by, we shall discover so many organs, that the cranium cannot contain them. I shall refer this question to the section on the primitive powers.

This philosopher is deceived, in affirming that I regard each convolution as a particular organ. I have never taught this; even if such were the case, it would not be impossible to recognise, on the external face of the cranium, the extraordinary development of certain convolutions. It is true that the investigation would be more difficult, if many neighbouring organs had acquired at the same time a great development. But however this may be, every individual cannot become the object of useful craniological observations.

I observe finally, that all the objections, and all the doubts of my adversaries, have a radical defect. Craniology and organology are experimental sciences.

Why do not my adversaries commence by repeating the observations that M. Spurzheim and myself have made? Why do they not collect facts, rather than oppose me by subtilties drawn from their own method of considering the powers of the mind and animal organization? I myself formerly believed in the commonly received ideas, but the power of facts has constrained me to sacrifice to truth, the knowledge which I derived from the school, and this mania of explaining every thing, for which I had contracted so strong a habit. The naturalist, above all, is the slave of nature; he ought to know what is; afterwards he can give himself up to his vain desire of knowing why, *what is, is, as it is.*

Observations on the Examination of the Heads and Crania of Animals.

In order to extend to animals, the observations which in man allow us to interpret the forms of the cranium, it is necessary to make a particular study of the structure of the heads of different species. We cannot give a general rule either for the mammalia, or for birds; nor for amphibious, frugivorous, or carnivorous animals. In certain species, age produces an essential change. Among fish, tortoises, &c., we cannot absolutely determine the form of the brain by the external configuration of the cranium.

Among certain animals the head is scarcely more covered with muscles than in man; others, except in certain regions, have the whole head furnished with strong muscles. In some species the frontal sinuses are wanting; in others the cellules, between the two osseous tables, are continued not only into the frontal sinuses, but extend through the whole cranium, even to the horns. In other species cells only exist in one part of the cranium, but these, it is true, are quite extensive. In birds the cerebellum only occu-

pies the median line of the occipital bone, its lateral parts are entirely occupied by the auditory apparatus. In some animals the cerebellum is covered by the posterior lobes of the brain; in others it is placed behind these lobes.

In nocturnal birds, the two tables of the cranium are considerably separated from each other, and the interval is filled with a very light cellular substance. In some species the osseous tables are parallel, although somewhat distant from each other; in others their direction is entirely different. In dogs we observe, both as respects the muscular mass, the frontal sinuses, and the crown (*crête*), a great difference not only in different varieties of the same species, but even between individuals. Some dogs are entirely destitute of frontal sinuses; others have them very large, as the wolf and hyena. The cat, the marten, the squirrel, the horse, the ape, are also destitute of frontal sinuses. The ox, hog, bear, elephant, &c., are provided with them.

In a word, the crania of animals require a particular study, in which we should never lose sight of the principle, that it is only that part of the crania of animals, the form of which is determined by the brain, that is important for organolgy. A collection of crania derived from animals, which have been known during their life, and which have been studied from their early life upwards, is the more instructive, as it enables the observer to judge, that the great difference found in individuals, as it respects their qualities and faculties, cannot be accounted for by accidental causes, and must be wholly owing to original organization.

Of the influence of the Brain on the Forms of the Cranium in the Decline of Life.

At the approach of old age, the whole nervous system begins to lose its plenitude, and consequently its activity. In all parts of the body the nerves shrink, the cerebral convolutions contract and flatten; plane surfaces and small hollows form on their prominences; they separate from each other; the intervals, (anfractuosities,) that they leave between them, increase; in a word, the whole brain diminishes.

Does it happen by this diminution of the brain, that a void space is formed between the brain and the internal table of the cranium? In opening the heads of very old subjects we do not perceive this. Let us see what experience teaches us.

It most frequently happens, that the crania of old men are thicker and lighter, than those of adults or young people. When I publicly announced this proposition, I was opposed by those physiologists, who are accustomed to anticipate experience by reasoning: they said that I was very bold, to maintain such absurdities before physicians and enlightened anatomists. Do not all the bones of the body (said they) diminish in advanced age? Do not all the bones become thinner? Why should the cranium be an exception?

I myself had believed as others did, and I was not a little astonished at first, to find that the contrary usually occurred. I multiplied my observations. I collected from cemeteries, museums, and charnel houses a great number of crania, the worn up jaws of which proved that they belonged to very aged subjects, and my early observations were in almost every instance confirmed.

Finally, I saw what Voigtel asserts in his *Manual of Practical Anatomy*,* "that the bones of the crania of

* Handbuch der practischen Anatomie, p. 274.

very aged people are often thick, light, and spongy." Walter himself, who has declared with so much warmth against my assertion, describes in his *Museum Anatomicum*,* the head of a man of upwards of sixty years, the bones of which had become thick, light, and of very little consistency; and the head of a woman of more than eighty years, the bones of which were thick, spongy, and so light, that the whole head only weighed fourteen ounces and a half; all the sutures were ossified. The external surface of both these heads was in a natural state. Bichat also records this case as being a common one. "The vault of the cranium acquires," says he, "a considerable thickness; we observe that this thickness, always increasing, offers an exception to the other bones, which become smaller." †

It is then certain, that there is deposited between the two tables of the cranium a certain amount of spongy, osseous matter, and that these tables gradually separate. Does the external table separate outwardly, and allow the cavity of the cranium to preserve the same capacity? or does the internal table encroach upon the cranial cavity, so as to diminish its extent?

If the external table separated outwards, the head at a very advanced age ought to become considerably more voluminous; we do not observe that this takes place. But, in conformity with the laws of organization, the internal table ought to follow the brain in its collapse; the osseous substance, as it is graddually deposited, ought to mould itself upon the brain, as in its primitive formation, at the time of the ossification of the cranium in the fœtus. In this manner the capacity of the osseous box lessens, in proportion as the brain, which it covers, occupies less space.

The examination of similar crania enables us to see distinctly, that the internal table separates inwardly,

* Ibid. Vol. ii. No. 375, p. 36. † Tom. i. p. 58.

and there is no fact that induces us to believe, that the external table is changed from its original direction. In those places where the brain is most sensibly depressed, we often observe thick depositions of osseous matter. The occipital fossæ become less deep, and their sides less transparent; the *spina cruciata* becomes more prominent within, and more strongly marked; the petrous bones grow thicker; the fossæ for the middle lobes of the brain, contract and lose their depth; the prominences of the *sella turcica*, by the apposition of new osseous matter, become thicker and more obtuse, &c.

What M. Richerand says, is not exact, viz., "If the bones of the cranium make an exception to the general rule, and become sensibly lighter, it is because the continual movements of the brain wear them up, and destroy them on their internal surface;" and in another place he says, "the bones of the cranium become so thinned by internal wearing, that the pulsations of the brain become sensible through the hairy scalp."

When, finally, at the most advanced age, the brain falls into such a state of atrophy, that the old man sinks into idiocy, all the changes in question become much more evident. Sometimes the internal table manifests the appearance of having had patches of osseous matter confusedly deposited upon it. The places where, in adult age, the frontal sinuses are usually found, protrude inwards; the sinuses enlarge; and, finally, the superior internal table of the orbital plate separates from the inferior one. (Pl. XXXVI. fig. 4, 5.) At first the orbital plate appears only to thicken; but soon there is a hollow formed between the two tables, which is sometimes nearly an inch in height. We can demonstrate mechanically, that the cerebral mass has contracted nearly an inch from the anterior and inferior frontal part of the cranium only. (Pl. XLV.) And yet, notwithstanding all these phenomena, no one is willing to admit that the brain di-

minishes in advanced age! There are found among the ancients some passages, which prove that this diminution of the brain in old age, was not unknown to them. As I have said above, in this state of things the convolutions separate from each other. This separation might have caused M. Portal to believe, "that the convolutions are deeper in old men than in adults."

In some cases, but less numerous than the preceding, the cranium becomes thinner in old men. The internal table follows the brain inwards; but, as there is less of the spongy mass deposited between it and the external table, the outer follows the inner; in these cases, the external circumference of the head must necessarily diminish. Such crania are also much lighter than crania of equal dimensions and equal thickness in younger subjects.

Sometimes, in extreme old age, the cranium at first greatly thickens and becomes very spongy; afterwards the external table is absorbed, as well as the spongy mass underneath it; but it is never renewed. This absorption generally commences in the parietal protuberances, so that deep oval depressions are found there. In looking on the inside of the cranium we find it uniform, and, where the cranial walls are the thinnest, they appear transparent. At last other parts are equally absorbed, and the cranium, in certain places, exhibits the appearance of impressions made with the fingers in a mass of wax; in others, that of a piece of parchment puckered by rapid desiccation. In certain places, the bones have at most the thickness of a sheet of paper; in others, they are still from four to eight lines thick. (Pl. XLVI. XLVII.) We observe on the internal surface of the base of the cranium all the thickenings above described.

Let me observe here, that, in this condition of the cranium, a slight pressure is sufficient to depress it in its thinnest parts. This circumstance is important in

legal medicine. After what I have just said, we can easily conceive, that, in the decline of old age, cranioscopy can at least determine what was formerly the state of the brain; but, on account of the unequal thickness of the cranium, it cannot pronounce with accuracy on the actual condition of the brain.

Answers to some Objections against the Influence of the Brain on the Form of the Cranium in a State of Health.

Ackermann pretended, that the variations in the form of the cranium, were occasioned by the air which penetrated into the osseous cells. Ackermann is dead, and I doubt whether any one has espoused so erroneous an opinion. Besides, I have destroyed this objection in my answer to the refutation of craniology by Ackermann. M. Spurzheim has also refuted it in his *Physiognomical System.*

If I except some naturalists of the first rank, as Sœmmerring, Cuvier, &c., physiologists and naturalists generally believe, with the respectable M. Hufeland, (who, however, does not exclude the action of the brain,) that the muscles, by the tractions and pressures which they exercise upon the cranium, contribute greatly in determining the form of the head, and that consequently we may greatly deceive ourselves in considering the prominences of the head or cranium, as produced by a considerable development of certain cerebral parts.*

However specious this objection may seem at first sight, it fails altogether when submitted to a serious examination.

1. Physiologists who bestow so much importance on the action of the muscles, are divided into two

* MM. Dumeril and De Blainfille maintain the same opinion in their lectures.

sects; and the opinions of the one are in contradiction to those of the other. Some pretend that the action of the muscles produces the eminences. Others maintain that the muscles ought, by their action, to flatten or depress the places on which they act. Which sect is right? They are both wrong.

2. Before the animal or man has left the uterus, the form of the head of one fœtus differs from that of another, and the form of each head already indicates certain leading forms of some cerebral part. In the fœtus the muscles have not yet acted. Furthermore, both in animals and in our own species, the face and the muscles of the head, for a long time after birth, and even to the period of the development of the teeth, are very small in comparison with the osseous box that contains the brain, which, as we have above seen, in proportion as its different parts are developed, acts constantly on the cranium to modify its form.

3. Most of the prominences which indicate organs, are placed on regions of the head on which no muscle acts, or which are only subject to the action of very feeble ones. The little prominences of the organs at the inferior part of the forehead, the more considerable projections on the anterior superior part, and the superior part of the frontal line, those from the summit of the head to the inferior part of the occipital bone, finally, those also of the parietal bones, cannot result from the action of muscles; for, all these regions are only subject to the action of the subcutaneous muscle, which, if it is absolutely necessary to admit its action on the cranium, would manifestly tend to level and give it a uniformly round appearance in every direction. Where is the physiologist, who would attribute to the action of muscles, the great prominences on the superior part of the forehead, where there are some important organs? the prominences on the summit of the head, of the parietal bones, of the posterior lobes of the brain, or of the superior part of the occipital bone, or the straight crests which are found

on the heads of many animals? If there were muscles attached to these prominences, as for example, to the osseous crests in some animals, these muscles could never produce an action from below upwards; they should, on the contrary, draw the osseous prominence from above downwards, or still more, backwards. So the great prominence at the superior part of the occipital bone, which corresponds to the organ of love of offspring in woman, ought not to be drawn backwards, but from above downwards.

4. In the region where the masticating muscles are attached, many very prominent and strongly defined organs are presented. M. Hufeland thinks, that, in many instances, these prominences can only prove that the individual, to whom they belong, is endowed with a strong power of mastication. Shall we always reason thus, or shall we observe facts! M. Hufeland is not ignorant, I believe, that generally we attribute to Negroes much stronger masticating muscles than to Europeans; well! Negroes have this region flattened. Have not other physiologists failed to mention that this flattening arose from the action of the masticatory muscles, so energetic in Negroes? Many animals, endowed with remarkably strong masticating muscles, such, for example, as the hyena, the bull-dog, the lion, the tiger, have not, by many degrees, this region of the cranium so much developed as some men, as many species of monkeys, as the little seal, the otter, the eagle, and even the wren; however, these last animals have extremely feeble muscles in the region of the cranium in question. And how can it be explained, that these prominences have so different a degree of development in men of nearly equal muscular power? How happens it that, in many heads which are in my collection, and which were taken from strongly muscular men, the organs are much less developed than in some other heads, which belonged to women of a delicate constitution?

5. If the prominences of the cranium were owing

to the action of the muscles, they ought to assume the contours of the attachment of these muscles; but none of the prominences, which I regard as the indices of an organ, are in this condition. All correspond to the form of the cerebral convolutions, which constitute the organ of which these prominences are the sign. I shall prove this hereafter, in treating of each organ in particular.

6. If the muscles drew the bones of the cranium outwards, they ought necessarily to act with more force upon the external table, and separate it from the internal. But it is exactly there, where the strongest muscles act, (for example in the temporal region, and in that of the occipital fossæ,) that the osseous plates are more closely in contact, that the cranium either juts out, or retreats. There, on the contrary, where the weakest muscles act, the laminæ are more separated, and it is never the external table which is moved outwards; it is, on the contrary, the internal one which is pressed inwards. This, for instance, is visible in the anterior inferior part of the frontal bone, in the middle of the *spina cruciata* of the occipital; and, as we have observed it, this separation is the more considerable as the individual is more advanced in years, where the muscles have acted for a very long time. In nature, therefore, we always observe the contrary of that, which, according to the objection, should be the result of the action of the muscles.

7. Some physiologists pretend, that the action of the muscles causes the depression of their points of attachment. Others attribute to them the prominences and the apophyses, for example, in the different bony processes, &c. In fact the muscles are attached sometimes in hollows or grooves, sometimes to prominences and crests; and it is precisely this, that proves that neither prominences nor depressions are formed by muscles; but that both are in consequence of the primitive form of the bones. In fact, who could attri-

bute the osseous crest, situated on the most projecting part of the cranium of certain animals, the occipital crest of the horse, the ox, the stag, &c., to muscles which act in quite a contrary direction? Will any one attribute to the action of muscles, the mastoid process situated behind the ear? But then, how can any one explain the other processes, whose direction is diametrically opposed to that, in which the muscles act; for example, the prominences of the occipital bone, which project from before backwards; the strongly developed osseous drum, which most of the mammalia have near the cavity of the tympanum? And why is it that the mastoid processes are often so strongly marked in very feeble men, and very little developed in those of an athletic constitution?

8. In tortoises, the strong masticatory muscles are placed in the internal cavities of the head; so also in all animals certain muscles are placed in the interior of the orbits: but have these cavities ever been seen contracted, enlarged, or modified in any manner by these muscles?

9. In certain diseases the action of the muscles curves the spine of the back: in most of these cases the right shoulder rises above the left in consequence of this action; here, say they, is a modification of bones produced by the muscles. The instance cited shows that when the action of certain muscles becomes predominant, their more feeble antagonists yield, but by no means proves that the form of the bones is modified by such an action, and that it can produce depressions, plane surfaces, and the prominences of the cranium.

M. Blumenbach cites the cranium of an old man, the left side of whose face had been so much contracted in consequence of *tic doloreux*, with which he was for many years afflicted, that it contrasted singularly with the right side. The violent cramp, says M. Blumenbach, has depressed the zygomatic arch of the affected side, as much as it has elevated the neigh-

bouring part of the lower jaw, and it has separated outwardly the zygomatic apophyses.

But, 1. This example is taken from a pathological case. There had existed here, during many years, a diseased condition of the parts. 2. M. Blumenbach makes no mention of the changes which the cranium had undergone. 3. It is more than probable that, in this long continued disease, the nerves of the face being in a state of atrophy have induced also an atrophy of the parts in which they are situated, which has produced a general wasting of these last, by which they are drawn together; but, finally, how were the muscles enabled to separate outwardly the zygomatic apophyses? What I have just said will be sufficient, I believe, to enable anatomists and physiologists to adopt more sound ideas on the actions of the muscles, and on the prominences of the cranium, and induce them to renounce the objection, which they derive from muscular action, against the utility of inspecting the forms of the head, in order to judge of the greater or less development of particular cerebral parts.

Hufeland believes that the prominences, which may arise in the cranium from accidental causes, such as blows; from gouty and syphilitic matters, &c., furnish a further objection against craniology, and that the cranioscopist can easily mistake an accidental exostosis, for the indication of an organ strongly developed.

In a similar case the cranioscopist would be liable to mistake; but that would by no means prove that in a state of health the organs, which have assumed a marked development, could not be exhibited on the cranium by determinate prominences. For the rest, the accidental exostoses, of which Hufeland speaks, disappear at the end of a certain time; they do not correspond on the two sides, and have not the form of the convolutions of the brain.

If, after all, Hufeland wishes only to prove, that one can be mistaken in cranioscopy, and if besides he admits craniology, I am far from contradicting him.

Errors are very possible, especially in those cases where persons, who have not the requisite knowledge and experience, undertake to examine heads. But where is the art or science in which error is impossible? Do not even mathematicians commit mistakes?

Platner of Leipsic rejects all the organs that I have discovered on the median line; for, says he, the longitudinal sinus exists in the whole length of this region, and it does not correspond to any cerebral part. (Pl. IX. fig. 48, 69.)

It is true, that immediately under the cranium, the falciform duplicature of the dura-mater separates into its two laminæ, and is attached to the superior borders of the parietal bones, and that it forms there a groove or sinus, but this sinus has hardly the diameter of a large sized quill. This space is much too narrow to prevent the median line of the cranium from forming projections externally, in those places where very strongly developed convolutions exist; and, consequently, to conceal the considerable development of these parts. In the occipital region, and often in the frontal region, the hemispheres separate more or less from each other. (Pl. IV. fig. 25, 28.) In this case the middle part of the *spina cruciata*, and of the inferior part of the frontal bone, descend deeper into this separation of the two hemispheres; the prominence of the cranium too, formed in the occipital part by the two posterior lobes, is double in this case, whilst it is single when the hemispheres are only slightly separated. (Pl. VIII. fig. 48; Pl. IX. fig. 48, 69; Pl. XIII. fig. 48, 69.)

Finally, it may be asked, if it is possible to discover the functions of all the organs. I shall examine this question in detail, when I come to speak of the means of determining the seat of the organs. Perhaps the surface of the cranium is not sufficient to enable us to decide on this point; for, there are convolutions which do not touch its internal surface. The most concealed of all, and which have escaped thus far the

eye of the anatomist, are those which cover the *corpora striata* on their external surface. (Pl. v. fig. 42; Pl. XIII. fig. 68.

All the convolutions situated on the two internal faces of the hemispheres, which receive between them the falciform duplicature, and by means of which they touch each other, present fewer difficulties. (See Plate XI., which represents a vertical section of the brain, between the two hemispheres.)

In attentively examining these convolutions, we remark, that they are all prolonged, more or less vertically, to the surface, and that thus they are found in contact with the internal surface of the cranium, through the medium of the membranes.

We have constantly observed, that these internal convolutions have the same size with those placed on the surface; the former are then but a continuation of the latter, and probably constitute a part of the same organs. Generally, in all the convolutions, we can only judge of those portions of them which appear at the surface; the rest are concealed in the anfractuosities. Neither does the cerebellum touch the cranium in the whole of its extent; yet notwithstanding this we judge of the degree of its developments, and this without ever deceiving ourselves, by the greater or lesser protuberance which the occipital fossæ externally present.

The part of the brain situated at its base, quite near the median line (Pl. III. fig. 26, 70; Pl. IV. fig. 70), is the only part that absolutely escapes the observer, in his examination of the cranium. The degree of development of all the other convolutions, is manifested either in the temporal region, or by the form of the orbits, or by the position of the eyes.

I will further add some observations by M. Démangeon,* on the influence of the brain in the form of the cranium.

* Analytical and Critical Picture of the Work of Dr. Gall. Paris. 1822.

"Those who have not reflected on the economical operations of nature, wherein the parts, the least essential for her purpose, are always kept in subordination to the influence of the most important ones, represent her as acting according to ideas which the grossest mechanism has suggested to them, where the employment of the most gross external agents cause the less resisting to yield. Forgetting that a drop of water in time hollows out a very hard stone, less by its consistence, than by the continuity of repeated dropping, they cannot conceive, that the continual action of nature in nutrition, changes and modifies the hardest as easily as the softest parts, by the successive apposition of nutritive elements, and the re-absorption of those that have remained a long while in the system. For this reason they would have us believe, that the brain obeys the inert resistance of the cranium, because this last is the hardest, in spite of the evidence to the contrary, in hydrocephalic subjects. It is then by an inconsistency which puts them in contradiction with themselves, that they recognise the dilatation of the cranium by the action of water in hydrocephalic subjects, and the sinuosities of the sanguineous vessels on the osseous surfaces.

"It is also with the same inconsistency, that they admit the action of the muscles as the cause of the production of the prominences of the cranium, although they are softer than the cranium; besides, that, observation proves that the protuberances are either out of the sphere of muscular activity, or in no sort of proportion to it. However, they not only see the brain and the soft parts, but also the cranium and all the bones gradually increase with age, notwithstanding the previously acquired dimensions and consistence of these last. They see also the shell of the snail, the shield of the tortoise, &c., progressively increase with the animal which they enclose, and assume protuberances without the assistance of any muscular traction exercised upon their texture externally. This takes place

for no other reason, than, because the shell and the testaceous covering are rather made for the animal, than he for them; and it is also reasonable to believe that the brain, being an object more essential to the end of nature than its osseous envelope, this last ought to yield to the developments of the former, as every thing demonstrates that it does. Nature then is less embarrassed by the consistence of the hard parts, in her attempts to develope those that are softer, than some would have us believe. It is by dreams of fancy, that the domain of the sciences is incumbered, and we must scatter them in order to penetrate therein and extend its bounds. It is a general axiom in natural philosophy and physiology, that it is not from the greater or less consistence of parts, but from their greater or less energetic or continued action, that those changes that are effected in nature depend. But, as of all animal parts the bones and scales are the most inert, they have the least power also, to modify and influence the other parts in their forms and developments."

Of the Influence of the Brain on the Form and Texture of the Cranium in a State of Disease.

The Influence of the Brain on the Cranium in Cases of originally defective Conformation of the Brain.

Other bones, it is said, grow independently of the brain, and receive their determinate form according to the laws of organization; why does not the cranium too, grow and receive its different forms Independently of the brain? This supposition is founded not only in analogy, but it is further confirmed by the existence of crania absolutely devoid of brains.

Crania without brains! I have proved already, that such do not exist. Let us refer to what I have established in my large work.

I have cited Duverney and Tauffer, who found in two heads of new-born infants water only, and no cerebral substance. I have thought that these heads belonged to the class of those observed by Morgagni, Bonnet, Vesalius, Tulpius, &c., where the brain, dilated or unfolded into a fine membrane, might have deceived Duverney and Tauffer.

But since my large work was published, I have myself had occasion to examine the hydrocephalic head of an infant born dead. Being more voluminous than the generality of heads of new-born infants are, it was delivered with difficulty, by the forceps, but without perforation, by M. Delpech. The superior, posterior, and lateral fontanelles were very large, and the fluctuation of a considerable mass of liquid was distinctly perceived. M. Hervez opened it with the greatest precaution in presence of MM. Delpech, Bousquet, and myself. After the incision of the cartilaginous membrane and the dura-mater, there escaped as great a quantity of water as the cavity of the cranium could contain. It was impossible for us to discover, on the whole internal surface of the cranium, the least trace of an arachnoid membrane, of the pia-mater, of a vascular membrane, or of cerebral substance, or, even the least mucosity on the internal surface of the dura-mater.

All the bones of the head, which I have preserved in my collection, were perfectly developed, and presented their natural forms; only the orbital plates were depressed, as usually occurs in hydrocephalic cases of any extent. This fact refutes then my first assertion, and it proves that the bones of the cranium may take their natural forms, independently of the action of the brain against their internal surface.

I will relate two analogous facts reported by M. Breschet, Chief of the Anatomical Department of the Faculty of Medicine, &c.

First Observation.

"A few days since, there was left at the Foundling Hospital, a male infant, which appeared to be ten or twelve days old; for, the umbilical cord had fallen off, and the umbilicus was completely cicatrized.

"This child lived nearly two days in the hospital, and during its continuance there, it manifested great weakness, had a laborious respiration, and some convulsive motions. The form and volume of the head exhibited nothing extraordinary, which could enable any one to suspect the existing disposition of the organs enclosed within the cranium; only the bones of the cranium were movable in the sutures.

"When the cavity of the cranium and the membranes of the brain were opened, there flowed out a considerable quantity of a clear, limpid serosity, resembling distilled water, in quantity from twelve to fifteen ounces. This watery fluid was contained within the cavity of the arachnoid membrane. The dura-mater appeared in its natural state, but the arachnoid membrane and the pia-mater were thickened and firmer than usual, and of a very vascular appearance. The brain and the cerebral peduncles (anterior prolongations) did not exist. In front of the annular protuberance, or middle brain, nothing was seen but a small quantity of a soft, greyish substance, with inequalities on its anterior part; this substance, at most, occupied an extent of from eight to ten lines from side to side, and from before, backwards.

"The cerebellum was covered by the duplicature of the dura-mater, which forms the tentorium. Its right lobe was but half the size of the left. The annular protuberance, the bulb, and the spinal cord were in their natural condition.

"The nerves being carefully laid bare, we distinctly

saw* the first pair, or olfactory nerves, the anterior protuberance of which was strongly marked; we saw also, two white filaments, which were directed backwards towards the spinal marrow; still, we were not able to follow these cords either to their origin or their insertion.

"The optic nerves, being exposed from the globe of the eye to the cavity of the cranium, exhibited in the orbit their ordinary size, but beyond the optic holes, their calibre diminished. Their point of union seemed less formed by the mingling of their common substance or their decussation, than by a transverse commissure of two or three lines in extent. These two cords then continued on, diverging, and terminated in the anterior part of the protuberance, towards the two anterior eminences of the *nates* and *testes*.

"The third pair was followed in all its branches, as well as the fourth and sixth. As to the fifth, its origin could easily be seen. Forming at first a single cord, it passed upon the anterior face of the petrous portion of the temporal bone to divide as usual into three branches. We followed the first or opthalmic of Willis into the orbit and on the frontal region.

"Finally, the auditory nerve, the pneumo-gastrics, the glosso-pharyngeal, and the great hypoglossus, presented nothing unusual. The same was the case with the spinal nerves."

Another fact of the same kind has been furnished me by M. Beclard. I will give an abridged history of it.

Second Observation.

"A fœtus was born at the full term, at the hospital of the School of Medicine, having its head a little larger than usual. The accouchement was natural, but rather long. The child lived five days.

* I say, we saw, because this examination was made by my associate Baron and myself in presence of MM. Veron and Lelut, students in the Foundling Hospital.

"The head being opened, the cranium was found filled with a lemon-colored water, a little viscid. The spinal marrow, the cerebellum, the pons Varolii existed. The medulla oblongata was divided in front, and exhibited the peduncles of the brain terminated by eminences, which appeared to be the optic thalami and the corpora striata. Besides this, the medulla was prolonged between the peduncles in two small white cords, which terminated in the ethmoidal grooves by the expansions of the olfactory nerves.

"This curious observation differs from the preceding one in this, that, in the second case, the cerebral peduncles existed and appeared to terminate in front with the eminences, which M. Beclard thought were the corpora striata, and the pretended beds of the optic nerves. Nothing similar was seen in the first case.

"If, from a small number of facts, we could come to general considerations, I should say these observations tended to prove, that congenital hydrocephalus depends rather upon some defect in the development of some of the cerebral parts, than upon an alteration, or in the destruction of this organ by the liquid.

"That, from these observations, it is reasonable to presume that the evolution of the brain had not taken place, that is to say, that its development had been arrested.

"That existence, or life in atmospheric air, is possible for a few days, without a brain.

"That the brain does not give rise to any nerve, and that, as far as the nervous system is concerned, we may consider it as being rather a ganglion for communicating nervous influence, than as the source of any nervous cords.

"That the olfactory nerves, existing in infants in whom the brain is wanting, do not derive their origin from this portion of the cerebral mass, unless we admit, that all the parts arise independently of each other, in the situations, where they are found.

"The size of the olfactory nerves in new-born children, which is always considerable, their club-like figure, the nature of their substance, the filaments coming off from the inferior surface of their bulb; finally, their existence in the children which I have described, lead us to believe, that those parts which are called the olfactory nerves, are not so much nerves, properly so called, as little lobes or prolongations of the spinal cord, analagous to the brain itself.

"If we consider them as nerves, we must admit, that the cerebral lobes or the corpora striata, are not the places of their origin, but that they derive it from a point farther distant.

"Do we not find in many fishes a disposition of parts which supports what I have advanced; and is there not a striking analogy between the conformation of the ethmoidal nerves of these animals, and those of the fœtus without a brain?

"In relation to the development of these prolongations, we may say, that the analogy of conformation is as much more strongly marked between man and these animals, as we examine the former at periods nearer his earliest formation, that is to say, during his fœtal life.

"Finally, from the observation of M. Beclard and myself, we are authorized in believing that the normal development of the containing parts, is not in dependence on the existence and the regular growth of the contained parts. The cranium may present a regular form, although the brain is wanting, or, if it has experienced a greater or less deviation in its evolution."

I perfectly agree with M. Breschet, when he presumes, that in these cases, the brain has been arrested in its development, and not destroyed or dissolved by a liquid. We have already proved this truth, in our Memoir presented to the Institute of France, the 14th of March, 1808, followed by observations on the report which was made on it, by the commission to which it was referred.

We have also proved, in many places, that the brain, properly speaking, does not give origin to a single nerve. But it would be wrong to consider the brain as being rather a centre for the nerves, than as the source of any nervous cords. The brain contains many masses of a grayish or gelatinous substance; for example, in the medulla oblongata, in the annular protuberance, in the optic thalami, so called, in the corpora striata, and in the whole surface of the convolutions which furnish new nervous filaments to those, which were already furnished by this same substance anteriorly, and these are the ganglia of supply (*renforcement*) of the white fibrous substance of the brain and the cerebellum.

As to the olfactory nerve, we have exhibited in our first volume, (Quarto, page 117; Folio, page 84.) the opinions that are held on it, and we have proved that it has no connexion with the corpora striata, which serve solely as ganglia of supply (*renfort*) to the brain.

Let us return to those cases which most frequently occur. When there is no brain, sometimes all the parts situated above the neck, the chest, the umbilicus, &c., are wanting also.

When the nerves of the senses only exist, some only of the cerebral parts, placed at the base of the cranium, are developed, that is to say, those from which these nerves are derived. In these cases the base of the cranium is but imperfectly developed, and gradually and in the same proportion as more cerebral parts exist, there is also a further development of some of the inferior and lateral parts of the cranium. These are called acephalous monsters, because neither brain nor cranium is distinguished above the eyes. PLATE XVIII. represents such a case, (fig. 3.) We see there the optic, the olfactory, and the auditory nerves. The anterior inferior part of the frontal bone, which goes to form the orbits, the temporal bones, a small portion of the parietal bones, and of the occiptal, &c., are but just commenced; in the

unfinished parts a great opening is left, *B*. I have proved, vol. I. p. 52, 4to., that simular monstrosities are not born so in consequence of cerebral dropsy, but that the fœtal defect is absolutely original. PLATE XIX. fig. 11, represents a vicious conformation of the brain. In this head, all the posterior inferior part of the occiptal bone is wanting; in consequence of this, a great opening remains in the posterior part. For some time a commencing portion of brain existed there. From this cause the middle portion of the parietal bone is a little swollen; but afterwards the brain escaped by the posterior opening, and the bones of the cranium, not continuing to arch, have remained flattened on the remnant of the brain. The subject in question is of the number of monsters which have, on the back of the neck, a membranous sac containing a very imperfectly developed brain. Similar vicious conformations evidently prove, how much the form of the cranium depends upon the form of the brain, and that the bones of the cranium are very rarely formed by laws independent of the brain.*

In these cases, where the brain has acquired but a very imperfect development, the cranium remains small in the same proportion. PLATE XVIII. fig. 11, represents the contour of the brain of an idiot from birth. This is from Willis. In fig. 1, the cranium of a child seven years of age, an idiot from birth. PLATE XIX, fig. 1, the head of a man twenty-six years of age, an idiot from birth. Mr. Bonn, Professor at Amsterdam, possesses the cranium and brain. PLATE XX. fig. 1, the head of a girl, twenty-two years of age, imbecile from birth; fig. 11, the cranium of the same. I have before spoken of these heads, and of many other similar ones which I have in my collection.

* M. Geoffray St. Hilaire has given drawings of these three acephalous monsters in his excellent memoir on many of the malformations of the human cranium, read before the Academy of Sciences, 1820.

When the cerebral parts increase in volume, the original imbecility is less complete in the same proportion, and the cranium, although still imperfect, acquires also more development. PLATE XXVI. exhibits the cranium of a boy of fifteen, who, on account of the great development of the organ of property (acquisitiveness) and a defective conformation of the frontal parts, XXI. 53, 54, 55, 56, had an irresistible propensity to rob. PLATE XXIX. represents the cranium of an old woman partially imbecile from birth. Let any one now compare these defective crania of persons, who only enjoyed qualities and faculties as defective as their brain indicates, with the beautiful cranium which encloses the well developed brain of the man of talents. (Pl. XXX. and with Pl. XXXIX. and Pl. LVI.)

The Influence of the Brain on the Form of the Cranium in Hydrocephalus.

When, in consequence of a collection of water, which takes place in the cavities of the hemispheres, the cerebral convolutions are unfolded and distended, the cranium contracts a faulty conformation, which is precisely the inverse of that of too small crania. In this case the unfolded brain distends the bones of the cranium, whether they are yet united by their sutures or not. In the early periods of this distention, we perceive exposed between the edges of all the cranial bones, or sometimes between some of them only, the cartilaginous membrane, which is visible over a large space at the place of the fontanelles.

In infants, that are born hydrocephalic, the head is compressible, that is to say, by the aid of compression, we can cause the bones of the cranium to approach each other. This circumstance is very important in legal medicine; since, in a similar case, we

should not, if the child dies during delivery, attribute its death to the mother. From the age of a few months up to ten or twelve years, effusions of water frequently take place in the cavities of the brain, in consequence of neglected cerebral inflammations, of a too rapid development of the brain, of falls or blows upon the head, and also in consequence of frequent masturbation. When such patients have, by degrees, lost their sight, and the pupil remains motionless and insensible to light, being constantly dilated; when they vomit frequently, &c., I have sometimes found the bones of the cranium already more or less separated, even sometimes to the distance of from three to six lines. Cases are recorded, where persons, even of more than thirty years of age have had effusions in the cerebral cavities, and where the bones of the cranium have been considerably separated in a very little time.

If the effusions are of such a nature as not to lead to the death of the individual, a great number of osseous points is formed in the cartilaginous membrane whence the little bones arise, which reunite anew the bones of the cranium *orselets vormiens.* (Pl. XXI.)

In most cases, when the fluid collects slowly in the cerebral cavities, the osseous radii become solid, and have a tendency to elongate as the distension increases, and to keep the cranium closed on all sides, without any particular points of ossification being formed. The cranium of a child seven years of age, completely imbecile, and almost entirely stupid, represented in Plate XXIII. is of this kind. We only perceive the cartilaginous membrane in a few places; the superior orbital plates are so entirely depressed from above, downwards and forwards, that the eyes of this child are very low and projecting. PLATE XXIV. represents the same case seen in front.

The following passage, extracted from Blumenbach, proves still better, with what force the internal parts

of the head act on the bones of the cranium. "In internal hydrocephalus," says this author, "the parts of which the temporal bone is originally composed, preserve, in fact, their primitive dimensions, but they are sometimes separated by the distension of the cerebral membranes, so that the small bones of the ear lose their natural situation and are put out of joint. I have seen very frequently in hydrocephalic patients, where the temporal bone had undergone this deformity, the *malleus*, the *incus*, and the *squamous* portion carried from below upwards with the temporal bones, and the *incus* absolutely separated from the *stapes;* once, I have even seen the *stapes* torn from the *fenestra ovalis*. This will explain why some hydrocephalic adults are deaf and stupid at the same time, while others preserve their hearing perfectly."

PLATE XLIX. represents the superior part of a hydrocephalic head of an infant of four months. As in this case the effusion had progressed rapidly, the whole head represents a parchment pouch. Here and there are seen some ossified parts; in general, there are observed, alternately, points and radii of ossification, and the cartilaginous membrane. The whole cranium had the flexibility of parchment. Generally the crania of hydrocephalic patients, even at the age of fifty and sixty years, are very thin, although completely ossified.

Ackermann and M. Fodéré, in their observations on the heads of cretins, remark certain peculiarities as always existing, but which, probably, they have only observed in a small number of subjects. I have observed a great number of cretins; I will not stop here to describe their whole constitution, I will speak only of their heads. The head is either incompletely developed or hydrocephalic. PLATE XXI. represents in profile a similar case of hydrocephalus of the common species. PLATE XXII. represents the same, seen from above. The water has acted there in all directions, but principally in that of the occiput.

The orbital plate is also strongly depressed; there does not exist on its internal surface any digital impression; which proves that the convolutions which rested upon it, originally projecting but little, were already entirely unfolded.

I would remark by the way, that, in the greater number of these hydrocephalic patients, we find the hairy scalp covered with a furfuraceous efflorescence.

There exists a great variety of these malformations of the head, which probably are most frequently owing to effusions.

PLATE XXXI. represents a similar head in front; the frontal suture is not united; the regions IX. IX. d. c. are far from being symmetrical; the orbits are superficial. PLATE XXXII. shows the same cranium in profile; we see that the diameter of XXI. in 11, is much smaller than the distance from one temporal bone to the other. The extraordinary long head, Pl. LIV., exhibits quite an opposite character. I know nothing of the particulars of the lives of those individuals, from which these two crania were taken.

As some preserve their mental faculties in spite of a very considerable hydrocephalus, so also we find, sometimes, the most singular forms of head among those individuals, who enjoy their faculties in all their strength. But we must not forget here, what I have said, in volume second, of the dispositions peculiar to mental diseases. Those heads which, in consequence of an extraordinary but not diseased development of certain organs, have assumed an uncommon form, are absolutely an exception to that, which is applicable to the predispositions to mental diseases.

Influence of the Brain upon the Cranium in Mental Diseases.

Mental alienations are diseases of the brain. Happily, in our days, Democritus would only find his Abderites among certain metaphysicians. If any one wishes to combat opinions fraught with the most dangerous consequences, let him oppose those which condemn to a cruel neglect and imprisonment in infected cells, those unfortunate victims, who always merit our compassion, and often our esteem. We hardly dare to fix our attention on the establishments for the insane; so defective are they in most countries, that they appear the shameful monuments of the most profound ignorance.

I soon perceived, that my researches would throw great light on more than one point connected with mental diseases. How could physicians, who had not the least idea of the functions of the brain in health, have just ideas of mental diseases? I employed myself, therefore, to open as many crania of insane persons as I could procure. I have already proved, in Vol. II. p. 206, that we find in the brain and its membranes, and even in the cranium, various sensible alterations. I shall now communicate to my readers, what I have ascertained relative to the cranium alone, and what Spurzheim and myself have constantly found confirmed.

When the alienation has been of short duration, the cranium often does not offer the least trace of diseased alteration, unless the disease has been developed insensibly, and in such a manner as not to show itself, until after a long period. Very frequently, we mistake the first phenomena of madness; we attribute to caprice, to carelessness, to vice, to a change in the moral character, what, in fact, is only the early manifestation of cerebral disease. But, when the disease of the brain is chronic, the same phenomena are manifested in the brain, that we observe in nerves that

have been diseased for a long time. After a long continued disease of the sciatic nerve, it gradually wastes away, and all the parts, to which it gave sensation, partake of this wasting. The same thing happens to the brain, when its vital forces have been injured for a long period. It wastes; its convolutions become narrower and lose their turgescence; the whole brain shrinks; and here, as in advanced age, the internal table of the cranium follows the sinking in of the brain. The bones of the cranium thicken, but they do not become, as in old age, more spongy and lighter, but, on the contrary, more dense, compact, and heavier, approaching the nature of ivory. (Pl. xxxvi.)

Many physicians have remarked this circumstance, but, far from regarding it as the consequence of a cerebral disease, they consider it as its cause. They have considered that the cranium, in consequence of its thickness, compressed the brain, and disturbed the exercise of the mental functions. Even in our days, Dumas, Bailey, Sir Everard Home, and others are of this opinion. If such were the case, mental diseases would only arise very slowly, and we should hardly be able to conceive how, by the aid of rational treatment, so many maniacs have been cured, and often in so short a time.

I am not the first, that has observed this thickening and this ebony hardness of the cranium; still physiologists and physicians have generally paid so little attention to it, that when I spoke of it, all contradicted me. In vain did I cite to the support of my observations those of Greding, whose writings were unknown to me for a long time after I had commenced publicly teaching my discoveries. This physician, in two hundred and sixteen bodies of maniacs that he opened, found a hundred and sixty-seven crania very thick, without speaking of those which in reality were not thick, but very dense. In a hundred violent maniacs he found seventy-eight crania very thick; in thirty crania of idiots, he found twenty-two very thick.

These exact observations were not sufficient to awaken the incredulous from their lethargy. Walter of Berlin remarks on this subject, "My whole life has been consecrated to the study of animal bodies, and human bodies in particular. I have examined the brains of the insane of every species, but never have found their crania thicker than in ordinary cases, as Doctor Gall maintains." Rudolphi, entirely occupied in maintaining his own opinion, passes over in silence the great number of thickened crania of maniacs that Greding has found, and insists on the small number of thin ones, of which Greding also speaks. As to my observations, he says, that my opinion is founded on a single cranium that I possess. However, when I had the honor to receive a visit from Rudolphi at Vienna, I exhibited to him a sufficiently large number of thick crania of maniacs that I possessed. In France Greding is reproached as having understood nothing of the anatomy of the brain, and the general opinion is based on that of M. Pinel, who only mentions one single cranium, which was very thick.

M. Esquirol also pretends to have made observations, which prove the contrary of that which I have advanced. Notwithstanding this, we found, in the far greater part of the heads that were sent us from the Bicêtre and the Salpêtrière, crania so thick or dense, that M. Spurzheim was able to tell whether the head, which he was engaged in opening, came from one of these two hospitals, or some other hospital, from the force which it opposed to the saw or hammer. Finally, M. Esquirol himself cites a great number of crania of insane people, which had become very dense and thick, or, what was more general, only very dense.

Probably this observation would have been less contradicted in France, if it had been recollected, as I afterwards learnt, that Bichat had made the same observations on the heads of maniacs. M. Curt Sprengel says also, that, in opening the bodies of the melancholic, he often found the cranium of more than usual

thickness. It is impossible that physicians, who are engaged in the opening of dead bodies, can, for a much longer time, contest this truth, unless, by a procedure unworthy of scientific men, they should desire to sacrifice a manifest fact to personal considerations.

When the insane become very aged, they feel the influence of years, and their cranium becomes thinner, as that of other old persons.

I do not wish to exclude the cases, where, by a general disease of the osseous system, by rickets, by an herpetic diathesis, by *horrigo*, (scald-head,) &c., all the bones may be found in an unnatural state, for example, become thicker, a change in which, perhaps, the brain has no part. We have seen, in the collection of the Elector Maximilian, a cranium, the bones of which were certainly an inch in thickness; but the bones of the jaws were proportionally thick, which does not occur in the bones of maniacs. It remains for us to examine, if a similar disease of the bones exists independently of a total derangement of the nervous system.

The changes of the bones of the cranium, which are simply the consequence of a cerebral disease, afford us the certainty, that the brain is the immediate seat of the disease; and that it is not necessary to search for the causes of these diseases either in the mind, or in a pretended perversion of the imagination, but in the material instruments.

These same changes teach us also, why these cerebral diseases resist curative measures so much the more, as they become more inveterate. The cure ought to be much easier so long as organic derangement does not exist; it would be more difficult, and often impossible, when shrinking and atrophy of the two cerebral substances, thickening of the membranes, ossification of the vessels, and thickening of the cranium have already taken place. Finally, these successive changes enable us to conceive, how mental diseases degenerate eventually into incurable mad-

ness. The cases where insanity, consequent upon a long disease, has yielded to treatment, are extremely rare; and this amelioration of the mental condition leads almost always to a violent paroxysm, during which an irritation, as sudden as it is excessive, produces a lucid interval rather than a cure.

A similar state is observed in idiots after wounds of the head. The moments of exaltation, which the dying sometimes have, may be attributed to the same cause.

The Influence of the Brain on the Cranium, in those Cases, where certain Cerebral Parts are more diseased than others.

It often happens, that the head is more prominent on one side of the forehead or the occiput, than on the other. When this want of symmetry does not arise from the situation, in which the heads of such persons had been placed from early infancy, they are generally, in the early years of their life, in very feeble health, or subject to nervous convulsions. In such cases we may always suppose, that a watery effusion exists in the prominent side. In adult age the health is often reëstablished, but the partial distention of the cranium continues; and the patients, in process of time, perceive the motion of water. They say that they have the sensation of a cold ball, which moves in their head, sometimes forward, sometimes backward. They are subject to head-aches, especially at the approach of a tempest or a storm. I have already spoken of two crania, one of which had become very dense and thick at the anterior part of the frontal bone, because the part of the brain, situated against this region of bone, had suffered from a neglected inflammation, the consequences of which had caused the death of the individual. The second of these crania had become very dense and thick in the region of the occiput,

in consequence of a large excresence in the *tentorium* of the *cerebellum*, which had compressed the posterior lobes of the hemispheres. In the cranium of the æronaut Blanchard, the right side was thicker than the left; the orbital plate of this side was more prominent, the internal cavity was smaller, all the anterior part was more protuberant; and this, because there had been a greater collection of water in this side than the other. In a decrepid old woman we found the cerebellum hardly as large as in a new-born infant. The brain itself had not diminished in the same proportion, consequently the cranium was very thick at the inferior occipital region only. The occipital fossæ were extremely small, and hardly transparent in a space of from two to three lines. The petrous bones, in their posterior part, were half as thick again as in their natural condition.

In the cranium of a man, who had received a sabre wound in one of the occipital fossæ, in consequence of which the cerebellum had been in a state of suppuration for several weeks, the occipital fossa of the same side is much smaller, and the bone is much thicker than in the other side. In the head of a young woman that was sent to us from the Salpêtrière, and of which I have before spoken, we found the left hemisphere much smaller than the right; this arose from a large ulcer in the middle of the optic couch, so called, of the left side. This optic couch, or rather this cerebral ganglion, had diminished more than half; the corpus striatum of the same side, and all the left hemisphere, had undergone the same diminution. PLATE LI. fig. 1, represents the sound hemisphere entire; fig. 2, the sound optic couch; fig. 3, the sound corpus striatum; fig. 4, the two anterior lobes seen from below with the two optic nerves. PLATE LII. represents the two hemispheres, but the left hemisphere alone is entirely visible; the right hemisphere extends beyond it, and we observe how much smaller the convolutions are. Fig. 2, is the optic couch

shrunken by suppuration and atrophy; fig. 3, the corpus striatum also in a state of atrophy. As to the cranium, Plate LIII. the whole of the left side is thicker than the right, particularly from the temporal to the sphenoidal bone; the left orbital plate is spherical and uniform, whilst we observe distinctly in the right orbital plate, which is much less convex, the impressions of the convolutions. The fossa between the orbits and the petrous bones, is much smaller than that of the opposite side; thick depots of osseous matter are seen on the internal inferior part, and on the internal lateral part, of the temporal bone, the petrous portion thicker, the occipital fossa smaller; in the cranium also, is seen the same shrinking as in the left hemisphere of the brain.* Later, I received a head, in which the right hemisphere was still more diminished, than in the preceding case. I have preserved a cast of it. In the cranium we observe on the right side, the same thickening and the same proportional contractions, that we observe in the preceding case on the left side. In both of these crania the temporal bones, so transparent in the natural state, are three lines thick on the diseased side. In both, all the other bones are considerably thicker on the diseased side, than on the healthy side.

M. Esquirol possesses a similar cranium, and Greding mentions many, that were thicker on one side than on the other. Will any one, after this, deny the influence of the brain on the form of the cranium!

* If the ophthalmic couch, so called, belonged to the optic nerve, one of the sides of this nerve should have been considerably shrunken. But such was not the case; the simultaneous wasting of the optic couch, the corpora striata, and the hemisphere, proves that the optic couches and the corpora striata are only apparatus of supply (*renfort*) for the hemispheres, as we have demonstrated in our anatomy of the brain, by numerous proofs of another kind.

The Influence of the Brain on the Cranium in Subjects predisposed to Suicide.

There is no mental disease which surprises its prey more secretly, than the unfortunate disposition to suicide. I regret that I am not able to treat the matter thoroughly in this place. I shall confine myself for the present to the consideration of the cranium.

We have examined many brains and crania of suicides; in all we found the cranium very dense, heavy, and also very thick; or, if it was not thickened, it resembled ebony, as it does in every other species of mania of long duration. The heaviest, thickest, and densest of all the crania in my collection, is that of a man, whom, not only an unfortunate propensity influenced to destroy himself, but who, before committing the act, believed that he was bound in duty to immolate a wife whom he loved. At the end of the first volume, I have devoted a few pages to this terrible disease, and I have related many examples of it.

Three crania of suicides, for which I am indebted to the kindness of Baron Larrey, are equally thick and dense. Since this phenomenon is so often manifested in suicides, it is certain, that, in the greatest number of cases, this propensity for self-destruction is a true and real disease of the brain, although its remote cause often resides in the abdomen.

We have often found in great criminals, whose crimes were greater than the external circumstances of their condition would seem to indicate, the cranium in the same condition as that of maniacs. Let observers and judges bestow some attention on this subject!

The Influence of the Brain on the Cranium, in Lesions of the latter, and in certain Diseases of the Membranes.

Many cases are recorded, where, not only in infancy, but in adult age, portions of the cranium, forced inwards by external violence, have resumed their original situation, either immediately, or after some time. I have in my possession a cranium, in which a fragment of the size of an inch, of the superior part of the frontal bone, had been forced in. The external table has exfoliated; the inner one is still in the same plane with the rest of the internal surface of the cranium, although in many points of its circumference, the traces of the fracture can be distinguished. In consequence of the laws above established, all the anterior part of the cranium is thicker than the posterior part.

In another cranium, also, the whole internal surface is smoothed off, while we distinguish deep cavities on the external part, which are consequences of severe blows, which this individual, who was a soldier, had received at the taking of Otschakoff. (Pl. LV. fig. 2.)

In a third cranium, we distinguished many clefts and considerable fractures. The individual survived the accident a long time; for, with the exception of a few rents and hollows, the whole is very well re-established. One point is observed to penetrate some lines within the osseous cavity; but so much bony matter is deposited in this place, that the point in reality hardly projects; the cranium is thick and heavy.

Blumenbach also relates examples of the bones of the cranium being forced in, which have spontaneously, and all at once, resumed their proper situation some days after the accident. He cites also a dissertation of Obertauffer on this subject. A similar instance is reported in the *Archives* of M. Horn.

When excresences are formed in the membranes, they rarely encroach on the soft substance of the brain; but, on the contrary, they press outwards. The internal table of the cranium is absorbed; the external is elevated externally, and becomes thin and transparent. It is by prominences of this kind, that we recognise the existence of excresences, or hydatids, as well in animals as in our own species. I have preserved in my collection many crania of this kind.

In an intemperate man, the frontal bone was elevated in the region situated above the left orbit; for many years this protuberance gradually increased, without any other inconvenience than a swelling and palsy of the upper eye-lid. Finally, the memory and the other intellectual faculties of the man became enfeebled. The frontal bone continued to elevate itself more and more, severe head-aches came on, blindness, paralysis of the inferior extremities and incontinence of the natural excretions supervened; an apoplexy terminated his sufferings. There was discovered, under the prominence of the frontal bone, a considerable excrescence of the dura-mater; even the orbit was so much contracted, that the eye had been forcibly pushed forwards.

Petit saw a similar excrescence at the inferior surface of the anterior lobes; it pressed upon the orbits and displaced the eye.

When similar excrescences go on increasing, they end by perforating the cranium, and sometimes by acquiring, on the superior or lateral part of the cranium, dimensions equal to the head. (Pl. LV. fig. 4.)

In the state of disease, we see, daily, examples of the energetic manner with which the soft parts are capable of acting upon the bones. Aneurisms finally perforate the most solid bones. Excrescences wear away the ribs. I know an individual, who, having had the breast bone depressed by the elbow of his nurse, was rendered asthmatic for many years; but, finally, the continual effort of the lungs has caused the ribs to

yield laterally, they are curved more outwardly, and the lungs having acquired sufficient space, respiration is properly carried on. When the globe of the eye has been destroyed, the orbit gets sensibly contracted in two or three weeks. When, on the contrary, the globe degenerates into an excrescence, the size of which exceeds its natural dimensions, the orbit becomes dilated so far as even to displace the bones of the nose.

What I have said in this section, shows, under what circumstances we may infer, from the external form of the cranium, a greater or less development of the cerebral parts, and also teaches us, that we are not justified in deciding upon the form of the brain, or the degree of development of the different cerebral parts, from the form of the external surface of the cranium, in cases of mental alienation, in chronic diseases, whether of the brain or the bones of the head, in old age, and still less in decrepitude.

I shall now endeavour to explain, how I have been enabled to discover the seat of the cerebral organs.

SECTION II.

DISCOURSE PRELIMINARY TO ORGANOLOGY.

On the Difficulties and the Means of determining the fundamental Qualities and Faculties, and of discovering the Seat of their Organs in the Brain.

With the exception of the exclusive spiritualists, who deny all connexion between mind and matter, there exists a sufficiently general conviction of the truth of the principles, that I have heretofore exposed, and which constitute the basis of the physiology of the brain. These principles are the irresistible consequence of a multitude of facts, that we cannot fail to observe every day. It will be sufficient to direct the attention of the least judicious of my readers to these facts, to enable each of them, imperceptibly, to arrive at the same conclusions. This, however, is not the case with respect to the determination of the fundamental qualities and faculties, and the seat of their organs. Some are pleased to say and repeat, that this part of my discoveries is the weakest and the least demonstrated. Special organology is further accused of absurdity, extravagance, madness, charlatanism, and imposture.

Still the determination of the primitive or fundamental powers of the mind, and the locating the seat of their organs or material conditions, constitute precisely the doctrine of the functions of the different parts of the brain. So long as these separate and particular notions are not admitted, the physiology of the brain will remain in vague generalities. Without this detailed knowledge, how shall we arrive at the most important applications which can be made, either to the right understanding of numberless physiological, pathological, and psychological phenomena, or to so-

cial institutions, criminal legislation, education, national characteristics, the arts, or the study of philosophy? The mystery of the gradual perfectibility of living beings is only explained by the successive exposition of their mechanical aptitudes, instincts, dispositions, and particular talents; it leads us, step by step, from the worm to the insect, from the insect to the fish, from the fish to the amphibious animal; from this last to the bird, from the bird to the mammalia, and from this to man; so that this *chef-d'œuvre* of the terrestrial creation is displayed before us, as the most complicated machine appears to the eyes of the artist, as carried on by the simplest wheels and levers.

These reasons impose upon me the obligation of demonstrating to my readers in the most rigorous manner, each primitive quality and faculty, and the seat of its organ, and thus giving to this part of my doctrine, the highest interest, and the most incontestable evidence.

Let us first pass in review some difficulties, which are constantly opposed to the discovery of a true physiology of the brain, and which still prevent metaphysicians, philosophers, anatomists, and physiologists from adopting it.

How far from the true doctrine of the functions of the brain are those, who consider man as an isolated being, withdrawn from all the laws of nature, as the image of creation, the microcosm, a part of the soul of the world, a portion of the divinity, an emanation from eternal light; and who, consequently, reject every idea of the connexion of man with any object of the three kingdoms of nature, as absurd and incompatible with his essence?

How far from a correct physiology of the brain are those, who attribute all the phenomena of man to the soul, to a spiritual being, in its essence and its actions independent of all material conditions, which is the efficient cause of organization, and the first cause of all the operations of human life?

And what becomes of the opinions of those who maintain, that the principal part of man, which constitutes his superiority over all created beings, has neither seat nor local determinate points, since a simple being exists without being contained, and has no relation to space; that it cannot have organs, since there cannot be any relation of cause and effect between matter and spirit; that it cannot carry within itself any sign accessible to our senses; that the manner in which it acts is concealed from the scalpel, touch, sight, and every means of research; that we perceive nothing but contradiction between matter and the operations of intelligence; that the unity of consciousness, (*moi*,) the simplicity of sensation, the nature of an idea, revolt at a dependence on matter, and against any material situation; that the soul, relative to time and space, is hardly ever with the body; and that the mind is absent, when, in deep meditation, we are not conscious of impressions on the external senses, such as the sensation of hunger, thirst, pain? &c.

Happily, these magnetizing and absolute spiritualists address to us these last words: "What is, then, the brain, and for what does it serve?" and they answer with haughty disdain: "We know absolutely nothing of it; neither do we wish to know." What profound philosophy in this confession, and what noble resignation!

How can the idea of the fundamental, moral, and intellectual powers, and the cerebral organs come to those, who refer all the phenomena of animal life to a single principle, to sensibility or sensation, of which all the other functions, from the most obscure instinct to the most elevated faculty, are but modifications? or, to those, who, by a similar tendency to abstraction, reduce the whole moral and intellectual man to two, three, six, or seven faculties of the mind, independent of all organization, and absolutely free in their exercise? or, to those who make of the intelligence and the will, personified beings, manifesting

themselves, also, without the concurrence of organization, sometimes as instinct, sometimes as propensity, sometimes as a certain faculty?

How could those persons dream of positive, moral, and intellectual qualities, who believe that man and animals are born with the mind perfectly blank, like a *tabula rasa*, and who cause an indefinite number of instincts, propensities, and purely accidental talents to emanate from the impressions, received by means of the five senses, from education, from chance? &c.

How can they have directed their thoughts towards the observation of the fundamental powers and their organs, who have wandered in speculation; who wish to know how mind and body is united; how mind and matter act and re-act upon each other; what the mode of action of the faculties of the mind; what life itself is, the essence of thought; how the mutual influence of divisible matter and the indivisible mind takes place; how all the faculties communicate between themselves, so that many are simultaneous in their action; how they each select such knowledge as is appropriate for each; how they receive sensorial impressions; in what manner the brain *digests* sensations, and forms ideas from them; if the acquisitions of the memory are composed of printed characters engraven on the brain as in a book, or of images really painted on the brain; by what artifice the brain perceives ideas, the relations of ideas, and a long chain of reasoning, so that in reading, the eyes transmit to the brain, straight or crooked figures, the mere forms of the letters, only; how it is that this direct sensation, is precisely the one that escapes us; how, finally in this same reading, of which our eye is the sole agent, does our ear appreciate the harmony of a phrase, and judge of the sounds that it does not hear; what proportion is there between the concussion of a nerve, the concussion of a portion of the brain, of a portion of matter, by an articulate sound, by a gesture, and the sentiment of an offence, and the idea of injured

honor; and when the passions are expressed even by silence, where is then the shock, and what is the organ that is charged with this new perception? &c.

All these whys and wherefores do not refute a single one of the proofs, which I have brought forward in the treatise on the organ of the mind. Observe the difference between the language of the metaphysicians and that of the naturalists. The natural philosopher lays it down as a fact, that heat will lengthen a bar of iron, and that cold will shorten it; that some drops of water, absorbed by a piece of wood, cause immense masses of stone to split; that the electric fluid in the twinkling of an eye, dashes to pieces mnouments, which have resisted the action of many thousand ages. Let those reasoners present themselves, who cry out against the absurdity of thinking, that fluids, so movable, can exercise a similar action on the firmest and most solid masses, and they will demonstrate to you by sophisms, as conclusive as those against the action of the brain, that all which you take for facts, is absolutely impossible.

How can these metaphysical physicians find or adopt a physiology of the brain, who still oppose to it the following reasoning: "The observer of physiological functions, studies only effects, and seeks to refer them to natural causes, so far only as he considers these causes and effects as being of the same nature; it is always a real and apparent movement, which is deemed as produced by another interior movement, that is supposed to be concealed in the depths of the organization; thus, it is the movement of the heart which produces that of the circulation, it is the slow compression of the sides of the stomach, which contributes to the transformation of aliment to chyle, and so of all the secretory functions, where the organic effects produced are always homogeneous with their real or hypothetical cause, and which are taken in the same objective sense; although without going out of this uniform order of phenomena, we are

very often ignorant of the nature of their connexion, or reciprocal productions; but what kind of connexion, relation, causality, resemblance, or analogy can be conceived between phenomena of such a different nature, and, taken in two points of view, so essentially opposed as are on one part the physiological functions attributed to the different parts of the cerebral organ, the motion, for instance, and the real concussion or supposed product in the centre of a nervous system; and, on the other part, such sensible modifications, such intellectual or moral act, which is supposed to be the consequence of it. And if it is pretended to make here a contradictory and absurd connexion, even in the expression that is given to it, in comparing thought to an organic secretion, we would demand, that the material product of such a secretion, should be represented to us, by the aid of some one of our external senses; let any one show us how the received impression is transformed into perception, recollection, image, judgment, in the same manner that we can see physiologically the alimentary paste successively transformed into chyle, blood, and into the different secretory and excretory fluids, which always remain accessible to the senses in their different metamorphoses."

After this language, any one would say, that physicians were thoroughly acquainted with the relations which exist between the nerves of the spinal marrow, sensibility, and voluntary motion; between the olfactory nerve, the optic nerve, and odor and vision; between the spermatic vessels and all the properties of the *semen;* between the intestines and the aliments assimilated to the specific nature of each individual. On the other hand, *concussion*, *digestion*, and *secretion*, appear to be their favorite causes of all physiological phenomena, since, at every moment, these expressions are made use of in their objections against the cerebral physiology. It is thus, for I must continue to be faithful to my method of replying, that the eyes

and the ears digest the light and the vibrations of air, and that they secrete vision and hearing; that a moderate shock, suspends or destroys the faculties of perception, memory, imagination, judgment, which is a proof in favor of the proposition, that the shock produced in the centre of the nervous system is essentially opposed to these functions; it is in this way that speech, and gestures, are the chyle and the blood successively formed from the alimentary paste of thought, the affections, and passions! Such is the sagacity of men, who pretend to deny the functions of the brain, because its mode of action has nothing analogous with the heart, the stomach? &c. And these same men, who protest so learnedly against all kind of connexion, relation, causality, resemblance, or analogy, between phenomena so entirely different in their nature, and derived from points of view so essentially opposed, as the physiological functions attributed to different parts of the cerebral organ, for example between any intellectual or moral act and a motion or shock, how can they admit, a few pages farther, that the signs, indicating division or a real separation of the cerebral localities belonging to different faculties, can be inferred, with a sufficient degree of certainty, from the states of delirium, insanity, or partial mental affections? Is it, then, the name of M. Pinel which has the magic power of creating a relation of causality and analogy between the brain and the intellectual and moral acts? Would not they be much more consistent, if they frankly denied that the diseases of the brain, as well as intoxication, strong emotion, narcotics, &c., could induce madness, eitheir total or partial, or any other alteration of the intellectual or moral faculties?

"If there was an organ," continues the same author, "a fixed seat in the brain for each kind of affection, each disposition of sensibility, or for each of the modifications of the temperament and the character, of which the experienced physician could only read the

signs but in the whole of the organization, in the acknowledged predominance of some internal organ; if there was, I say, such an established cerebral sign for each passion, whence could those continual variations come, that each of us constantly feels in his own dispositions? As the man, who has the nerve of sight, or hearing, well formed, always sees or hears equally well, or nearly so; for the same reason, he who has the organ of courage, ought to feel himself equally strong and courageous, or nearly so, at all times. Why is it, then, that while the protuberance, belonging to such a particular sentiment or passion, remains the same, there are so many and such continual vicissitudes in the corresponding affection or sensitive disposition."*

This passage abounds with inaccuracies and suppositions, that the physiology of the brain disclaims. The affections and dispositions of the sensibility, the modifications of the temperament, have never been derived from a cerebral organ. The author of this article would have done better for himself, and for the honor of the *Dictionary of Medical Sciences*, if he had commenced by studying, or at least by reading my works, before he had arrogated to himself the right of censuring the physiology of the brain. He would have found his *homo duplex*, and the means of establishing his reasonings rather on facts than on metaphysical dreams.

Another obstacle equally chimerical, is to dream of a physiology of the brain: I understand, that it is still professed in the schools of physiology, that the faculties of the mind are by no means an object of physiology; that being of a nature entirely opposed to the other functions, they are above the sphere of observation; that we can know nothing of them; that, consequently, it would be absurd to endeavour to find any connexion of them whatever with organization. Intelligence and volition are free operations of the mind,

* Dictionaire des Sciences Medicales, Tom. xxxvii.

simple powers, spiritual, in no way in contact with matter, and without any dependence upon it. Thus, with a haughty modesty they refer to another tribunal all the moral and intellectual part of man.

As to the other functions, the same professors instruct their pupils with an admirable ability. Let us see, then, if the difference of our knowledge in the physical phenomena, and in the moral and intellectual phenomena, is such that it ought to oblige us to renounce these last.

First, all our knowledge of the functions of organization is empirical; for the structure of the organs has never enabled us to discover any function, not even the circulation of the blood, or the irritability or the contractility of muscles. It is from experience that we know that the liver secretes bile; it is from experience that we learn the multiplied functions of the lungs. All our positive knowledge in natural history, in natural philosophy, in chemistry, in medicine, has its source in experience or empiricism. How inconsistent, then, is it to reproach the physiology of the brain, that the qualities and faculties, and the localities of their organs are first proved by experience and then confirmed by general principles, which could not even be established but by experiment! Our acquisitions would be much more sure and stable; they would never have receded, if we had never gone astray on the hollow and sterile ground of speculation. I refer to ideology and metaphysics. Let us continue the examination of the nature of our knowledge. We know that the stomach digests; that the food is transformed into chyle and into blood; that the blood furnishes the materials of an infinite number of other secretions; that the semen contains the germ of all the physical, moral, intellectual, and hereditary dispositions of the individual. We know that we smell with the nose, hear with the ears, and see with the eyes. We know farther, that all these functions are deranged when their organs are diseased. Thus we

know the facts, and some conditions which are requisite in order that these facts should occur; but the why and the wherefore are almost always unknown to us.

Well, this is precisely as much as we know in regard to the intellectual faculties and moral qualities. We know, that they are not the accidental product of the fancy of the mind, of sensorial impressions, of education, or other external circumstances; we know that they are innate and determined by nature herself; that their exercise is dependent on organization; that they arise, grow, decay, simultaneously with it; that the intellect and the will, the perception, the memory, the judgment, the imagination, the attention, &c., are sound, changed, enfeebled, exalted, or void, according to the condition of the brain. We know, that in the different species of animals, the instincts, propensities, and faculties increase and diminish with the perfectibility or the debasement of this organ. We know by analogy, by a thousand proofs, physiological and pathological, by an infinite number of individual facts, by comparative anatomy and physiology, that the brain is a collection of many organs, and that each instinct, propensity, and faculty is manifested by a particular organ. Observations, infinitely multiplied, or the most constant experience, have taught me the seat of each of these organs, &c. All these propositions are decisively proved to all those, who have given themselves the trouble to study all the branches of the physiology of the brain. I defy physiologists to know more of any other function of organization.

Nevertheless, still revolting against the idea, that even the manifestation of the superior faculties of the mind, reason, will, &c., depend upon organization, and making no account of idiotism, insanity, madness, delirium, &c., the metaphysicians believe they are enabled to combat us by an irresistible argument. The ME, [individual consciousness,] say they, remains always the same, although by a continual succession of composition and decomposition, the organs of the

body are so changed in the course of a few years, that there does not remain a single atom of those that formerly composed it. Hence the ME, the consciousness, the mind with all its attributes is not in any connexion, in any relation with matter.

Similar causes produce similar effects. Hence new compositions are made after the type of the preceding ones. Hence there results the same form for the nose, the mouth, the hands; you smell, see, hear, and walk nearly in the same manner as you smelled, saw, heard, and walked ten years ago. So also, the new compositions of the brain are formed after a preëxisting type, and hence there results the same moral and intellectual character; provided that your argument is completely founded in fact.

In this argument, you are only correct so far as you really preserve the consciousness of your personality at all times. But your ME undergoes modifications always in harmony with the modifications of the organization. From the moment of your birth to the age of puberty, from this to old age, how many modifications take place in your tastes, affections, propensities, passions, and talents! There are cases, where, by an alteration of the organs, the ME is transformed into another ME; for instance, when a man believes himself transformed into a woman, a wolf, &c.; there are other cases, where the old ME is entirely forgotten or replaced by a new one; not an uncommon accident after severe disease, especially in cerebral affections. Thus, this objection, so captivating, is rather an illusion, so far as it seems to prove the independence of the mind on organization. But let us return to it.

So long as the brain was considered as a spongy mass, inorganized; as a collection of impure viscera; as a secretory organ, as a pulpy mass, as a simple envelope of the origins of the nerves of senses, as the reservoir of the vital spirits, of the nervous fluid, how could any one have the most obscure presentiment, that there

existed a connexion between a similar mass and the moral and intellectual faculties?

When they began to consider the brain as making a part of the nervous system, it was not difficult to suspect, that it performed an important function. It was seen, that the nerves of the spinal column were necessary to voluntary motion, that the nerves of the five senses exercised the functions of smelling, seeing, taste, hearing, and touch. With a very little reflection, one could be easily convinced, that the brain served as the organ of intelligence. But the moral man, the propensities, affections, passions, and sentiments remained reserved for the temperaments, for the heart, for the plexuses and the ganglia of the chest and the abdomen.

It is but a few years, since all those who were at the head of insane hospitals, or who wrote on insanity, considered mental alienations, either as diseases of the mind, with which the body had no part; or they placed their immediate seat in the chest or the viscera of the abdomen. This general belief not only diverted the attention from the true seat of these diseases, but it deprived the physicians of mad-houses of one of the most precious and most fruitful means of discovering the true fundamental qualities and faculties, the relation of their alterations with the changes of the brain, the correspondence of partial alienations, or monomanias, with the plurality of cerebral organs, and their partial suffering, &c.; and finally of exposing the erroneous doctrines of philosophy, which are still professed in all the universities.

I rejoice in having been the first, who has attacked these errors of our most respectable authorities, and of having effected the most happy revolutions, not only for the study of the nature of mental diseases, but also for their treatment. Let it be remembered with what perseverance I have combated these fatal prejudices, in my public lectures, and in my works. Let any one also read the work of M. Spurzheim on Insanity, &c.,

and let any one compare the old articles, *Mental Alienation*, *Madness*, *Insanity*, *Delirium*, *Monomania*, &c., in the *Dictionary of Medical Sciences;* the work of M. Pinel, and in many respects, inestimable; with the new opinions of M. Esquirol, and with the excellent works of MM. Georget and Falret, and their striking difference will abundantly testify, that positive knowledge, frankly announced, always ends triumphantly.

The greatest miracle that the metaphysicians or the reasoners have achieved, is, in persuading anatomists and physiologists, that organization and its results are quite the opposite of what they really are. We see objects single, we see them straight, we see them at a distance, but reasoning has proved that we see them double, upside down, and immediately in the eye, &c. It is thus that anatomy demonstrates, that the nerves do not derive their origin in the cerebral substance; that the different parts that constitute the brain arise, strengthen themselves, and terminate in different places; which ought to lead to the presumption, that these different distributions of the nervous filaments of the brain, are destined to different functions. The metaphysicians, on the contrary, have established that the mind being simple, its seat in the brain ought to be equally simple, and the physiologists who had, as they supposed, discovered that the brain is the organ of the mind and of human nature, had the complacence to reduce their organ of the mind to a single point, and this single point was charged with being the rendezvous of all the nerves, the common centre, the organ of common sense, the seat of all the operations of the mind. But at the moment when they flattered themselves with having preserved the simplicity of the mind, it never occurred to them that a point, in order to be single, is not necessarily an immaterial point. It has always resulted from this artifice of the ideologists, that their dupes, the physiologists, have had, and still have a horror of all idea of a plurality of organs for the different faculties of the mind.

The mind being simple, the ideologists conclude from this, that all its acts, thought, understanding, will, judgment, reason, imagination, were also necessarily simple, and could not in their exercise be subject to matter. I do not know how they could elude the examples of stupidity, madness, delirium, in short of derangement of all the functions, in consequence of a defective organization, of the diseases of the brain, of intoxication, &c. If we oppose to them analogous functions in brutes, it must either be admitted that animals possess mind; or, those who consider animals too degraded to be endowed with so noble an inheritance, must make of memory, imagination, judgment, instinct, propensities, passions, the will, intelligence, material functions, without perceiving that this method of reasoning is but a snare set by the materialists; for, from the materiality of the faculties of animals, it would not be a great step, to the materiality of the faculties of man. However it may be, the theory of the simplicity of the qualities and faculties of the mind, does not admit of seeking many organs for their manifestation.

Those who did not believe, that the brain was a particular system, independent of the other nervous systems, who took the whole mass of the hemispheres for the result of the concurrence of all the nerves of the body, how could they attribute other functions to the brain than those proper to the nerves? This error was in harmony with the complete ignorance of an internal source of sensations, ideas, propensities, and talents, and it wonderfully confirmed the ruling axiom which has always paralyzed the physiological researches of the brain; that nothing is in the mind which has not previously existed in the senses.

Hydrocephalic individuals have been observed, that enjoyed almost entirely their moral and intellectual faculties; still it was believed that, in these cases, the brain was disorganized, dissolved, &c. With such an opinion how could it be believed, that the brain con-

tributed in the least towards the functions of the mind? The false interpretations put upon certain lesions of the brain, brains that were said to be ossified, with the mind in a state of integrity, children endowed with many intellectual faculties, and whose crania had been found entirely deficient in brains, &c., fully confirmed the opinion already so much accredited by philosophers.

In general, history teaches us, that anatomical and physiological knowledge has almost always been upon a level with the philosophical knowledge of the time. As intelligence and will were the only powers of the mind which were known, there was only sought in man and animals some measure for the abstract idea,—*intelligence*,—without regarding any instinct, propensity, or faculty in particular. They sought for this measure in the absolute size of the brain; in its different proportions with the body, the nerves, with the other cerebral parts, with the face, &c.; they sought it in the facial line of Camper, and they neglected the study of the different parts of the brain, as compared with the different faculties of the animal.

It is true, they discovered, very early, many cerebral parts of different forms, colors, consistence, and organization, such as the bridge of Varolius, the great crura, the pretended optic thalami, and corpora striata, the corpora quadrigemina, &c., and they were tempted to proclaim these parts as different organs; but they discovered at the same time, that these parts were found in the brains of the mammalia, which was a proof that the brains of the mammalia were composed of the same parts, as the brain in the human species; consequently, said they, it is not right to admit these parts as organs of the different human qualities and faculties.

On the other hand, it was believed that the brain of certain species of animals, was deprived of some of the parts of the hemispheres, although these same animals were endowed with qualities, that were attributed to these parts in the brain of man.

How could they avoid this difficulty? Anatomists and physiologists did not then know the laws of the organization of the nervous system; they did not know the office of the grayish, reddish, gelatinous substance; they could not divine that all these different parts, that were found as well in the brains of the mammalia as in that of man, are only the apparatus of the origin and reunion of the nervous filaments, of which the hemispheres are composed; and of which the different bundles or particular distributions, are the true organs. But, if anatomists had compared the brains of the other mammalia with that of man, and the brains of the mammalia with each other, they would have ascertained that all these brains did not, by any means, contain the same parts on all the same organs. They would have found also that the absence of the posterior lobes of the hemispheres, in some species of the animals, is only apparent, as I demonstrate when treating of the organ of the love of offspring.

I have come now to the obstacle which has had the most powerful influence in retarding the physiology of the brain, and which our philosophers and our physiologists will not soon surmount, even now.

At the commencement of the *Treatise on the Plurality of the Cerebral Organs*, vol. II., I have cited many ancient and modern authors, who had hinted, that the different moral and intellectual powers of the mind ought each to have their particular organ in the brain. I have asked myself after this, how it could be conceived that not a single anatomist or physiologist had discovered a single organ, and that all had terminated their researches by despairing of the possibility of this kind of discoveries; and, at the same time, laid this to the charge of those false philosophers, who, for thousands of years, have been, and still are sustained in our schools and in philosophical works.

In the first volume, I have already cited the opinions of different philosophers on the faculties of the

mind. Understanding, will, sensibility, desire, voluntary motion, intelligence active and passive, speculative and practical reason, reasoning, imagination, liberty, thought, sentiment, action, attention, comparison, memory, judgment, reflection, recollection, desire, preference; these are nearly the qualities and faculties, that were supposed to be the only faculties of the mind of man. Some adopted a single one only —sensibility, attention, for instance, as the fundamental faculty and origin of all the rest. Others admitted two, three, seven, as the general source of all.

When it was required to suppose the existence of, or even to seek for an organ, it was for one of these faculties of man, that a search was made; they sought then an organ for perception, memory, judgment, imagination, understanding, will, attention, and so on.

But, in these researches, no one consulted experience; no one observed the difference in the brains in comparison with the differences in the moral and intellectual characters of individuals; no one made any use of comparative anatomy and physiology; no one conceived the idea of making an instructive collection of the crania of men and animals that had been remarkable for the energy of any one faculty or quality whatever. Every one gave free scope to his imagination. It was the pineal glands, the corpus callosum, the cavities of the hemispheres, &c., which by turns presided over such or such a faculty. What one built up, another destroyed, since neither the one nor the other could base their suppositions on facts, sufficiently constant or multiplied.

In fine, it was impossible, and it will always be impossible, to discover an organ for any of the faculties that I have just named. Instead of being radical, fundamental, primitive faculties, they are only abstractions, generalities, general attributes of true fundamental powers. Let me explain myself: the faculty of the relations of space, and the faculty of the relations of

sounds, are two particular talents, two primitive fundamental talents. But, in the faculty of the relations of space there is perception, since it is necessary first to perceive the relations; there is attention, without which these relations would not in the least determine the individual; there is recollection and memory, otherwise no animal would find again the place of his habitation; there must be comparison and judgment, otherwise the individual would confound one place with another; and the landscape painter who combines or who invents situations, ought to have imagination. So also the musician would not be a musician, especially a composer, if he did not perceive the relations of tones, if he had neither recollection nor memory, if he did not judge of melody and harmony by these relations; if he had not imagination to invent new combinations. Thus attention, perception, memory, judgment, imagination are nothing else than the different modes of action of every one of the fundamental faculties whatever. They are essential to each of these faculties, when they are graduated to the power or ability to create, — to that which we call *genius*. When they are weak, there is a feeble degree of attention, of perception, of memory, a defective judgment, and no imagination.

This explains how it can happen, that one may have strong attention, easy perception, a tenacious memory, and extremely correct judgment, an inventive and brilliant imagination in one particular talent, and be almost imbecile in another.

It is the same with all the talents and faculties. Perception, attention, memory, judgment, imagination, intellect, intelligence, thought, comparison, reflection, preference, understanding, are not powers existing by themselves. They necessarily belong to an object, to a particular talent, and are only attributes of it. But philosophers have always neglected the talent or the particular determinate object, or, in other words, they have made an abstraction of the fundamental faculty,

and have rested on general attributes, on generalities, on their abstractions.

This way of proceeding is the most convenient and the most natural to the human mind. Children always commence by seizing the general properties before they observe the differences of individual objects. They know the young of animals, in general, before they know the calf, the colt, the duck, the chicken, in particular, &c. They know the dog before they know the grey-hound, the bull-dog, the terrier. We all know what a bird is, without thinking of the difference between a tom-tit and a nightingale, between a chaffinch and a greenfinch.

But in nature, these abstractions, generalities, general attributes have no reality, no proper existence. Extension and weight are general attributes; but these two general attributes exist only in abstraction, in thought. In nature, extension and weight are inseparable from a determinate body. The true naturalist seeks to know these bodies, knowing very well that it is impossible for him to find extension and weight in an isolated existence.

Every reader will now understand why the philosophers and their imitators, the anatomists and the physiologists, have never been able to discover any organ, nor any external sign for the faculties of the mind, such as were adopted, and such as they are now established, in all the schools of philosophy.

The same fault has been committed, when the instinct, the affections, the passions have been considered as positive things; these are so many abstract notions. Instinct is not an *unit*. There is an instinct of propagation, an instinct of love of offspring, an instinct for constructing, an instinct for travelling, &c. It is these particular instincts which have an independent existence, which determine the peculiar nature of the individual; it is these only which have their appropriate organs, and which it is possible to discover.

Further, the passsions are nothing abstractedly con-

sidered; they are the very energetic activity of the propensities and talents. There is passion in the propensity for propagation, as there is passion in the talent for music. How then can we find an organ for the passions?

The affections are simply the modifications of the different organs. Pain and pleasure, joy, fear, chagrin, modesty, anger, despair, pity, &c., take place when certain organs are affected in a particular manner. Consequently there cannot be an organ or a seat peculiar to the affections. Organs only exist for the propensities and the talents which can be affected in a thousand ways, or, the activity of which can be increased even to passion.

When I have exposed the fundamental qualities and faculties, that I have ascertained up to the present time, I shall be able to present the true philosophy of man in its clearest proof. What I have just said will, for the present, be sufficient to convince the reader, of the defects of the philosophy of our metaphysicians, and he will conclude with me, that it is by their chimerical doctrines, that the progress of elevated physiology, or, the study of moral and intellectual man, has been most fettered.

Let any one imagine to himself, from a consideration of all these difficulties, how far we ought to expect, on the part of anatomists, physiologists, and professed metaphysicians, an exact judgment on my discoveries. In the number of those who are in a favorable position for verifying and sufficiently multiplying experiments, how few are there, who are endowed at the same time with a taste for the study of nature and with a physiological spirit! How rare, also, it is to find men of a fitting age, who, by an uninterrupted cultivation of science, have preserved a sufficient degree of flexibility, to abandon old errors and receive new truths!

Let us count also among these obstacles, the reputation which those professors enjoy, who despise the

new doctrines, so called, who, by their decisive and peremptory tone, sink their disciples in security and pernicious indolence; let us reckon also, the pretensions and the still more despotic decisions of learned societies and academies, who, ridiculing, with Boileau, the decrees for the maintenance of the doctrines of Aristotle, prepare the same spectacle for their successors.

It will be seen how necessary it was to remove difficulties before I could determine one single fundamental quality or faculty. Happily these obstacles were presented one by one. So long as a quality or faculty, or its organ, remained undiscovered, I never had the least anticipation of what I should eventually find, nor of the place where I should discover the organ. Entirely abandoned to nature, it was requisite that I should have a considerable number of striking facts to afford me a slight presentiment, and a much greater number still to put me on the proper track. How many times, after years, have I been obliged to reject that which had appeared to me well established! How many times have I been tempted to renounce all my researches, and to admit what those who had gone before me had maintained, that it was impossible to discover the traces of the operations of the mind!

However, the numberless observations that I had made from my infancy on man, in my intercourse with my brothers and sisters, with my play-fellows and school-mates, and those that I had made on animals of every species, awakened me from my despondency. Finally, the powers of facts became sufficiently powerful to convince me of the reality of my object and the possibility of obtaining it.

Thus, in consequence of the accumulation of facts, light came gradually upon me. I discovered sometimes one fundamental quality or faculty, sometimes another; at one time, one organ, at another time another; and as these discoveries were multiplied and confirmed, the prejudices, the scholastic errors, and fears disappeared.

As so large a number of naturalists and physiologists still doubt the possibility of discovering the functions of the different parts of the brain, we shall proceed to the discussion of the means, that we have believed ourselves able to employ, up to the present time, and those which we have employed with the greatest success.

OF THE MEANS NECESSARY TO DISCOVER THE FUNCTIONS OF THE DIFFERENT PARTS OF THE BRAIN, OR OF DETERMINING THE FUNDAMENTAL QUALITIES AND FACULTIES AND THE SEAT OF THEIR ORGANS.

Of Anatomy, considered as a Means of discovering the Functions of the different Parts of the Brain.

I shall speak here of the anatomy of the brain under four different points of view; of the anatomy of the brain, as a simple dissection or examination of the conformation of the brain; of the physiological and pathological anatomy of the brain; and of the comparative anatomy of the brain. The first must necessarily be as barren in leading us to the discovery of cerebral functions, as the three others may become fruitful. But up to the present time the physiology of the brain has received no advantage from anatomy, under any point of view whatever, for the simple reason, that no one has yet had the least idea of the nature of the functions of the brain; that is to say, not the least idea of the fundamental qualities and functions, which belong to the different parts of the brain.

Of the Simple Dissection of the Brain as a Means of determining the Moral and Intellectual Fundamental Powers, and of discovering the Seat of their Organs.

There are but few cases, where the structure of parts, enable the anatomist to understand the functions which depend upon them; and when that happens, his ideas are merely conjectures. Thus the bones and the ligaments are examples of this kind. Before having seen the motion produced by muscles, their figure does not enable us to divine either their irritability or their contractility. The dissection of the stomach, the liver, the kidneys has not taught the functions of these vicera. What purpose would it serve to know the structure of the eye and the ear, if experience had not taught us their uses? Would the most profound perspicacity ever have attributed the sense of smell to the pituitary membrane of the nose, and the sense of taste to the nervous papillæ of the tongue, when even to this day anatomists still dispute, to which nerve the gustatory faculty belongs? The tendons and ligaments have been confounded with the nerves, for ages; and the organization of the heart has had so little influence in leading anatomists to a knowledge of its functions, that, to the time of Harvey, the arteries were considered as conducting tubes of air.

It was infinitely more difficult still to discover the functions of the cerebral parts by their simple dissection. There are in the brain neither muscles nor levers for motion; there are no excretory canals, no external apparatus, no extension, no relaxation, no concussion or oscillation of fibres, no refraction of the rays of light, no vibration of air, no liquid in motion. The functions of the nerves and of the brain differ essentially from every other function of organized parts; they are of a peculiar nature, beyond the reach

of our senses and our imagination. Although exceedingly varied, and diversified in themselves, we could hardly conceive of the possibility of any difference in the intimate structure of their innumerable fibres, and consequently would not imagine any difference in their functions, if we did not reflect that the myriads of fibres, among which we do not observe any difference in animals and vegetables, have nevertheless a difference among them, which is evidently proved by the diversity of their effects. In whatever region we examine the two substances that constitute the brain, we can hardly perceive any difference between them, either in their structure or their chemical composition. The nervous fibres, it is true, are sometimes more or less firm, white, or bony; they are directed sometimes in one sense, sometimes in another; the convolutions of the hemispheres are sometimes narrower, or broader, or serpentine, &c. What inference can the anatomist draw from all this?

It is then demonstrated, that the knowledge of the parts and of their form, direction, consistence, color, &c., never leads to the knowledge of their functions. Almost always has the knowledge of functions preceded that of the parts. It was not necessary to know the structure of the eye, nor the mode of existence of the optic nerve, to know that it was the organ of sight. For a long time it was not believed, that the nerves were necessary to the functions of the senses, because it was thought, that the sanguineous vessels carried the impressions to the heart, the supposed seat of the soul.

It was also without the assistance of any anatomical guide, that I made all my physiological discoveries; and these discoveries might have existed for ages, without their concordance with the organization of the brain being ascertained.

Whenever it has been attempted to advance the pretended knowledge of organization before that of functions, it has been altogether conjectural, and wore

the impress of the prejudices of the age. It is in this way, that the heart has been constituted the seat of courage, love, sympathy, cruelty; the liver was formerly the seat of anger and physical love; it is thus, that, even to this day, the moral and intellectual faculties are made to arise from a mixture of the humors on the temperaments; and the dispositions and passions take their rise in the abdomen or from the solar plexus. If anatomy were a sure guide in establishing the uses of different parts, would Willis have said that the vital spirits, necessary for motion, were secreted in the cerebellum? Would Galen have connected the organ of smell with the anterior cavities of the brain? Would the soul, alternately dislodged from the pineal gland, the corpus callosum, the annular protuberance, &c., have been replaced by Sœmmerring in the vapor of the cavities of the hemispheres, and by Ackermann in the medullary substance which lines the interior of the same cavities! Would memory have been placed sometimes in the gray substance, sometimes in the posterior lobes of the hemispheres; judgment sometimes in the fibrous substance of the hemispheres, sometimes in their cavities? This is one of the sources of the errors of Descartes, of Albert-le-Grand, of Servetto, of Auranti, of Van-Helmot, of Lancisi, &c.

We ought at least to expect, as I have mentioned in another place, that anatomists, on seeing the great diversity of the cerebral parts, would have been the first to deduce from it the diversity, and consequently the plurality, of the organs of the powers of the mind. But, in our day, we cannot persuade ourselves any more than Vicq-d'Azyr, of the plurality of the cerebral organs; a very striking proof, how little the simple knowledge of any mechanical structure, is capable of enlightening the physiologist.

It is rather by observing physiological phenomena, that we arrive at a more just idea of the brain. Accordingly, it has been requisite for me to collect a great number of physiological and pathological facts, before

I could come to any rational induction respecting the laws of its organization. I owe almost all my anatomical discoveries to my physiological and pathological conceptions; and it is only from these, that I have been able to convince myself of the perfect accordance of the moral and intellectual phenomena, with the material conditions of their manifestation. It is, therefore, more and more apparent, that they are but false suggestions of those of my opponents, who, pretending that I had arbitrarily interpreted my anatomical discoveries, endeavour to throw distrust over my physiological discoveries on the functions of the cerebral parts.

The Anatomy of the Brain in its Physiological Applications, as a Means of discovering the Fundamental Powers of the Mind and the Seat of their Organs.

Without doubt the anatomy of the brain, would have afforded anatomists and physiologists the first impulse for meditating on the meaning of its organization, on its agreement with the forms of the head, and the modifications of development of its different parts, if they had ever brought to the subject other views, than those purely mechanical.

The organization of the brain, although analogous to that of the other nervous systems, is still so wonderfully finished and perfected, that we are enabled to divine its high destiny. But what are generally the preparatory acquirements of those who devote themselves to anatomy? To be a great anatomist, it is only requisite to have a great deal of patience, good instruments, good eyes, and dexterity in the use of the hands. It has never been considered, that philosophical studies, natural history, natural philosophy, should be regarded as indispensable, or even useful, to the anatomists. And even if the dissectors of the brain should have been imbued with the philosophy

of Locke, of Condillac, &c., they would have had one reason more for always remaining strangers to all idea of its use. The mind having always been considered by a philosopher as having no relation with the body; and all its moral and intellectual powers having been derived from the impressions on the five senses, an especial organ for all these functions, was superfluous.

The division of the brain into two hemispheres, into many lobes, into many other parts very distinct in their form, their direction, consistence, color, and the varied although constant distribution of its two substances, should have induced among the anatomists a suspicion, that all these variations might be destined for different functions; the more, because the division of the other nervous systems, into two equal parts, their subdivisions into particular nerves, and their varied and different uses, afforded them a striking analogy. But very few physiologists have manifested a presentiment of this. With most of them, this light, so clear, has thus far been obscured by the gloomy ideas of the metaphysicians. The spirituality of the mind, according to their conceptions, required a simple seat, a single point, a centre of the common senses, &c. These ideas have occasioned the loss of all the fruit, that they would have been able to collect from antecedent knowledge, so rich in its application.

They would have been enabled to observe, that the fibrils of the brain, manifest themselves later as distinctly as the fibrils of the other nervous systems, whose functions are earlier called into action; that precisely in the same manner as the different subdivisions of the nerves, the viscera, the spinal marrow, and the senses are not simultaneously developed, so also the different parts of the brain are not developed simultaneously; that consequently, in the same manner as the functions of the other nervous systems and subdivisions, are destined to different fuctions which succeed each other, so also the brain and its subdivisions ought to be equally

destined to different functions which succeed each other. We may observe that in new-born infants, the frontal parts of the brain are much less developed than the middle lateral lobes, and that from the age of four months to ten or twelve years. That the cerebellum is generally very slowly developed, towards the age of puberty; that the whole cerebral mass diminishes in old age, but that this diminution does not affect all the parts of the brain at the same time; they could observe that in man, certain parts are generally more developed than in woman; that other parts, on the contrary, are more developed in woman; that the volume of the brain is very different in different individuals; that the hemispheres in different individuals sometimes present small contracted convolutions, sometimes large and prominent ones; sometimes large and prominent in one part of the head, and small and contracted in another. They could have remarked that the heads of different individuals have quite variable forms, and that these variations correspond with the variations of the form of the brain; that the heads, and consequently the brains, of different nations, present very different forms, &c.

Ought not all these circumstances to awaken the attention of anatomists? Ought they not to be able to excite their curiosity on the signification of all these different parts of the brain? Should they not have viewed these physiological facts with a reference to these anatomical phenomena? The inactivity of the mind of the new-born child, and his great need of nourishment and sleep; the growing activity of the faculties of children, especially the faculty of observation and abstraction; the successive apposition of the instinct of physical love towards the age of puberty; the successive but not simultaneous diminution of the vigor of our moral and intellectual faculties; the difference in the sentiments, propensities, and the intelligence of man and woman; the difference in the moral and intellectual character of different individuals; the dif-

ferent energy of certain propensities and faculties in the same individual; the difference of national character, &c. But nothing of all this has happened. Now only since the fundamental powers and their localities have been determined by experience, that all these circumstances have been referred to the brain, and serve admirably to confirm the physiological discoveries, and to demonstrate their harmony with the cerebral organization.

Of the pathological Anatomy and Physiology of the Brain, as Means of discovering the Fundamental Powers of the Mind and the Seat of their Organs.

The pathological anatomy and physiology of the brain, so far from putting anatomists or physiologists on the track of any fundamental quality or faculty, or the seat of their organ, have not even been sufficient to convince them, that the brain is exclusively the general organ of the moral qualities and intellectual faculties. They have even seized upon the lesions and the diseases of the brain to prove that, with very considerable alterations of the brain, all the faculties of the mind can exist and be exercised in their full integrity. It has even been necessary for me in my second volume, to enter into a long discussion to refute these pretended observations, that are brought in support of this error.

I have been able to show, that, previous to my anatomical and physiological discoveries, there did not exist the necessary knowledge, to determine with exactness the malformations, lesions, and diseases of the brain, nor the means of judging with correctness of the influence, that the lesions and diseases of the brain exercised on the moral qualities and intellectual faculties.

As to mental alienations, madness, idiotism, universal or partial insanity, I was still obliged to combat

the highest authorities, MM. Pinel, Esquirol, Fodéré, to establish that all the mental diseases always have their immediate seat in the brain. The public were so little enlightened by pathological facts observed in the brain, that it was still boldly maintained, that cases existed, where a hemisphere of the brain and even the entire brain, had been destroyed, and where not the least trace of brain was found; where it had been dissolved or disorganized by collections of water in the cranium; where it had been ossified; without the cessation of the exercise of the mental faculties.

Would it not have been expected that physicians, who are the most inclined to observe and study mental alienations, and to make examinations of the dead bodies of the insane, would be the first, not only to find the immediate seat of these diseases, and the most convincing proofs of the plurality of the organs, but also, the fundamental qualities and faculties? They present you with numerous cases where persons, who manifested an involuntary excitement in some particular, that is to say, who were on the borders of insanity, and have been preserved from it, by resorting to occupations which were foreign to the object which had taken so great an ascendency over them. Could they not have been able, with Bonnet, to infer from thence, that in thus acting they allow certain parts of the brain to repose, whilst at the same time they put other parts in activity? They every day see cases, where certain qualities certain faculties are injured, whilst other qualities, other faculties remain sound; cases where the individuals are rational or irrational on a single point. They show you examples of rational alienation, since those who are effected by it, perceive and combine in every other respect, as rational beings. They speak to you of cases where the affective faculties are singularly troubled, whilst the intellectual faculties are in the most perfect calm, and *vice versâ*. They have every day under their eyes cases of imbecile people, who are only so in some respects, and

who in other relations, sometimes evince an astonishing degree of intelligence. Every day they attend insane people in whom sometimes physical love, or murderous rage, or the passion for robbery, or haughtiness, or religious fanaticism, &c., stifles every other idea, every other sentiment.

Could they make no use of similar facts so strongly marked, nor seize with avidity, that which nature so often presented them? But no; philosophical errors held them captive in spite of the demonstrations of nature, the most opposed to their prejudices.

The observing mind of M. Pinel had been forced to observe the falsity of the doctrines of Locke and Condillac. Not content with ascertaining the insufficiency of the division of the faculties of the mind, into affective qualities and intellectual faculties, he expressly says that the different alterations, which the moral and intellectual faculties sometimes undergo, invest themselves with such varied forms, that the subdivisions of their principal divisions are as different, and as strongly marked among themselves, as the principal divisions are. See him then ready to shake off the chains of metaphysics! and at the same instant, he and his worthy and respectable pupil, M. Esquirol, bend to the yoke, and pretend that they have observed, in a healthy state of the other functions of the mind, partial lesions of the physical sensibility of perception, attention, memory, of the principle of the association of ideas, judgment, imagination. The reader will recollect, that I have proved in the second volume, that in none of the cases, cited by MM. Pinel and Esquirol, did there occur more than one of these common attributes of lesion, whilst the others could have existed without alteration.

We see then with melancholy astonishment, that neither pathological anatomy, nor the pathology of the brain have in the least contributed to discover the true fundamental powers of the mind, and how then

could it be possible from such means, to conceive the idea of particular organs, and their particular seats in the brain?

Of the Mutilations of the Brain as a Means of determining the Fundamental Qualities and Faculties, and the Seat of their Organs.

It is a subject of constant observation, that, in order to discover the functions of the different parts of the body, anatomists and physiologists have always been rather disposed to employ manual means, than to accumulate a great number of physiological and pathological facts, to combine these facts, to reiterate them, or to await their repetition in case of need, and to draw slowly and successively the proper consequences from them, and not to announce their discoveries but with a wise reserve. This method, at present the favorite one with our investigating physiologists, is imposing from its materiality, and it gains the approbation of most men, by its promptitude and its apparent results.

But it has also been constantly observed, that what has appeared to have been incontestably proved by the mutilator A, either did not succeed with the mutilator B, or, that he had partly found in the same experiments, all the proofs necessary to refute the conclusions of his predecessor. It is but too notorious, that similar violent experiments have become the scandal of the academicians, who, seduced by the attraction of ingenious operations, have applauded with as much enthusiasm as fickleness, the pretended glorious discoveries of their candidates.

But besides, these cruel experiments, when they are made on animals of an order comparatively low, are hardly ever conclusive for man. In chickens, pigeons, rabbits, guinea pigs, and even in newly-born animals of a superior order, the whole animal life is

not by any means under the dominion of the brain. I am willing to admit that some results can be obtained, in most cases however, extremely doubtful; even in relation to the phenomena of irritability, sensibility, the functions of the viscera, those of voluntary motion, respiration, &c.; but never will I grant to the physiologists, that the lesions and the mutilations of the brain, either designedly or accidentally occasioned, are the means, the only means, of enabling us to become acquainted with the functions of its constituent parts.

In order that experiments of this kind should be able to throw light on the functions of each of the cerebral parts, it would require a concurrence of many conditions, impossible to be fulfilled. It would first require that we should be enabled to restrain all the effect of the lesion, to that portion only on which the experiment is performed; for, if excitement, hemorrhage, inflammation, &c., affect other parts still, what can we conclude? and how can we prevent these inconveniences, in mutilations, either artificial or accidental?

To be assured that we have entirely destroyed an organ, it would be requisite that we should know beforehand, wtih exactness, all its extent and its sources. But who, up to the time of our discoveries, has had the slightest knowledge of the direction of the different nervous fasciculi, which form the convolutions? Who has had the least idea of the different origins of these fasciculi, and of the multiplied points of their reunions? We are accustomed to make horizontal sections; but never can we remove an entire organ by these sections; for, except in cases of complete hydrocephalus, the nervous fibrillæ of the convolutions are not ramified on a horizontal plane; on the contrary, they plunge diagonally, or perpendicularly, or obliquely, towards their sources of supply, and their original points of origin. Thus, how can we destroy any organ whatever, without at the same time injuring those that are in contact with it, without pene-

trating deeply into the brain, and without causing the death of the animal?

It would be necessary, that we should be able to make an animal, whose brain has been wounded and mutilated, who is filled with fear and suffering, disposed to manifest the instincts, propensities, and faculties, the organs of which could not have been injured or destroyed. But, captivity alone is sufficient to stifle the instinct of most animals. The elephant no longer thinks of copulation; the nightingale, even in the midst of his amours, ceases to sing.

It would be necessary, that, while injuring or destroying some particular portion of the brain, we should be able to confine the injury to the *animal* function of the part affected, that is to say, the instinct, the propensity, the faculty which depends on this, and in no way interfere with the *vital* functions of the brain; for when, after a concussion, blow, cut, &c., there supervenes an inflammation, a benumbing paralysis, vertigo, delirium, mania, or convulsions, how, with this derangement of the *vital* functions of the brain, can the animal functions of any of these functions continue to be manifested?

In similar violent experiments, it would be necessary to destroy the same organs, as completely in one of the hemispheres, as in the other. But thus far none of the physiologists, who have undertaken these mutilations, have taken into consideration the circumstance, that all the organs of the brain are in pairs; and that each hemisphere contains organs precisely similar.

Finally, and especially, it would have been requisite to know what could be found, and what ought to be sought for, in the brain. It would also have been necessary, that the mutilators should be divested of every metaphysical prejudice; that they should have a detailed knowledge of the fundamental powers. Where is the physiologist, where, the anatomist, who has been able to follow this direction, and who has not wished to find generalities and abstractions?

These remarks will be sufficient to prove, that those mutilations, which Sir E. Home has lately proposed, and would make us believe were his own invention, and which are always cried up anew, can never lead to the discovery of the special function of any part of the brain whatever. What shall we think then of those pretended learned people, who contemptuously protest against the proofs of all kinds, which I give of such or such a fundamental quality or faculty, and of the seat of its organ, for the reason, which according to them is very plausible, that these proofs are not founded on similar mutilations and on the derangements which have resulted from them?

I shall proceed to demonstrate immediately, that there exist in the different species of animals, *natural* mutilations of the brain, according as these animals are more or less removed from man, and we shall see what valuable advantages the naturalist can derive from the comparison of these fragments of the human brain.

Can Comparative Anatomy and Physiology at present serve as Means for discovering the Fundamental Moral and Intellectual Powers, and the Seat of their Organs?

When it was maintained, that man had the largest brain, and that this was the cause of his superiority over other animals; when it was maintained, that the angles of the facial line of Camper indicated the degree of intelligence of man and animals, the comparative anatomy and physiology of the brain was made use of. I have proved the inefficiency of these two means. There were indeed some authors, such as Herder, Bonnet, George-le-Roi, &c., who had caught a glimpse of the utility of similar researches; but these have not been practically followed out, and they cannot be so yet with the most ordinary success.

In accordance with their principles, philosophers opposed the instinct of animals to the understanding and will of man. The instinct, as a personified power, was regarded as performing the vicarious office of the mind, the understanding, and the will equally personified. As all the propensities, sentiments, and talents were regarded as modifications of the activity of the mind, so also all the mechanical aptitudes of animals, all their propensities and interior impulses were modified operations of instinct. Both in man and animals, all investigations ended in these generalities; all reciprocal relations were denied; a complete line of demarcation was established between man and animals, and no connexion could be tolerated between them. To believe that animals partook of certain propensities and faculties in common with us, was a heresy. Their different instincts were no more specified or distinguished from each other, than the qualities and faculties of man. It was the part of materialism, to find an analogy between the propensity for propagation in man, love for his offspring, local memory, &c., and the instinct of propagation, the love of progeny, and the local memory of animals. It is because a man *wills*, that he kills, that he defends his property, that he builds, that he sings; it is from instinct, that the animal kills, that he defends his property, constructs, sings, travels, &c.; hence it follows that there is no comparative physiology of the moral and intellectual powers, and hence there is no comparative anatomy of the brain.

What shall be said to this kind of reasoning, when it is founded on the authority of those, who have the most cultivated comparative anatomy? Cuvier expressly says, that instinct has no visible mark in the conformation of the animal.* By and by I shall have occasion to do justice to this decision, which is falsified in every animal, from the humming-bird to the

* Animal kingdom.

cassowary, from the mouse to the elephant; a farther proof that physiology ought to precede anatomy.

So long as this comparative physiolgy shall fail or be defective, comparative anatomy will be subject to insurmountable difficulties. Let us suppose, that an animal, the dog for instance, has many faculties and consequently many organs in common with us, such as the instinct for propagation, the love of offspring, of attachment, of a local sense, &c., it is evident, in the first place, that these organs will be otherwise modified in the dog, than in man; in the second place, as the dog wants many organs with which man is endowed, there ought to result in the animal an entire form of the brain, very different from the entire form of the human brain. The situation of the organs must necessarily undergo variations very difficult to ascertain. Organs, which in man are placed near the middle of the forehead, are also similarly situated in the dog; but, as the organs which in man occupy the external lateral of the forehead, are wanting in the dog, they are placed last at the side, close by the temples, as I shall demonstrate, for the organs of the senses of the relations of space.

This difficulty would not be so great, if nature had created only a small number of species of animals, so that in each species the gradual perfectibility would be effected by the addition of one new organ to the others; in this case, the organology being once known in man, the interpretation of less complex brains would become very easy. But, in this multitude of species, nature has made distributions and mixtures of organs almost infinitely various: here is an animal where the organ of love of offspring is contiguous to the organ of the instinct for propagation; there, the organ of the love of offspring is entirely wanting, and that for propagation is immediately in contact with another, which altogether changes the form of the brain and the head; here the organ of the sense of locality, is contiguous to the organ of

construction; there the organ of music is placed between these two; and so on.

The further an animal is removed from man as it respects his qualities and faculties, the more difficult will be the interpretation of his brain. Such a head will be in part composed of organs entirely different from those of man: and how is it possible to have an idea of a propensity or a faculty, that it is impossible for us to feel? Nevertheless the same brains will present an analogy in those parts, the functions of which are analogous to those of man.

In general, the nearer the species approaches man, as it respects the qualities and faculties, the easier will the interpretation of his brain become to the physiologist, who, by long experience, has learnt to interpret the brain of man.

My readers will now perceive that, in order to derive all the advantage possible from comparative anatomy and physiology, the study of a great number of brains is indispensable; but this study can never be made in dissecting and examining one brain to-day, and another to-morrow. Neither memory, nor the most scrupulous attention, will suffice to retain all the parts and all their forms, in order to be able to compare them with the parts and the forms of another brain. On this account I have commenced making a collection of brains, partly in plaster and partly in wax; but the expense of a similar collection, even should it be incomplete, generally exceeds the fortune of an individual. Brains, preserved in brandy, or in a solution of corrosive sublimate, lose much of their form, and are very difficult to handle. Thus we can only hope from time, what indifference and prejudice still refuse us. Since our contemporaries are not disposed to admit the importance of this kind of research, we must resign the imperfections of the physiology of the brain to those after us who will have the taste and the courage to continue, what, without contradiction, was infinitely more difficult to commence.

Now I shall undertake to show, how I have overcome a great part of the difficulties of which I have just spoken, and I shall explain the means which have the most assisted me in my researches after the fundamental qualities and faculties, and the seat of their organs.

Exposition of the most convenient Means for determining the Fundamental Qualities and Faculties, and the Seat of their Organs.

I had hardly obtained certain indications of other moral and intellectual powers, than those professed by the philosophers, when I perceived the necessity of directing all my researches, in the first place, towards the discovery and the determination of the instincts, the propensities, and the positive talents; being convinced that for these only organs exist, and seats can be determined.

I constantly said to my friends, indicate to me the fundamental powers of the mind, and I will find the organ and the seat of each. I have experienced many more difficulties in endeavouring to resolve the first problem, than the second; although for this I have encountered, as it respects certain qualities and faculties really fundamental, obstacles which as yet I have not been able to overcome. But as to the primitive, fundamental, radical powers, I know the organ of many modes of manifestation, without being able to reduce them to their fundamental power. There also exist qualities and faculties, upon which I am not yet able to pronounce whether they are simple fundamental powers (*sui generis*), or whether they should be considered as simple modifications of certain primitive qualities or faculties, or, as a mixed result of the simultaneous influence of many fundamental powers.

The important search always is for these independent powers, for, it is only for them, that organs exist in the brain. But where shall we derive this knowledge? Wherever we inquire, we get this common answer: "What need have you of seeking other faculties of the mind than intelligence and will? Man is an architect, mathematician, poet, solely because he has applied his understanding to architecture, mathematics, and poetry. He gives himself to love, he takes care of his children; he robs, he is ambitious, because such is his choice." I had in vain to ask, why it was that such an one applied himself by choice to architecture, rather than to any thing else; why another took pleasure in robbing, in places of honor, &c.

In order to invalidate this unsatisfactory appeal to the will and the understanding, I referred them to the mole, the rabbit, the ant, who construct their subterranean galleries, with astonishing foresight; I referred them to the beaver, the bee, the penduline, who construct their cabins, their hives, and their nests, with inimitable art; I referred them to the quail, the cuckoo, the stork, and the swallow, who, after a long absence, return to their old habitation; I referred them to the blood-thirsty weasel, the cunning fox, the bold wild boar, the singing nightingale, and the imitating mockbird. But still my ears resounded with the cry of the philosophers, *it is instinct;* and one would have believed, that all the means for explaining these phenomena, had been exhausted.

What should I do in this uncertainty? I regarded then as very precarious all that, up to that time, was known concerning the moral and intellectual part of man, because the generally received ideas were in contradiction with nature. I did what I engaged my adversaries to do, I gave myself entirely up to observation, awaiting, with patience and resignation, the results that it would afford me. I have confined myself to the collection of facts, and the noting of the

circumstances under which I observed them. I have been careful in my wishes to explain observations, for fear of misleading my judgment rather by the sagacity of my mind, than of instructing myself by the faithful image of reality.

The facts on which I have founded my assertions are mostly of such a nature, that they can be repeated and multiplied voluntarily by each of my readers. I have not desired to seek in another hemisphere that which could be found at home. The duck and the bull are organized by the same laws as the flamingo and the cameleopard. If we examine with the same attention the crania of Germans, Frenchmen, Russians, Italians, &c., with which we scrutinize the most minute circumstances in the crania of the Caribs, the Becherais, the Hottentots, the Tongouses, &c., we shall have less trouble in multiplying observations, and, as they will acquire a more durable value, they will lead also to more useful results.

The numerous facts that I bring to the support of each fundamental power and the seat of its organ, prove how thoroughly I am convinced of the necessity of multiplying experiments. But these facts will, at most, serve to gratify curiosity, if I confine myself to the consideration of each separately, instead of comparing them with each other, and endeavouring to separate that which is accidental and particular from that which is essential and general, in order to deduce from them laws and truths that are constant. He who contents himself with single facts, as it has been too much established in principle to do, may increase the number to infinity, without deriving any fruit from his labor. He cannot, by so doing be in the least enabled to foresee or produce analogous facts. Not distinguishing the essential from the accidental, he will for ever remain as much a stranger to all that he has not yet seen, as he who enters for the first time on the field of nature; he will be constantly groping in his science; he will never see the whole, which it is only

possible to seize by the connexion of individual facts; and never will be enabled to create a philosophical idea of his object, in order to arrive at new views or to a true discovery.

There exists a sect of philosophers who pretend that individual facts, however numerous, can never lead to general laws; because we can never observe all the facts possible. It is on this account that philosophers in the possession of their abstract and general ideas, boast of being infinitely above the common observer. They suppose, then, that nature does not act consecutively, and by laws constantly the same; they assign to each fact a separate cause. If then the justice of principles is to be doubted, because they have not been derived from a great number of individual facts, what will become of all human knowledge? Whence have the natural philosopher, the chemist, the physician, derived their principles?

It requires, it is true, much sagacity, much circumspection, and a profound knowledged of nature, to discern the phenomena which enable us to deduce the laws, in consequence of which they exist. Almost always this requires many facts, observed under varied circumstances. This is the reason why, when I have only a few facts in favor of a proposition, that I am careful to say: *I have often seen that; I have always seen that; I have never seen that differently;* similar expressions surprise a reader prone to adopt precipitate opinions.

But a principle merits all our confidence, when it enables us to prognosticate phenomena with correctness, or even to cause them to take place, and to foresee, precisely, the necessary results from the circumstances, as well as to determine the circumstances from the results. When one pursues researches with perseverance, when one is sufficiently fortunate to be able to continue his observations during twenty, thirty, or forty years, under the most varied relations, upon educated people as well as upon the ignorant, on the

rich as well as on the poor, to repeat them in a thousand different ways among the most dissimilar nations, and find them always confirmed; when he carries back his observations to the most ancient times, and when he studies the busts, the portraits, the engravings of men who have immortalized themselves by eminent qualities or faculties; when he has studied the biography of these men, and followed them from their youth to their death; when he has made himself acquainted with the means that have favored their development; and when in all this he never finds exceptions, and never meets with contradiction, he may confidently expect that he is on the sure way of truth. The transcendental or speculative philosophers have always excited a smile in me, when I have heard them say, in order to manifest their contempt for the physiology of the brain, that experiments and facts have only a subjective value; that the observer merits, at most, the name of being curious; that I am always right as it respects experience, but, in a philosophical point of view, I am always wrong; does not that signify that their *soi-disant* philosophy of nature, is in direct opposition to reality?

First Method, derived from common Language, to attain to the Knowledge of the Fundamental Qualities and Faculties, and the Discovery of the Seat of their Organs.

In conformity with the ideas, of which I have given my readers a foretaste at the commencement of the first volume, I shall at first solely adhere to the manner, in which the different propensities, sentiments, and talents of men and animals are habitually named. I have always thought that this language was a creation of the faculties of man, and that he did nothing more than express by sounds, whatever took place within him. We always hear men of great talents,

of marked characters, spoken of nearly in these terms: Such an one is born a musician, poet; he has an innate talent for mathematics; he has a passion for constructing, for travelling; he is strongly given to women; he has an insatiable ambition; he is revoltingly proud; he is excessively obstinate, &c. Do not these forms of expression suppose, that these qualifications delineate with precision the prominent traits of the character?

It was individuals, endowed with one or the other of these qualities or faculties, that I set myself to observe. When I was convinced that an eminent talent, or a strong propensity, was really the work of nature, I examined the form of the head of the individual, and had it strongly impressed on my memory.

In the introduction to the first volume, I have related how it was that I was enabled to ascertain those among my school-fellows, who possessed a great facility of learning by heart. I ought then to have been able to have known, that the particular qualities and faculties are not a consequence of the entire form of the brain, and that, consequently, they are not manifested by a general form of head; but the number of observations, that I had made up to that time, was not sufficiently large to establish my ideas. It was a matter of course, that I fell into errors, palpable mistakes; but it was not very difficult to get rid of them, in order to regain the correct way. For instance, I had accidentally observed, that, in some musical composers of great reputation, the superior part of the forehead was compressed by the sides, whilst the inferior part, immediately above the external border of the eyes, was very broad. Perhaps, said I to myself, this triangular form of forehead is the sign of a great musical talent.

But I soon found great musicians equally renowned who had the top of the forehead very broad. This observation enabled me to perceive, that I had not yet found the external mark of the musical talent. My friends were quite disposed to console me for this

folly; the exceptions, said they, prove the rule. I never was of this opinion; a student of nature from my infancy, I could not suppose that there was any thing indeterminate or vague in her works; her laws ought to be immutable and fixed; and every exception, bearing upon an essential point, was a proof to me that the seat of an organ had not yet been ascertained. This severity towards myself determined me to continue my researches, and multiply observations, until I should be enabled to find a constant and common sign; as for instance, in all the great musicians that I had opportunity successively to see. It would have been impossible for me to make similar discoveries in a less extensive sphere, and in a less populous city, or one less frequented by strangers of distinguished talents. The more my observations multiplied, the more was it probable that I was on the point of succeeding, in determining a fundamental faculty or talent, and in indicating, with exactness, the seat of its organ. Happily, my first researches were directed to those talents and qualities, which, so frequently occurring, drew my attention towards them. I have pursued the same method in discovering the talent for mathematics, construction, colors, &c.

Persons who were not at all familiar with the uniformity of the laws of nature, have sometimes objected to me, that what was true at Vienna, might be false, or, suffer great modifications at Paris, or London, &c. Such a supposition has never embarrassed me.

But there is another remark which it is proper to make to young naturalists. We ought not to expect to find in all individuals, endowed with a given quality or faculty, that the organ which corresponds to it is developed in a remarkable degree. Few people know the different degrees and the greatest possible energy of the qualities and faculties; those who have been brought up, secluded in the paternal mansion, know them the least. It is necessary to have had frequent

opportunities of comparing one's self with others, to judge correctly of the point on the scale, where one is placed himself, in this respect. The man of mediocrity places the extreme limit at a point, beyond which the man of genius passes, at his very entrance in the career. That which genius, in its innate capacity, in itself hardly perceives, appears to the man of moderate capacity, exaggerated, fantastic, unnatural, mad, inconceivable. We ought then, to be on our guard, and only choose for the subject of our observations, those men whose eminent quality or faculty is generally acknowledged, and well proved by their deeds or productions.

In the second place, and this remark is as correct as the former, we shall not be fortunate in our researches, except when we choose for subjects of our observations, individuals, who only enjoy, in an elevated degree, one single quality or faculty, and who, as it respects the rest, are ordinary men, or even below mediocrity. In these individuals, the distinguishing organ is exposed by itself, is more strongly developed; and even if one has only seen twenty similar individuals, he must have necessarily acquired very little tact not to be able to distinguish, on some part of the head, a prominence which is the same in all. If, on the contrary, we select individuals endowed with many marked qualities or faculties, we shall be embarrassed, in consequence of many well defined developments presenting themselves. There is a further difficulty, when the organs of well-marked faculties or qualities are placed by the side of each other, the prominences of each organ in particular are effaced, and a collective eminence arises, which is rounded. Hence it happens, that, from the inspection of the head of a man of very distinguished talents, the beginner will not perceive any thing very remarkable, because he does not distinguish any single well pronounced prominence, whilst the experienced observer will not be led into error. It is much easier to distin-

guish the organ of music, the sense of the relations of space, of poetry, in men in other respects of limited capacity, than in those who possess a certain combination of talents.

Second Method; Counter Proof.

Nothing has been easier for me, than to find a counter proof for controlling a fundamental power and the seat of its organ. I examined individuals who possessed in a very moderate degree, the quality or the faculty that engaged my attention; people, for instance, who had not only a very feeble talent for music, but even an antipathy for this science. When, in the same region, where, in those who excelled in music, there existed a considerable development of the brain, I could not find in others any prominence, but on the contrary, a plane surface, or even a depression; when I constantly found this conformation, it served to confirm the idea that I had adopted. We much more frequently find subjects, who aid us rather by the counter proof, than by the positive proof, if not by the almost entire want of development of organs, at least by their inconsiderable development; for, heads of mediocrity are as frequent, as those of genius are rare; besides, notwithstanding the numerous talents with which a man may be endowed, he is always weak in some particulars; and such a subject may sometimes be useful for the positive proof; sometimes, for the counter proof.

Third Method derived from the particular Conformation of the Head of the Individual.

When I discovered on the head of a person a protuberance, produced by the development of one part of the brain, I attempted to learn in what respect this individual was endowed with some eminent faculty or quality. But, in order successfully to make

such an inquiry, much prudence and practice were necessary; for, our friends and our enemies estimate our qualities and talents very differently. There are cases, also, where a talent or a disposition, with which we are endowed in a very high degree, has never had an opportunity of manifesting itself. Oftener still, and this happens especially with the common people, an individual has exhibited the most unequivocal proofs of some particular faculty or propensity, without his having observed, that the least difference exists between him and other individuals of his class, until finally chance discovers it to him.

I have, in society, made use of many expedients, in endeavouring to know the talents and the inclinations of people. I converse, for example, on different subjects. In ordinary conversation, we generally engage in those subjects, which have little or no connexion with our faculties or our dispositions. But when the interlocutor touches upon one of our favorite subjects, we take at once a lively interest. Where is the man, who does not love to display all the activity of his mind, when he finds himself within his own sphere?

The occupations, by which we get our living, generally prove nothing, either in relation to our faculties or our ruling propensities. Sovereigns and fathers make their subjects or sons, generals, magistrates, advocates, physicians, architects, painters, &c. But the occupations to which we resort for recreation, are almost always in conformity with our talents and our tastes.

When an individual has devoted himself to a particular pursuit in spite of all obstacles, and has acquired in it a certain power, he is certain that he has followed his vocation; that is to say, that he has obeyed the impulse of his innate faculties and propensities.

Do you wish to ascertain the character of a person without running the risk of being deceived, even though he should be advised of your intention, and put on his guard? Lead him to talk of his infan-

cy and early yuoth; ask him to relate his school-boy tricks, his conduct to his parents, his brothers, and sisters, his relations, and comrades, and the emulation with which he was animated; make him tell you the history of his friendships with certain children, and of the hatred he felt for others; question him on his plays, &c. It will rarely happen that he will dissemble in these particulars; no one can doubt, that he has to do with a man who knows perfectly well, that the character remains at bottom the same, however the objects which interest us change with age and the social relations. When, besides this, I farther observe what a person sets a value on, or despises, praises, or excuses; what events interest him; what society he seeks; if I see him act especially on occasions where there are conflicting interests; if he is an author, and I read his book, &c., the whole man is unmasked before me.

When once I have discovered the dominant faculty or inclination, I still make use of the two former methods.

I thus run through families, schools, asylums for orphans, foundling hospitals, houses of correction; and I particularly observe, wherever I find those subjects that are distinguished by some innate propensity, or by a particular conformation of the head; I compare them all with each other, always with the view of collecting new facts and proofs, in support of the reality of a fundamental quality or faculty, and of the seat of its organ.

Fourth Method; Collection of Heads cast in Plaster.

We are not at all times equally well disposed to discover the characteristic marks of a head; neither have we at our disposal, living people, whenever we would wish to renew our researches or enlighten our doubts. Often it is impossible to collect together a great num-

ber of individuals, endowed in a high degree with the same faculty, in order to compare them with each other. These difficulties induced me to make a considerable collection of casts. Whenever I became acquainted with any one, who possessed in an eminent degree any quality or faculty whatever, I took a cast of his head. In order to have the entire form of it, I shaved off the hair, to which many willingly submitted, or, I obtained precisely the external configuration of the head by feeling and measuring. In a few years I thus formed a collection of four hundred casts, of men of all conditions and classes, from the beggar to the prince; the deaf and the dumb; idiots, children of all ages, boys, girls, women, &c. I laid schools, houses of correction, hospitals for the insane, all of them under contributions for this object. I possessed those casts of individuals whose qualities and faculties I had already observed; in this number, there were found persons of the poorest education, as well as those educated with the greatest care.

I placed side by side all the casts of individuals in which I had observed a prominent quality or faculty. If the external sign of it was already known to me, I carefully observed if it existed in all these heads. When I had still to look for the organ, the problem was, certainly, much more difficult; in this case I observed the following principles, viz., heads which coincide in respect to a single marked quality or faculty, ought also to coincide with the form of the cranium in a certain place; in consequence of this I ran over all the regions of my heads, I compared them all; and when I perceived a marked difference of the form in the same region, I abandoned this region. It is necessary for every one to observe for himself, to know how many times it is requisite to resume his researches, in order to be able to find what is common in all these heads. Often I left on my table, for whole months, from ten to twenty of my casts; I examined them daily at different moments, and in the

most different dispositions of mind, until, finally, I was struck, and sometimes at the moment when I least expected it, with the protuberance common to them. It is very natural that it should be so; to-day one discards such a pretended sign that he has just ascertained to be false, and to-morrow, another. Thus, one says to himself from day to day, it is not this, it is not that, neither is it this, and when, finally, all the characters ascertained to be false, have been set aside, the true one appears of itself.

When in this manner we have discovered in ten or twenty heads, a common character, we return with increased ardor to the methods above indicated. These casts of living people are of the greatest assistance. By their means we become familiar with all the forms of the head; it has often happened to me to discover on them prominences which certainly were formed by the brain, but which until then I had not perceived, and at that instant, even, I commenced their study, to discover their signification.

Fifth Method; Collection of Human Crania.

As in my researches I had not cranioscopy for my object, but the discovery of the functions of the integral parts of the brain, it was my aim to learn the form, as exactly as the seat, of each organ; but, in the heads of living subjects, the muscles, the skin, and the hair are sometimes so thick, that it becomes very difficult to judge with precision, of the protuberances of the cranium. Some regions, such, for instance, as the base, are neither susceptible of being seen nor felt.

This imposed upon me the necessity of making a collection of crania; but how could I procure them? By so doing every body is shocked. Supposing even that we could collect some in the hospitals, in the institutions for the insane, in the houses of correc-

tion, it would rarely happen, that we could obtain exact accounts of the biography of such objects; and how rarely do we find physicians sufficiently accommodating to assist a kind of researches, to which most of them attach no value? With perseverance, and by means of the facilities with which an enlightened minister favored me, I was enabled to form a collection of the crania of very remarkable men. Many persons, whose heads I had moulded, died; I compared their crania with the cast of the living head, and I rectified my ideas of the situation and the form of organs, as well in the brain as in the cranium. At the same time I observed the difference that takes place in the form of the organs, from the living to the dead subject. Finally, this collection was the occasion of numerous researches that I made, on the brains of idiots, of maniacs, of subjects attacked with every kind of mental disease, researches which led me to make invaluable discoveries in diseases of this kind. It is thus that my collection of crania, which is a bugbear in the eyes of the vulgar, becomes the source of the most useful and important discoveries.

It is probable that, for a long time, no naturalist will be able to form a collection as rich as mine; for there is little hope, that men will ever be able to overcome the difficulties with which a similar undertaking is attended. But this ought not to discourage any one; a collection of casts, made with discrimination and judgment, will be sufficient. Let the head of the dead body be shaved, and plaster be applied over the whole head, so as to form a hollow mould in two or three pieces, and a most exact cast can be obtained from this mould. Many families submit willingly to this operation, and the more readily, as it is the most infallible method of transmitting to posterity a bust of the deceased person, having a perfect likeness. If our ancestors had thus moulded the heads of great men, what a treasure for the observing philosopher would

they have transmitted! Unfortunately, we possess but very few correct busts. When the artist composes, he is allowed to obey exclusively the rules of art; but when he is engaged to trasmit to posterity the portraits of men who have lived, he is obliged servilely to copy nature: in such cases, to wish to idealize his model, is to disfigure nature. But, unfortunately, artists, instead of rendering homage to truth, allow themselves to be still subjugated by the imaginary rules of art, and the pretended laws of the beautiful. They are too proud to mould heads, and simply execute a mask; and yet it is certain, that so long as they will not resolve on this course, we shall have either imperfect or false imitations; and two busts of the same man, coming from the hands of different artists will always differ. I observe still that the greatest artists, painters, designers, and sculptors, when they meet with uncommon forms, and which appear to them disagreeable, consider them as defects, as errors of nature, and believe that they ought to modify the proportions. And yet usually these uncommon forms, which offend the eye, are precisely the expression of the moral and intellectual character.

Observations on the aforesaid Methods, of discovering the Fundamental Faculties and Qualities, and the Seat of their Organs.

All the methods above indicated suppose, that the favorable development of an organ, always proves the possibility of the favorable manifestation of a quality or faculty. As I have, in a very detailed manner, proved in many places of this work, that this is really the case, I deem it superfluous to advert again to this subject.

Although the means in question have constantly cleared the way for the discovery of the fundamental qualities or faculties, they have not always been

sufficient however to distinguish the radical power from its simple products. To what fundamental power should we refer architecture, sculpture, painting, design, mechanical dexterity? Or are the phenomena, that we regard as simple, different modes of one and the same radical power, effected by as many particular organs? I have been obliged, as already stated, to make my first researches upon men endowed with very eminent qualities or faculties; consequently, on subjects in whom the organs had the maximum of the manifestation of their activity; but this activity is often so far removed from being essentially the fundamental power, that it requires a good deal of sagacity to distinguish the one from the other. And still I found myself obliged to give to this kind of manifestation, which usually accompanies the uncommon development of an organ, a name which should designate it with precision. Thus, for example, it is unquestionable, that the excessive activity of a certain organ manifests a propensity to rob, and that of another organ, a propensity to kill. I was then obliged to name these organs after this kind of activity. In the main, I was right, since these propensities result from this given degree of development of these organs; but, at this period, I had not extended my observations sufficiently far, to be able to assume such a point of view, as to regard this excessive action of the organs as a gradation of the manifestation of a fundamental quality. It was not until long after this, that I was enabled to resolve these difficulties; and if I have succeeded in it, it is as much by reasoning, as by observation. Thus, in certain cases, opinions will always remain divided, on the question of knowing what ought to be the denomination of the fundamental quality or faculty, which we only perceive, in a very energetic mode of its action, as being the consequence of an extraordinary development or activity of its organ.

Means of discovering the Fundamental Qualities and Faculties, or the Fundamental Powers of the Mind, as well as their Seat. Continuation.

The following methods have assisted me less in discovering the fundamental qualities and faculties, than, in proving their discovery.

Sixth Method.

I had made it a practice, for a long time, to mark on crania the form and situation of the organs, as fast as I discovered them, when I began to examine how far these places on the cranium, corresponded with the subjacent cerebral parts. Let any one imagine my joy and astonishment, when I observed, that the form of each of these external marks that I had discovered, must necessarily be such as it is, on account of the cerebral parts underneath; the last being first formed. When the protuberance is a segment of a sphere, it covers convolutions that are spirally rolled upon each other, as in the organ of construction; when the external sign is conical or pyramidal, there are conical or pyramidal convolutions underneath, which give rise to it, as the organ of the relations of sounds. Sometimes the external mark is simple, and sometimes it is double; in each case, according as the congenerous organs of the two hemispheres are near or distant from each other, of which the organ of the love of offspring is an instance. The same thing takes place relative to the direction of the organs, whether they are perpendicular, horizontal, oblique, from before backwards, or from above downwards.

We always attentively examined if the elevated, prominent, and broad places of the cranium, corresponded to cerebral parts that were ample, wide, and developed. We have never found exceptions in sound brains, and in those of subjects of middle age. When the forehead is low, and contracted, the

convolutions which it covers are always small, indicating moderate intellectual faculties. The contrary takes place when the forehead is high, wide, and projecting. In all cases where the sentiments, propensities, and instincts predominate over the superior intellectual faculties, the posterior part of the head is largest, as in animals and in persons, that are very sensual but of limited intellect, and the convolutions that are placed there, have acquired the greatest development of convolutions in the brain. (Pl. VIII. and IX.)

In cases where any faculty or quality was manifested with much energy, we found the cerebral parts, situated under the mark, much more developed and prominent, than in the neighbouring parts.

My readers will recollect the changes that the brain undergoes in the different ages. I have proved that the cranium changes form gradually, as the cerebral parts successively develope themselves or decay. The two sexes, sometimes having the frontal parts, sometimes the superior occipital parts of the cranium more prominent, evidently manifest in the same regions cerebral parts more developed, or more elongated; but I shall go more into detail on this subject, in the treatise on the particular fundamental powers. It remains constantly certain, that the largest, the most prominent parts of the cranium indicate in the individual convolutions the most developed, and cerebral parts the most active.

Seventh Method; comparative Anatomy and Physiology; natural Mutilations of the Brains of Animals.

I have demonstrated above, that the comparative anatomy of the brain of man, and the different species of animals, could not be attended with any happy result in the discovery of the fundamental powers of the mind and the seat of their organs, so long as anatomists were not directed in their researches by

the previous determination of the instincts, propensities, sentiments, and talents of man. But this knowledge, once acquired and applied to animals, becomes an inexhaustible source of instruction, and the most irresistible proof, if the fundamental qualities and faculties, and the external marks of their organs have been determined in harmony with the laws of the whole animal kingdom.

The origin of the mechanical aptitudes, instincts, the inclinations, and the faculties of animals, and the essential difference of these powers, are by no means subject to so many doubts, as the origin and the essential difference of the moral qualities and the faculties of man. It is almost generally admitted, that in animals every thing is innate. To know then their different instincts, their different propensities and faculties, would be to know their fundamental powers; and the same analagous powers in man would be considered equally as his fundamental powers.

However, except two organs, I have not made any discovery of this kind in animals, although from my earliest youth I have had a great number constantly under my eyes. I have seen dogs that were good, bad, affectionate, cross, courageous, and cowardly, some endowed with an astonishing local memory, and others, getting lost every where; I have seen rabbits, sows, cows, cats, both good and bad mothers; birds that were docile and indocile, singing birds, and those that did not sing; sparrow-hawks or little falcons passionately fond of the chase, and others of the same species that could not be taught, &c.; but all this has such a natural appearance, that we hardly reflect on it. It was only the different qualities and faculties of man, especially their extreme feebleness or their extraordinary energy, which impressed me so strongly as to arrest my attention. To have one's attention fixed on these differences, and to be convinced, is almost simultaneous. Hardly had I advanced a few steps in my method of discerning and rectifying the

qualities and faculties of man, before the qualities and faculties of animals opened my eyes at once, and the notions of their habits and manners, that I had collected, became to me a source of the most extensive and frequent use.

Nothing then was more natural than to compare the instincts, the propensities, and the acts of intelligence of animals, with the propensities and the intellectual faculties of man. Every thing which is common to man and animals, said I to myself, ought to be referred to the same law, with the exception of the modifications which arise, in part, from modified organic apparatus, and, in part, from the influence of other qualities or faculties. The same viscera and destined also to the same organic functions; the same senses and occupying the same places in the head, and destined for the same object; then again, the same propensities and the same faculties in man and in this or that species of animals, being found; it must follow, that the same organs and the same seats of these organs, exist in man and in animals.

Here, then, is the first shoot of a system of comparative anatomy and physiology. Natural approximations opened to me a vast field to rectify and confirm the observations, that I had made on man. The more a quality or faculty is common in animals, the more did I acquire the means of multiplying my proofs; because I was enabled to prove, in a greater number of species, the propensity or the fundamental faculty and the seat of its organ.

Very often the approximation of the brain, and especially the propensities and the faculties of animals, towards the brain and the qualities and faculties of man, contributed much to dissipate my doubts and decide my hesitation. The brains of animals are less complicated, their instincts, their propensities, and their faculties are very strongly marked, open, and distinct; their crania, consequently, are more distinct in the species, and even in the individuals, compared with

each other; the external marks of their organs are more isolated, and easier to ascertain. Any one, then, can easily conceive how much the study of comparative anatomy and physiology may afford assistance and assurance to the physiology of the brain.

I never shall forget that I have to combat both the prejudices of philosophers, and the greatest authorities among the naturalists; and this will be an additional inducement in the exposition of organology, to accumulate proofs upon proofs, that the qualities and the faculties of animals have very visible and palpable marks in the conformation of their heads. Neither prejudices nor authorities will succeed for a much longer time in subjecting the instincts, and propensities, and the varied and different intelligences of animals to a single occult imaginary power, nor in withdrawing them from the universal laws of organization.

As those animals which differ much from man, have the organs of vegetable or organic life entirely different from the viscera of men, we may, with probability, presume, that they have also the organs of animal life different from those of man. This explains to us why we observe in animals, phenomena which surpass our understanding, without speaking of what takes place within them, and which our imagination can never reach. In these cases, comparative anatomy and physiology admit of no application to man. Still these same animals may have some points of contact with animals more analogous to the human species, and with man himself, as far as regards the most essential and the most indispensable qualities, such as the instinct of propagation, the love of offspring, the carnivorous instinct, the instinct of construction, of sociability, of self-defence, &c. Insects, fishes, amphibious animals, afford us examples of this. The same qualities are found in birds, many species of which furnish the best proofs of the organ of singing, the carnivorous instinct, the organ of the sense of the re-

lations of space, the organ for the instinct of love of offspring, &c.

Let us now see, if comparative anatomy and physiology do not afford an infinitely more fruitful and more conclusive method of discovering the functions of the cerebral parts, than those violent mutilations so much boasted of and yet so sterile in results. The animals the nearest allied to man are, as it respects animal life, as it respects the moral qualities and the intellectual faculties, but fragments of man. Their brains are deprived of many parts with which the brain of man is endowed. All these brains are, then, natural mutilations in comparison with the human brain. They are farther natural mutilations, in comparing those of one species with those of another. Thus, if we wish to ascertain the seat of the intellectual faculties of man, we may compare the brains of the dog, the horse, the ox, the ape, &c., with that of man; if we have not the brains, we may compare the conformation of their heads, and we shall see that the heads of animals are very slightly elevated: that, for the most part, they recede immediately above the orbits, and that they are flattened; that they never form a vault extending beyond the eyes. On the contrary, observe man, with his forehead elevated three inches above the orbits, and often, arched in front. We shall observe farther, that the more the forehead of the dog, the monkey, the horse, is elevated above the eyes, the more these individuals will partake of some resemblance to human intelligence. Is there now any necessity of extirpating from a man the cerebral parts placed opposite the forehead, or of waiting until an unfortunate accident shall destroy them, in order to learn that these parts of the brain must be considered as the organs of the most elevated of the intellectual qualities of man?

Do you wish to distinguish the organ, which in man inspires the taste and the talent for music? Compare

the head, or rather the external inferior angles of the forehead of a great musician, with the heads of the dog, the ape, the ox, and you will perceive that in these last, the parts of the cranium, and, consequently, the cerebral parts placed underneath it, do not exist. Compare; further, a singing bird, the black bird, the thrush, the nightingale, &c., with the gross-beak or haw-finch, the sparrow, the owl, &c. Compare the male nightingale, the male mocking-bird with their females, and you will soon be convinced, that the heads of the males are more square, more angular, more prominent above the eyes, and that those of the female are constructed conically. Observe the narrow forehead of the dog, the ape, the badger, the horse, in comparison with the square forehead of man, and you will have the solution of the problem, why these animals are neither musicians, nor painters, nor mathematicians, &c. Compare the carnivorous birds and mammalia, with the frugivorous birds and mammalia, and if, in a dozen cases, you are not struck with the constant difference of their heads and their brains; if you do not ascertain which is the cerebral part that causes this difference in the instincts of animals, you are not destined to penetrate the enigmas of nature.

In order advantageously to compare the brains and the crania of animals, with those of man, it is necessary to be familiar with the nervous systems of many species of animals in comparison with that of man. Although all the cerebral organs in man and animals are found precisely in the same place, this rule appears in different species of animals to undergo great exceptions, as I have before remarked. These exceptions are caused by two circumstances. The first is the direction, either horizontal or perpendicular. In animals where the position is entirely horizontal, as the ox, the cerebellum is very superficially situated behind the posterior lobes of the hemispheres. Not attending to this circumstance, naturalists have pretended that the posterior lobes were wanting in these animals, and

comparative anatomy, so far as the organ of the love of offspring was concerned, was thought to be in fault. In many species of birds, as in hens, turkeys, &c., the cerebellum is entirely isolated behind the brain. The lateral parts of the head contain the organ of hearing, &c.

The second circumstance that might induce us to believe, that the cerebral organs have not the same situation in man as in animals, is, that the brains of animals are deficient in many of the organs peculiar to man. The entire series of human organs is often interrupted. There results from this, as I have also above indicated, entire forms of brains and crania extremely varied.

This circumstance causes, even in some species of animals, an apparent difference in the situation of the nerves of the senses. In man the numerous small inferior convolutions of the brain extend beyond the bulb of the olfactory nerve. (Pl. IX.) In many animals, on the contrary, such as fishes, the amphibia, birds, the ox, (Pl. III.) the sheep, (Pl. IV.) the mole, &c., the bulb of the olfactory nerve is found in front of the anterior inferior convolutions; either because these animals do not have these convolutions at all, or they are very short in them.

But since, on account of the organs that are wanting in these animals, sometimes in one region, sometimes in another, the place of the organs varies in a particular point, how can the naturalist be assured that, for instance, the protuberance at the external border of the forehead is, in such an animal, the organ of the sense of localities, in another that of the sense of sounds, and, finally, in man, that of the sense of numbers? How is it possible, in these cases, to establish the analogy which exists between man and animals, and to find in these last a confirmation of the organs discovered in man.

This is, certainly, a great difficulty for a beginner, but nothing for a practised observer; for, first there

is an opportunity of making a number of comparisons between different species of animals, and between different individuals of the same specise. In the second place, the forms of the organs already ascertained afford us great resources. These forms always remain the same as far as the essential part is concerned, and the expert observer will hardly ever be liable to confound them. If we compare a man, in whom the organ of the sense of localities is strongly developed, with a dog who has also this organ strongly marked, and with a lemming, we shall find in each the same form of organ. If we are still in doubt, we have only to make the comparison with other species of mice, and with dogs, that have the organ of localities feebly developed. This method is applicable to all the organs, so far as it is required to find in animals, confirmations of the organs discovered in man.

Finally: the comparison of the human brain with that of animals, enables us to know, of what integral parts or of what individual organs, the brain of man is composed; where the animal ceases in man; where the noble character commences, which distinguishes him from the brute, and how much he is elevated above brutality; a study much more useful and more positive than the vain reveries of the metaphysicians.

Eighth Method; Accidental Mutilations.

It is true, that I have rejected violent mutilations, as a means of discovering the functions of a cerebral part, or of any organ whatever. The reasons that I have alleged still exist in those cases where an accidental mutilation has disturbed the functions of any faculty or quality whatever. Still, when, after the seat of an organ has been discovered by other means, and this discovery has been sufficiently proved, and this organ having been injured, there ensues any lesion of the faculty that is attributed to it, we may with the fullest assurance, regard this phenomenon as

a new proof. When, for example, the organ, by means of which we possess the faculty of retaining names, has been injured by a bullet, and there follows from this an inability to recollect names; or when the region, where the organ of numbers is situated, becomes painful every time that one makes difficult calculations; when, after a lesion of the organ, already well proved, of the instinct of propagation, there ensues impotence and a disgust for cohabitation, no one will suppose, that it is bad reasoning, to regard these facts as so many new confirmations.

Ninth Method, taken from the Succession and the Arrangement of the Organs.

The physiology of the brain, advanced as it is at present, is an undeniable proof, that the employment of the means above indicated, has been infinitely more useful to science, than all the efforts of the metaphysicians and anatomists, who have not been governed by the spirit of sound philosophy. Now that we know a sufficiently large number of the primitive radical powers and organs, it becomes more and more possible to ascertain the laws according to which nature has disposed them in the brain. These laws have afforded me a new and extremely philosophical means of assuming, in the first place, and then of discovering the seat of the fundamental powers.

Let me explain.

Up to the present time, I have never permitted myself to be influenced by reasoning *a priori*, having early learned how perfidious it is, and of how many plausible errors it is the source. I preferred to abandon myself entirely to observations. The consequence was, that I sometimes discovered one fundamental quality or faculty, sometimes another, sometimes one organ, sometimes another. Whenever I believed that I had determined a primitive or fundamental power,

in whatever degree of activity, and I thought that I had found the seat of its organ, I marked the place of this organ, and designated its form on the cranium. In this way of proceeding, I could follow no other order than that in which I made my observations. I defined, sometimes in one region, sometimes in another, the form of the organ that I had just discovered. Occasionally I had the good fortune to seize at once, both the place and the form of an organ precisely. But sometimes, too, there has been so much vagueness in my first outlines, that I have been obliged to make a greater number of observations, better compared, in order to determine the seat or the form of an organ with more precision. From this has arisen the craniological chart, seized by the public with so much avidity; and since it was the only thing to the purpose which has appeared, it was thought that the whole tendency, and all the merit of the physiology of the brain, were contained in this chart. Artists soon took possession of it, have executed it either well or ill, without ever consulting me, and have published a great number in all sorts of forms. This has determined us to make them more exact either on crania, or on plaster casts.

After I had a thousand times considered this arrangement of organs, I was struck with the following great truths. If the reader has in his hands a head similarly marked, I entreat him to place it before his eyes, and to follow me in my reflections.

1. The qualities and the faculties, which are common to man, and the other animals, have their seat in those cerebral parts, which are equally common to man and brutes. Whenever, then, we are speaking of a quality or faculty common to beasts and man, we should seek its organ in the inferior posterior, the posterior inferior, or the anterior inferior parts of the brain. Of this number for example, are, the instinct of propagation, the love of offspring, the instinct of self-defence, that of providing food, the instinct of cunning, &c.

2. The qualities or faculties which man exclusively enjoys, and which form the barrier by which he is separated from the brute, have their seat in those cerebral parts which are wanting in animals, and we must consequently seek them in the anterior superior, and the superior anterior parts of the forehead. Of this number for example, are comparative sagacity, the metaphysical disposition or causality, wit, the talent for poetry, the disposition to religious sentiments and ideas.

3. The more indispensable the qualities and faculties may be, the more do we find their organs placed near the base of the brain, or towards the median line. The first and the most indispensable of all the organs, that of the instinct of propagation, is placed nearest the base; then comes that of the love of offspring, &c. The organ of the sense of localities is more indispensable than that of the sense of tones, or that of numbers; and hence the two last are placed farther from the median line than the first. Then, the more a quality or a faculty is essential, the more it is necessary to seek its organ near the base of the brain, or the median line. The organs, that are less indispensable, are placed towards the top and sides of the head. If I wished to discover the organ of the talent for poetry, I should not, according to this principle, look for it either at the base, or near the median line of the brain.

4. That the organs of the fundamental qualities and faculties, which mutually aid each other, are also placed near each other; for instance, the organ of propagation and that of the love of offspring, that of self-defence and the carnivorous instinct, that of tones and of numbers. If there exist organs for the senses of order and of the measure of time, it is very probable that they will be found in the neighbourhood of that of the sense of locality, of tones, and of that of the sense of numbers.

5. The organs of the fundamental analogous qualities and faculties are also placed near each other.

For example, the organs of the relations of places, colors, tones, and numbers are placed in the same line, the same as the organs of the superior faculties, and those of the propensities of the inferior animals.

Every one must be struck with the profound wisdom, which is manifested in the arrangement and successive order of the organs. This connexion has appeared to me to be one of the most important proofs of the truth of my discoveries. I challenge all those, who would wish to attribute my determination of the radical powers and the seat of their organs, to caprice, to a destination arbitrarily conceived, to be endowed with the tenth part of the perspicacity necessary to have only the most obscure presentiment of this order which is so admirably combined! But once found, we discover there the hand of God, which we cannot cease to adore with the more astonishment, in proportion as his works are more displayed before our eyes. We easily conceive how these laws, which preside over the arrangement of organs, ought to facilitate new discoveries in the organical part of the physiology of the brain.

After the exposition of the fundamental powers and their organs, I shall treat of gestures, mimicry, and the forms of heads peculiar to different nations. We shall see that the language of gestures, and the form of the head in different nations, compared with the national character, are equally a means not only of confirming the discoveries already made, but also of making new ones.

Before treating of the fundamental qualities and faculties in particular, and of indicating the seat of their organs, it will be useful to tell the reader what I understand by the expressions, *qualities and faculties*, *fundamental*, *primitive*, *radical*; and to give some general notions of the brain and cranium, and on the manner in which we should undertake the investigation of the seat and the form of the organs.

Definition of the idea, Fundamental, Primitive, Radical Qualities, Faculties.

Although I cannot present in all its development my philosophy of the moral and intellectual qualities, instincts, propensities, and sentiments, until after the exposition of all the radical powers at present known, I believe that I have said enough, to enable the reader to recollect the difference, which exists between the general attributes of philosophers, between perception, attention, memory, comparison, judgment, imagination, &c., and the instincts, propensities, sentiments, and the determinate talents. Each of these last belongs to a particular organ, whilst the others are only attributes, modes of activity of the true fundamental powers. The attributes are inseparable from all radical faculties or qualities, whilst these exist by themselves, and constitute a proper, specific function.

It would be well, if we could determine all the fundamental powers, as, for example, the propensity to propagation, the love of offspring. But the ordinary action of the qualities and faculties hardly excites attention; it escapes from us in its primitive destination; we see the different ramifications of the tree, but its root is concealed. So also we are often struck by the modifications, by the different degrees of manifestation of the radical powers; but we have not penetrated to their source, their root. We see the poet, and the external mark of his talent; but this degree of activity is evidently the result of an extraordinary development of one cerebral part. What is the function of this part in its primitive destination? What is its radical fundamental function? The propensity to robbery, to murder, to benevolence, to devotion, are each equally the result of the development and extraordinary action of an organ. But to what radical, primitive, fundamental function should we refer them? Here are great difficulties to overcome. For many

organs we have already succeeded in determining a primitive, radical action; with regard to others, I shall enter upon the discussion of them with my readers, as often as an opportunity offers.

In the mean time, we believe that we can indicate, in the following manner, the characteristic conditions which entitle an instinct, a propensity, a sentiment, a talent, to the appellation of fundamental, primitive, radical.

1. When a quality or faculty, or rather its organ, neither manifests itself, nor is developed, nor decreases, at the same period as others. It is thus that the organ of the propensity for propagation, and the propensity itself, are developed, and usually manifested later than the other propensities. It is thus that the memory of names, is generally impaired sooner than the other faculties.

2. When, in the same individual, a single quality or faculty is more or less active, and its corresponding cerebral part is more or less developed than the other parts. It is thus that the great sculptors, painters, designers, sometimes have not the least disposition for music; and the greatest poets, little talent for mathematics.

3. When a single quality or a single faculty is active, whilst the others are paralyzed, and only the single organ developed, which corresponds to it. It is thus that those who are idiots, in all other respects, are sometimes imperiously affected by physical love, or have a great talent for imitation, &c.

4. When all the other qualities and faculties exist in full force, and all the other organs being sufficiently developed, one single faculty or single quality remains inactive, and one single organ undeveloped. It is thus that certain individuals cannot comprehend that twice two makes four; that others hold music and women in abhorrence.

5. When in mental diseases there is only a single quality or a single faculty that suffers, or there is only

one which remains in its perfect integrity. It is thus that one person is insane in relation to religious ideas, to his pride only, &c.; that another, although mad in all respects, yet gives lessons in music with great correctness.

6. When the same quality or faculty is manifested in a manner totally different in the two sexes of the same species of animals, and the organ in the different sexes is differently developed. It is thus that the love of offspring and its organ are more strongly marked in the females of most animals; it is thus also with singing birds, that the male alone sings, and has this organ well developed.

7. When, finally, the same quality or faculty and the same organ are always found in a particular species, and always are wanting in another species. It is thus that many species of birds, that the dog, the horse, &c., have neither the propensity nor the organ of construction, which are so wonderfully manifested in other species of birds, in the squirrel, in the beaver. It is thus that certain species of animals are carnivorous, emigrate, sing, take care of their young, &c., whilst other species are herbivorous, pass a sedentary life, do not sing, and abandon their offspring.

In all these instances we may admit the quality or the faculty in question to be a fundamental quality or faculty, a primitive, radical power. It is by no means necessary that all these conditions should be united; but the more there are of them, the better the independence, the speciality of the quality, or of the faculty, and the existence of the organ will be proved.

Description of the Brain, of the Head, and the Cranium, so far as the Knowledge of it is necessary for the perfect Understanding of the Seat of the Organs.

Those who possess my large work, with the atlas, will have a much greater facility in understanding the

following descriptions and the indications of the seat of the organs, than those who are deprived of these means. But even those who consult the plates, must not flatter themselves with having an exact idea of the brain and the cranium, without having seen them. Whatever degree of exactness I place in the determination of the seat of the organs, I know by experience, that no one can well instruct himself in this part, without having a cranium, or, what is much better, a marked or purposely designed head, before him.

PLATE IV. represents the inferior surface of the brain, such as it is applied to the base of the cranium. PLATE IX. represents the superior surface of the brain placed in the cranium in its natural situation. PLATE VIII. shows the brain seen in profile, also in its natural situation in the cranium. PLATE XI. represents a vertical section made between the two hemispheres, so that we see the internal surface of the left hemisphere where it touches the right. We make a perpendicular section in commencing with PLATE IV. from 28, 91, *c*, *a*, 22, 25, to PLATE IX. 69, 48.

In all the brains, the organs (or rather the expansion of the organs after they have arrived at the surface of the brain) are marked with Roman figures.

PLATES X. and XII. 38, 38, 38, is the radiated appearance of the medullary fibres, S. S. S., which depart from the commissures (*renfort*) f. p. p. p., to go towards the formation of the nervous membrane of the brain, which forms the folds which we call convolutions.

Now the reader can form to himself a correct idea of the position of the brain in the cranium, of the cranium itself, and of the manner in which the organs appear on its surface. We see distinctly, (Pl. VIII.) that the whole cranium is filled by the cerebral mass; that between the internal surface of the cranium and the brain there are only some membranes to be found, that is to say, the vascular membrane, (*pia-mater*,) the arachnoid membrane, very thin, and a membrane of more consistence, called the *dura-mater*.

The Bones which form the Osseous Box of the Brain.

Sphenoid Bone.

The inferior part of this bone is not a subject of consideration here. It is true, that it is in contact with a small portion of the middle lobes, but we can only discover its form after death. A small portion of this bone is placed against the posterior external part of the orbits, and contributes a little to determine their form. A portion of its alæ touches the posterior border of the frontal bone, as well as the anterior border of the temporal, and the anterior inferior angle of the parietal.

Temporal Bones.

The temporal bones (Pl. XXVIII. VI.) extend from the posterior border of the alæ of the sphenoid bones, to the inferior border of the parietal bones, and even as far as a portion of the anterior and lateral border of the occipital bone. The temporal bones contain the auditory apparatus. Behind the auditory opening is found the mastoid process; which is filled with cells.

Occipital Bone.

The occiptal commences behind the sphenoid at the base of the brain; it forms the occipital hole, which gives passage to the spinal marrow, and extends downwards and backwards, then ascending, where it joins the posterior edges of the parietal bones. (Pl. XXVIII. I. II.)

Parietal Bones.

These bones (Pl. XXVIII. IX. XIII.) unite in the superior part of the median line; in descending they

extend laterally to the temporal bones, backwards to the occiptal, and forwards to the frontal.

Frontal Bone.

The frontal bone, in ascending, extends from the root of the nose and the superior part of the orbits, to the superior anterior border of the parietal bones, (Pl. XXVIII. *a*, 56, 55, 54, 53, XXVII.) and laterally to the sphenoid bone.*

In books of anatomy, it is true, they describe these bones as having always the same form; but the fact is, that their form differs in different individuals, according as the cerebral parts situated against them have different proportions among themselves. It is precisely this which causes the various forms of heads; varieties of forms, which indicate the different modifications of the moral and intellectual character of individuals.

The crania of animals, as I have before said, require a particular study, not only as it respects the diversity of the species, but also according to the age of the individuals. In some species, we can determine the form of the brain, from an examination of the external surface of the cranium, very nearly in the same manner as in man; in others, on the contrary, the external table of the cranium, either in its whole contour, or in some regions, is so far from being parallel with the internal table, that the external form of the head and cranium, in no way resembles the form of the brain. Hence in these animals, the organologist can arrive at no conclusions, but from the internal surface of the cranium, or the external form of the brain.

* I make no mention of the ethmoid bone, because, being covered entirely by the bulb of the olfactory nerve, it is not in contact with the brain.

Method of examining the Organs.

It is first necessary to be familiar with the middle, ordinary, or moderate degree of development of the organs. The attentive inspection of a great number of heads, and the study of their ordinary forms, for a long time continued, will gradually procure this knowledge. We can then profit by all occasions for acquiring an exact idea of the extraordinary development of the different cerebral parts, and their prominences on the external surface of the head. We should examine the heads of great poets, mathematicians, mechanics, musicians, travellers, &c. In adhering to these two indispensable precautions, we shall soon remark that the most characteristic organs form neither the bumps of the buffoon anti-organologists, nor salient prominences like an egg or the fist.

The anterior parts of the forehead, bald heads, and crania do not require to be felt; an experienced eye is sufficient to judge of the degree of development of the brain in general, and of certain regions and certain parts in particular. We shall do well by studying, first, the different sizes of heads in general; then, we should endeavour to ascertain the different developments of the frontal region, the occiptal, the lateral, the top of the head, and we should end by studying the subdivisions of all these regions.

When it is required to touch or feel, it is necessary to resort to an expedient, which I have always experienced a difficulty in making my auditors comprehend.

Supposing that the examination of organs requires a very nice touch, they seek them with the ends of the fingers, the fingers being at the same time separated. In this manner we may perceive certain asperities, fissures, little grooves, exostoses, tumors, &c., upon the head; but, in this way, we shall never discover prominences that are slight, large, round, oval, &c., that the

different developments of the cerebral parts produce on the surface of the heads or crania. It is, on the contrary, necessary to join the fingers, and pass and repass their inner surface over the spot or place where we seek the external sign of an organ. We thus augment the points of contact, and in thus gently passing the hand over the head, we easily discover prominences, that even escape the eye.

Most of my auditors, being instructed in this method, detect the organs at the first touch, or the first *coup-d'œil.* But there are some eyes and some hands, so unfortunately served by the brain, that it is impossible for them to be convinced of the reality of the most distinct forms. *Non omnia possumus omnes.*

SECTION III.

EXPOSITION OF THE FUNDAMENTAL POWERS, OR THE PRIMITIVE, RADICAL MORAL QUALITIES AND INTELLECTUAL FACULTIES; THE INSTINCTS, PROPENSITIES, SENTIMENTS, TALENTS, AND OF THE PARTICULAR SEAT OF THEIR ORGANS.

Those who call to mind the historical account of my discoveries, will not expect that I should treat of instincts, propensities, sentiments, and faculties in the same order in which I discovered them.

I will try to conform, as much as possible, to the order, that exists in the organization of the human brain. I shall commence with the inferior propensities or faculties; then I shall pass to the qualities and faculties which gradually assume a superior order, and I shall conclude by the most elevated sentiment, — that of rendering homage to the Divinity. This course will conduct us to the only true philosophy, to the detailed knowledge of man, and it will furnish us with luminous solutions of questions of the highest interest.

Instinct of Generation, of Reproduction; Instinct of Propagation, &c.

I commence with that function of the living organization, on which depends the existence and the continuance of the different species of animals. The first and the most universal of all the commands was — *Increase and multiply!* Why then should we use evasions when the most indispensable of all the instincts is concerned, the instinct which governs all the rest, and by the aid of which *l'une des moitiés du règne animal se*

*confond avec l'autre dans les délices d'une inexprimable jouissance.**

Considérons ce penchant avec toute l'attention que mérite sa haute destination; suivons-le, tant dans ses actes réguliers, que dans ses égaremens. Quoique ce sujet, objet des méditations de tant de naturalistes, ait été traité mille fois, il fournit encore des résultats aussi neufs qu'importans pour le physiologiste, pour le médecin, pour l'instituteur et pour le moraliste.

En traitant l'histoire naturelle du penchant à la propagation, ou de l'instinct de la reproduction, je prouverai qu'il n'a ni son origine, ni son siége dans les parties sexuelles. Je démontrerai que ces parties sont subordonnées à une puissance supérieure, au cerveau, et que par conséquent, c'est dans le cerveau qu'il faut chercher tout ce qui a rapport à cet instinct, tant dans l'état de santé que dans l'état de maladie; que c'est le cerveau qui explique tous les phénomènes qui la concernent; que c'est le cerveau qui règle tout ce qui y a rapport; que c'est en agissant sur le cerveau qu'il faut modifier les diverses manifestations de cet instinct.

L'instinct de la Reproduction est une Fonction du Cerveau, et n'appartient nullement aux Parties Sexuelles.

Souvent déjà nous avons vu que les naturalistes attribuaient aux instrumens exécuteurs ce qui est dû aux organes législateurs. On attribuait la cabane du castor à sa queue, l'intelligence de l'éléphant à sa trompe, la peinture, la sculpture, et toutes les facultés intellectuelles de l'homme à ses cinq sens, particulièrement à ses mains.

* For various reasons the remainder of this Section is retained in the original. For the application of the principles of Dr. Gall, contained in this Section, the reader is referred to the "*Edinburgh Phrenological Journal*," and to Spurzheim's first volume, on the organ of Amativeness.

Par une raison plus forte, l'on imputait à l'influence des parties de la génération sur le cerveau, ou même à ces parties seules, ce qu'on aurait dû imputer au cerveau et à son influence sur les parties sexuelles. Puisque l'on cherchait le siége des instincts et des penchans dans les ganglions et dans les plexus du bas-ventre et de la poitrine, qui n'aurait pas placé l'instinct de la génération dans les instrumens que l'on voyait seuls jouer un rôle dans cette fonction ?

Il y avait cependant un moyen d'être averti de son erreur. L'on voyait de temps en temps des enfans de deux, trois, quatre, cinq ans, où les parties sexuelles n'étaient encore nullement développées, où il n'y avait encore aucune sécrétion d'une liqueur irritante, être portés impérieusement vers l'autre sexe et s'adonner aveuglement à l' exercise de la volupté. L'on voyait des vieillards des deux sexes, chez qui la source du prétendu excitant était tarie, être tourmentés par des désirs que le flasque rétrécissement de leurs parties sexuelles ne permettait plus de satisfaire. L'on avait vu des castrats et des eunuques rechercher encore avec ardeur les jouissances vénériennes. Les physiologistes avaient même consigné des faits qui démontraient que des femmes privées de la matrice par vice de conformation primitive, n'avaient pas moins ressenti l'aiguillon de la chair.

L'on s'est, de tout temps, beaucoup occupé des changemens que l'époque de la puberté opère dans l'existence totale du jeune homme et de la jeune fille. Voyant le développement et l'activité naissante des parties sexuelles, l'on se faisait illusion, et l'on croyait que les facultés morales et intellectuelles qui commencent à se manifester avec plus d'énergie dans ce même moment, etaient subordonnées aux organes de la génération. Mais on avait tout-a-fait perdu de vue le cerveau, dont diverses parties acquièrent à la même époque un surcroit de développement et d'énergie. C'est la seule raison pourquoi le garçon et la fille cessent d'être enfans ; pourquoi les forces morales et intellectuelles se manifestent avec plus de vigueur ;

pourquoi cette activité se peint dans l'éclat de leurs yeux et dans l'expression de tous leurs traits, etc. etc.

C'est encore la raison pourquoi l'adolescent et la fille nubile conservent chacun leur caractère propre d'homme ou de femme, nonobstant le même changement opéré dans les parties sexuelles à l'époque de la puberté.

C'est encore la raison pourquoi certains cretins et certains idiots ne sont pas moins imbécilles, quoique leurs parties sexuelles soient parfaitement développées et que l'exercise de leurs fonctions soit très énergique.

C'est encore la raison pourquoi quelquefois des enfans, à l'âge de trois, cinque ans, ayant les parties sexuelles parfaitement développées et etant impérieusement portés à l'acte vénérien, restent pourtant enfans sous tous les autres rapports.

Tous ces phénomènes haurcient-ils pas dû désabuser les physiologistes, et leur faire chercher les changemens moraux et intellectuels observés à cette époque, ailleurs que dans l'action des parties sexuelles ?

Je vais rapporter quelques passages de l'ouvrage de M. Georget, où il parle des sympathies des organes cérébraux, T. II., p. 159 et suiv. On jugera facilement qui a le premier fait naître ces idées.

"Avant d'entrer dans le détail des faits, dit-il, remarquons que s'il s'agit d'un penchant, d' un désir, d'une passion, c'est dans le cerveau que nous aurons à en chercher le siége immédiat ; car cet organe seul est l'instrument des facultés intellectuelles et affectives, du moins chez l'homme et les grands animaux ; l'amour, le désir de l'union des sexes est donc dans le cerveau. Seulement il peut exister ailleurs un excitant, un besoin qui éveille, par influence sympathique, ce désir, ce penchant. Et tantôt alors le désir naîtra le premier, uniqu ement par la force cérébrale, et provoquera le besoin ; tantôt, au contraire, celui-ci sera le moteur de celui-là. Ce sont précisément là les rapports des organes génitaux et du cerveau.

"I. *Action du cerveau sur les organes génitaux ; désirs vénériens naissant directement de l'action cérébrale.*

"Je ne crains pas d'avancer un paradoxe en soutenant que les causes les plus nombreuses et les plus puissantes des désirs vénériens ont leur source dans l'action même du cerveau. Les propositions suivantes en sont des preuves incontestables.

"1. Le désir vénérien est un phénomène cérébral.

"2. Les fonctions génitales sont en très grande partie sous l'empire de la volonté ; je ne crois pas que le penchant à l'union des sexes soit jamais tellement irrésistible, que l'individu ne puisse y résister, du moins momentanément. D'ailleurs il suit la loi commune aux autres penchans, qui acquièrent d'autant plus de pouvoir et d'influence sur la raison qu'ils sont plus énergiques.

"3. Les désirs vénériens, et l'action de l'appareil organique destinée à les satisfaire, présentent dans leur développement, leur marche, leur terminaison, des phénomènes analogues à ceux que présentent les autres penchans, les fonctions qui sont sous la direction immédiate du cerveau. Ainsi, ces désirs et cette action tout-à-fait nuls à la naissance et pendant les premiers temps de l'existence, commencent à se manifester plus ou moins vite, plus ou moins fortement dans les années qui précèdent la puberté ; de cette époque, qui arrive en général de douze à seize ans, quelquefois plus tôt, quelquefois plus tard, selon les dispositions particulières, les sexes, les climats, jusqu'à quarante-cinq ou cinquante ans, ils sont dans leur plus grande énergie ; ils vont ensuite en décroissant, et finissent par s'affaiblir et s'éteindre à mesure que le cerveau perd de sa force, et en même temps que les autres passions.

"4. Les causes les plus fréquentes qui éveillent les désirs vénériens, qui excitent les organes génitaux, les situations de la vie plus propres à produire cet

effet, sont les idées, les conversations, les lectures lascives, des affections gaies, les réunions de sexes différens, telles que spectacles, sociétés, bals, etc.; la vue de personnes du sexe opposé; des rapports plus ou moins directs, des attouchemens, etc. Il est bien certain que l'excitation génitale, dans la grande majorité des cas, est précédée de l'idée, de la pensée de la jouissance désirée; c'est alors que l'on sent ce trouble de l'intelligence, ce feu brûlant qui semble couler dans les veines et se porter au lieu du sacrifice, que l'on est pris de ce frissonnement qui annonce une forte détermination partie du centre sensitif. Et, au contraire, les causes qui font oublier, rester dans l'inaction le besoin de la reproduction, sont la solitude, ou plutôt une société peu nombreuse, l'éloignement des sexes, l'absence des circonstances qui retracent des tableaux voluptueux, tels que romans, livres où sont des peintures vives et animées de l'amour, l'occupation continuelle de l'esprit à des travaux qui fixent l'attention, les fatigues musculaires, les affections morales tristes, l'ennui, le dégoût, la possession du même objet, etc.

"5. Pendant le sommeil, le cerveau a un tel empire sur les organes génitaux, qu'il suffit de rêves voluptueux pour exciter l'éjaculation. Et si l'excitation directe des organes génitaux, dit Cabanis, est souvent la véritable source des tableaux voluptueux qui se forment dans le cerveau pendant le sommeil, c'est aussi très souvent de ces tableaux seuls que l'excitation de ces mêmes organs dépend.* Pendant le sommeil l'imagination a une puissance plus étendue sur certains organs; par exemple, sur ceux de la génération, parce que dans cet état le cerveau ne recevant plus d'impressions externes, les impressions internes sont plus vives ou plus dominantes.†

"6. La pensée, l'imagination influent bien manifestement sur la puissance vénérienne, sur la prompti-

* *Rapports* etc., tome I, page 540.
† *Id.* T. II, page 184.

tude et la vivacité des jouissances vénériennes; ces jouissances sont plus ou moins vives, promptes, faciles, possibles même, selon les dispositions d'exaltation ou d'indifférence, de désir ou de dégoût, etc. Les exemples se présenteraient en foule pour appuyer cette proposition.

"7. L'excitation cérébrale légère que produisent les liqueurs alcooliques, le café, réveille le penchant amoureux; l'ivresse l'éteint. Entre ces deux états il en existe souvent un autre fort remarquable, ce sont des désirs violens, mais sans véritable besoin, une excitation purement cérébrale avec le calme, l'inaction la plus absolue des organes génitaux.

"8. On connaît les effets des prétendus charmes, sorts, etc., jettés sur de nouveaux conjoints dans les temps d'ignorance et de superstition; on connaît les succès des noueures et dénoueurs d'aiguillettes, etc.

"9. Les praticiens ont observé des phénomènes génitaux dans des affections cérébrales. Ainsi l'érection chez l'homme a été observée par Bichat, à la suite de commotions cérébrales; elle n'est pas rare dans l'ataxie; M. Serres l'a vue dans deux cas d'*affection du cervelet*, dont l'un était un épanchement de sang, et l'autre une inflammation. On sait que les pendus présentent fréquemment ce phénomène, et que des individus ont été assez dépravés pour chercher à se procurer des jouissances par un moyen aussi odieux.

"10. La saignée, l'affaiblissement des penchans et des passions par les macérations, les jeûnes, le régime végétal, l'usage de l'eau seule pour boisson, diminuent et finissent par faire oublier *les désirs charnels*, surtout chez les personnes qui n'en sont pas naturellement très tourmentées.

"11. M. Gall place le siége de l'amour physique dans le cervelet. C'est peut-être le point de la doctrine sur la pluralité des organes cérébraux et leurs fonctions particulières, en faveur duquel M. Gall a réuni le plus de preuves. L'observation de M. Serres est ici de quelque poids. M. Larrey en cite une d'un

militaire qui, après avoir reçu un coup de sabre sur la nuque, ne ressentit plus jamais aucun désir vénérien. Hippocrate assure que les Scythes se rendaient impuissans en se coupant les veines qui sont derrière les oreilles ; cette tradition, qui n'est sans doute point vraie quant au fait qu'elle nous transmet, indique pourtant qu'on avait saisi quelques rapports entre la nuque et les organes génitaux. Ferrand (de la Maladie d'amour ou Mélancolie érotique) assure que des médecins ont retiré des avantages de l'application de sangsues à la nuque ou derrière les oreilles, chez les malades atteints de cette affection. Enfin j'ai vu à la Salpêtrière une de ces femmes à *tempérament ardent*, dont toute la déraison consistait en des désirs vénériens des plus impérieux ; avant d'entrer dans l'hospice elle avait plusieures fois supporté, provoqué les approches de dix, douze ou quinze hommes dans un jour. Pendant son séjour, elle était très souvent prise d'une forte douleur à la nuque, en même temps qu'elle ressentait ce vif penchant à l'union des sexes, qu'elle satisfaisait par la masturbation, à laquelle elle se livrait jusqu'à dix ou douze fois par jour ; ce qui la soulageait beaucoup, ne lui causait aucun accident, et faisait disparaître immédiatement la douleur de la nuque.

" 12. Un fait très important, et bien propre à éclairer la question qui nous occupe, est celui-ci : il est d'observation que la diminution et l'extinction de la possibilité du coït, chez l'homme (chez la femme on ne peut s'assurer de cette remarque), précède constamment la diminution et l'extinction des désirs vénériens ; c'est ce que l'on voit arriver naturellement chez les vieillards, et accidentellement chez les libertins, dont les organes génitaux ne sont plus excitables à force d'avoir été excités. Les vieillards qui n'ont pas la prétention de donner pour un acte de sagesse ce qui n'est réellement que l'effet de l'impuissance, conviennent sans peine de cette vérité ; et il n'est personne qui n'ait été à même d'observer la situation triste et misérable de ces malheureux dont les organes géni-

taux, flétris et comme inertes, ne peuvent plus répondre en aucune manière à l'action cérébrale manifestant des désirs vénériens d'autant plus pressans, qu'il est moins possible de les satisfaire.

II. *Action des organes génitaux sur le cerveau; désirs vénériens excités par l'action de ces organes.*

"1. L'état d'érection excite ordinairement les désirs vénériens, soit par la sensation agréable ou de gêne qui l'accompagne, soit en rappelant à l'esprit l'image de la jouissance dont cet état est une condition. Tantôt, comme nous venons de le voir, elle naît de l'influence cérébrale, mais d'autres fois ce sont des circonstances purement locales qui la provoquent, telles que des attouchemens, le frottement de la muqueuse du gland ou du vagin. Toutefois il est bien digne de remarque que l'acte vénérien ainsi excité, est beaucoup moins ardemment désiré que lorsque le cerveau en est le premier provocateur, à moins que le besoin n'ait le pouvoir de réveiller le désir dans toute son énergie.

"2. La plupart des maladies génitales n'ont aucune action sur le cerveau, comme excitans vénériens. Lors même qu'elles causent l'erection, comme on le voit dans certains phlegmasies de l'urètre, dans l'irritation du col de la vessie par l'usage de cantharides, cet état est plutôt douloureux, pénible, que propre à porter aux plaisirs de l'amour.

"3. L'action de la chaleur sur les organes génitaux favorise l'érection; le froid produit un effet contraire.

"4. Les physiologistes qui ne veulent tenir aucun compte de l'influence cérébrale sur les organes génitaux, et rapportent tout à ces organes, s'appuient beaucoup des résultats de la castration. Il est en effet certain que les personnes auxquelles on a enlevé les testicules de bonne heure, présentent des phénomènes fort remarquables. Il n'est pourtant pas absolu-

ment vrai que ces personnes soint entièrement sans désirs vénériens: on a de nombreux exemples du contraire. Les eunuques ou castrats ne présentent point les caractères de la virilité; ils conservent la complexion féminine. Comme les femmes, ils ont la voix enfantine, leur système pileux ne se développe point à la figure ni au thorax. Le cerveau reste chez eux sans énergie morale et intellectuelle, et comme les êtres faibles, les eunuques sont faux, dissimulés, trompeurs, vindicatifs. Narsès est peut-être la seule exception qu'ait offerte cette classe malheureuse; par ses exploits et son courage, par son caractère, il se montra l'égal d'un grand capitaine. Les eunuques, ainsi que les animaux châtrés, engraissent promptement. Ces derniers, comme les premiers, n'ont point ou perdent les signes propres à leur sexe. Bien plus, quelques animaux, mais les mâles seulement, éprouvent des changemens très marqués lors de la saison des amours; ainsi le bois du cerf croit d'une branche, certains oiseaux sont parés d'une hupe, et leur voix retrouve la faculté de chanter.

"Un fait ne peut anéantir un autre fait, et, bien que les testicules influent, n'importe comment, sur le cerveau, il n'est pas moins certain que cet organe est le siége du désir vénérien, et devient le plus souvent la cause excitante qui provoque le besoin de l'union des sexes. Tout de même, les muscles et l'intégrité du cordon rachidien sont essentiels à l'exercice des mouvemens voluntaires, quoique le principe de ces mouvemens, leur point de départ réside dans le centre des volitions. Je n'entrerai ici dans aucune explication, parce que j'avoue que mes réflexions sur cet objet ne m'ont conduit à rien de satisfaisant touchant la nature des rapports des testicules et du cerveau.

"L'on a voulu trouver aussi chez la femme une partie de l'appareil génital qui correspondit au testicule, pour le siége du besoin de l'union des sexes, et la plupart des auteurs se sont déclarés en faveur de l'utérus. En sorte qu'ils placent dans cet organe

toutes les maladies érotiques ou prétendues érotiques; de-là les noms de *fureur utérine*, d'*hystérie*, de *suffocation de matrice*, par lesquels ils les désignent. Mais ici, non-seulement aucun fait ne rend la chose probable, il en existe qui prouvent évidemment le contraire: ainsi, l'on a observé des femmes privées d'utérus et extrêmement portées aux plaisirs de l'amour. Le clitoris a été regardé par quelques uns comme étant chargé de cette fonction; Moschio, Albucasis, Ferrand, en conseillent l'excision dans certaines affections libidineuses. M. le professeur Dubois prétend avoir retiré du succès de cette opération chez une jeune nymphomane. Cependant personne ne suit la pratique de ces observateurs, probablement parce qu'on n'en espère rien de bien avantageux.

Il suit de ce qui vient d'être dit, que toute exaltation morbide des désirs vénériens est une véritable monomanie, dont le siége ne peut être que dans le cerveau, et dont la cause, comme celle des désirs vénériens, doit le plus souvent être cérébrale. Je suis bien convaincu que, dans cette circonstance, les organes génitaux ne sont que secondairement excités, qu'ils ne sont que les complices du cerveau. Remarquez en effet, 1. que cette maladie a lieu précisément à l'aide des circonstances que nous avons considérées comme des excitans cérébraux: ainsi c'est dans les grandes villes, dans le grand monde, dans les classes qui fréquentent les spectacles, les bals, les sociétés, qui lisent des romans, qui n'ont aucune occupation qui les distraye ou les fatigue, qu'on rencontre des nymphomanes; on sait à peine ce que c'est dans les campagnes, les petites villes, où, pourtant, le besoin de l'union des sexes est aussi bien senti que dans ces conditions. 2. Que la masturbation qui éteint, satisfait le besoin, n'est ici presque toujours d'aucun secours, parce que ce sont des désirs particuliers, comme de posséder tel ou tel objet. 3. Les hommes dont l'imagination n'est en général que très peu occupée de ces sortes d'idées ne sont point non

plus sujets à cette affection, quoique, selon moi, ils aient des besoins plus pressans, plus forts que les femmes. Nous reviendrons d'ailleurs sur ce sujet dans la partie de cet ouvrage réservée à la pathologie. Les auteurs confondent avec cette maladie une autre affection qu'ils placent également dans les organes génitaux, dans l'utérus, quoiqu'elle n'ait le plus ordinairement aucun rapport avec elle, et que, seulement, elle la reconnaisse quelquefois pour cause, je veux parler de la prétendue hystérie. Un fait bien remarquable aurait pourtant dû frapper les médicins, et les éclairer sur le siége de ces maladies: c'est que les affections des organes génitaux, de l'uterus ou du vagin, du pénis, du testicule ou des ovaires, aiguës ou chroniques, telles que cancers, siphilis, blennorrhagie, hydrocèle, sarcocèle, hydropisie des ovaires, tumeurs utérines de toutes sortes, restent plus locales que toutes autres, ne se manifestent souvent que par des incommodités locales, ou même ne se rencontrent qu'après la mort, ayant été ignorées pendant la vie.

" M. Esquirol a connu une dame âgée de cinquante ans, dont les règles avaient cessé de paraître depuis un an, chez laquelle l'écoulement reparut et dura plusieurs années, par l'effet d'une passion amoureuse vive qui vint troubler son repos."

Déjà dans le premier volume, p. 387, M. Georget avait démontré que la volupté vénérienne est une sensation, une perception cérébrale; que tous les phénomènes qui y ont trait, sont également cérébraux, et que le sperme paraît uniquement destiné à exciter la vitalité du germe. " La jouissance vénérienne, dit-il, peut être considérée comme une joie extremement vive et de courte durée ; c'est le plaisir le plus vif, la sensation la plus délicieuse dont soient susceptibles les êtres sentans. Na nature a semblé, par-là, vouloir attacher un attrait puissant à l'acte important et universel de la reproduction.

" L'animal en rut, l'homme dans l'attente du plaisir,

sont tourmentés du désir de satisfaire un besoin devenu impérieux, irrésistible; toutes les idées sont absorbées par celle-la; la pensée n'a plus de force; quelquefois la raison en reçoit de légères atteintes; c'est une véritable monomanie momentanée ... Les mâles, dans les espèces qui ne se marient que passagèrement, se livrent souvent des combats sanglans pour obtenir la possession d'une femelle; d'autres parcourent des espaces immenses pour le même objet: l'homme ne le cede souvent en rien aux animaux dans de pareilles circonstances. Immédiatement avant la consommation de l'act reproducteur, l'esprit est dans une sorte de rêvasserie, de mélancolie douce; il semble goûter à l'avance ce plaisir toujours impatiemment attendu, et qui doit le plonger dans un océan de délices, la respiration est lente, expirante, entremêlée de longs soupirs, de soupirs sanglotans; le système musculaire est affaibli...Pendant l'acte vénérien, la sensation voluptueuse va toujours croissant jusqu'au moment où l'ébranlement nerveux devient tel qu'il offrirait tous les caractères d'une affection grave, si l'on n'en connaissait la cause; toutes les facultés cérébrales sont anéanties; la pensée est nulle; les sens sont insensible aux impressions des objets; l'insensibilité est générale et profonde, en sorte qu'on peut couper certains reptiles accouplés, sans pour cela les séparer; souvent la système musculaire entier est pris de spasme, de roideur, de convulsions; c'est quelquefois une syncope véritable, un état voisin de l'épilepsie...

"Immédiatement après la cessation de cette volupté convulsive, de cette surexcitation cérébrale, succède un état tout opposé, un affaissement général, proportionné à l'étendue, à l'activité du mouvement qui l'a précédé, aux dispositions du sujet, etc. Les facultés de l'esprit, les forces musculaires tombent dans un collapsus bien remarquable; les yeux, naguère si vifs, sont mornes, languissans; la physionomie exprime l'apathie, la tristesse, l'ennui, l'étonnement; le dégoût remplace les désirs; ordinairement alors l'objet

qui tout-à-l'heure captait toutes les affections, n'inspire plus que de l'indifférence, de l'éloignement, quelquefois même de l'aversion ; c'est aussi alors que l'auteur de la *Nouvelle Héloïse* pense que la femme peut s'assurer si l'homme est conduit vers elle par quelque autre sentiment que par celui de la passion que le même instant voit éclore et disparaître, et si la tendre amitié ne comblera pas de sa douce influence le vide affreux que cette passion laisse lorsqu'elle est satisfaite."

Tout confirme donc la proposition, en apparence si paradoxale, que tous les phénomènes qui se rattachent aux fonctions des parties sexuelles, ont pour centre de réunion le cerveau.

Examinons maintenant quelle est la partie cérébrale qui préside à l'instinct de la génération.

Le cervelet est l'organe de l'instinct de la génération.

Personne ne soutiendra que le penchant à la propagation, ou l'instinct de la génération, soit un produit artificiel de la volonté, de l'entendement, de l'éducation, ou d'une influence extérieure quelconque. Ainsi je ne m'arrêterai pas à prouver que cet instinct est une force indépendante, un penchant propre existant par lui-même. Je n'exposerai pas non plus son histoire naturelle, qui, d'un côté, est suffisamment connue de tout le monde, et d'un autre côté, m'entraînerait dans des détails d'histoire naturelle presque inépuisables. Je passe donc de suite à l'essentiel, en commençant par faire concevoir à mes lecteurs comment m'a pu venir cette idée, aussi étrangère aux principes physiologiques qu'à l'opinion générale.

Historique de la découverte que le cervelet est l'organe de l'instinct de la propagation.

Une jeune veuve se trouva attaquée, peu après la morte de son mari, de mélancolie et de violentes convulsions. Ces accès étaient précédés par une tension et un sentiment de chaleur très désagréables dans la nuque. Quelques instans après elle tombait par terre dans un état de roideur, jusqu'à ce qu'enfin la nuque et la colonne vertébrale fussent violemment retirées en arrière. La crise ne manquait jamais de se terminer par une évacuation qui avait lieu avec les tressaillemens de la volupté, et dans une véritable extase; après quoi, elle restait sans attaques pendant quelque temps.

Plusiers fois je lui soutins, avec le plat de la main, la nuque, durant ses accès, et j'y sentis une forte chaleur; mais j'y remarquai sourtout une proéminence bombée très considérable. Plus tard, cette dame m'avoua que depuis son enfance il lui avait été impossible de résister à un besoin impérieux, et que dans les momens où ses désirs étaient les plus pressans, la tension et la sensation de chaleur brûlante dans la nuque l'incommodaient le plus.

Ces circonstances réveillèrent mon attention. Je me rappelai avoir remarqué des symptômes semblables dans des cas pareils, et je ne tardai pas à apprendre que des personnes d'un tempérament très ardent éprouvent dans la nuque une tension et une sensation de chaleur, dans certaines occasions, et sourtout après des émissions excessives et inconsidérées, ou apres une continence prolongée.

Apollonius de Rhodes dit, en parlant de l'amour passionné de Médée :

"Le feu qui la dévore s'attache à tous ses nerfs, et se fait sentir jusque derrière la tête, dans cet endroit où la douleur est la plus vive lorsqu'un amour extrême s'empare de tous les sens."*

* *Histoire abrégée de la littérature grecque*, de M. Schœll, vol. I. p. 99.

Van der Haar avait déjà appelé l'attention des médecins sur la connexion qui existe entre certaines affections maladives des parties génitales, et des mouvemens convulsifs, et des trémoussemens des muscles, accompagnés de douleurs et de sentimens de chaleur dans la nuque.

Tissot a consigné des observations du même genre. Un horloger de dix-sept ans, toutes les fois qu'il provoquait une ejaculation par l'onanisme, perdait connaissance pour quelques instans, et éprouvait des mouvemens convulsifs de la tête, qui était violemment retirée en arriére, et son cou enflait. Pendant tout le temps de ces accès, qui finirent par devenir habituels chez lui, il sentait de violentes douleurs dans tout la partie postérieure du cou. A la fin, il en résulta une faiblesse extrême des muscles extenseurs du cou. Chez un autre sujet, les mêmes causes produisirent une paralysie complète de ces mêmes muscles, de manière que le malade laissait constamment pencher sa tête sur sa poitrine.

Préparé comme je l'étais par mes précédentes découvertes, l'idée ne dut pas m'échapper qu'il pourrait bien exister une connexion entre les fonctions de l'amour physique et les parties cérébrales placées dans la nuque. En très peu de temps j'eus recueilli un nombre prodigieux de faits à l'appui de cette idée.

Avant tout, je dois fare connaître au lecteur la forme et la situation de cette partie du cerveau qu'on appelle *cervelet*, et la manière dont son plus ou moins grand développement se manifeste à l'exterieur.

PLATE IV. 1. on voit la surface inférieure de deux lobes du cervelet. PLATE XV. 1, 1, sa surface supérieure. PLATE VIII. sa partie latérale. Les Pl. V. VI. X. XI. XII. XVII. représentent des préparations propres à faire connaître sa structure intérieure.

Le volume du cervelet diffère beaucoup chez différens sujets du même âge. Chez les adultes, sa largeur est de quatre à cinq pouces, et son épaisseur de vingt à vingt-cinq lignes; sa longueur de deux à trois pouces et quelques lignes.

Le cervelet est placé dans le crâne, dans les grandes fosses occipitales. Ses lobes touchent, sur le devant, au rocher des temporaux, et par derrière à la partie transversale de la *spina cruciata*. Latéralement, il s'étend jusqu'à la pointe de l'angle inférieur des pariétaux; il occupe toute la partie inférieure du crâne, depuis la partie large du procès mastoïdien d'un côté, jusqu'à la partie moyenne de la *spina cruciata*, où il y a ordinairement à l'extérieur une saillie, et jusqu'à la partie large du procès mastoïdien de l'autre côté. Dans le sens de la largeur, il occupe en entier les grandes fosses occipitales d'un procès mastoïdien à l'autre.

Comme les os crâniens sont très minces partout où le cervelet les touche, il faut que la forme de leur cavité intérieure corresponde exactement à leur proéminence extérieure, et cette dernière doit rendre exactement la forme du cervelet. Par conséquent, le crâne sera dans cette région plus étroit, plus large, plus aplati, plus bombé, plus bas, plus haut, selon que le cervelet s'étend plus ou moins dans différentes directions. Que l'on compare les Pl. VIII. X. XI. XII.

Quelques savans prétendent que l'on ne peut pas juger de la grandeur du cervelet dans l'homme vivant; car, disent-ils, depuis la saillie que l'on sent presque immédiatement au-dessus de la fossette du cou, jusqu'au trou occipital, il est impossible de tâter le crâne. Mais c'est précisément dans cet endroit que les deux lobes du cervelet s'écartent, et laissent entre eux un intervalle dans lequel est placée la portion inférieure de la partie verticale de la *spina cruciata;* et c'est par cette raison que la forme du cervelet ne se trouve nullement masquée. A-peu-près à un demi-pouce latéralement, la partie postérieure-inférieure de l'occipital se voûte vers le bord postérieur du procès mastoïdien. Or, plus cette proéminence est bombée, plus elle descend vers la nuque, plus elle s'élargit vers les oreilles, plus aussi le cervelet est grand; dans ce cas, la nuque est large et forte, le cou arrondi, fort

et large derrière les oreilles. Lorsqu'au contraire le cervelet est peu développé, ces parties seront plattes, étroites, renfoncées; la nuque sera peu large entre les procès mastoïdiens; le cou, quoique épais en partant du tronc, sera étroit dans l'intervalle d'un procès mastoïdien à l'autre.

Ceci suffira pour mettre le lecteur à même de juger du développement plus ou moins considérable du cervelet.

Je considérerai ce sujet dans l'état de santé et naturel, dans l'état de santé modifié artificiellement, et dans l'état maladie.

Preuves prises dans l'état de santé, que le cervelet est l'organe de l'instinct de la propagation.

1. Chez les animaux dont la propagation ne s'effectue pas par le concours de deux sexes, on ne distingue rien qui resemble au cervelet. Chez tous les animaux, au contraire, qui s'accouplent, on trouve une partie cérébrale placée immédiatement au-dessus de la moelle épinière, partie qui remplace le cervelet dont sont doués les animaux plus parfaits.

S'il était possible de démontrer que cette conformation a lieu sans exception dans les plus petits animaux, soit de terre, soit aquatiques, cette circonstance suffirait seule pour établir que le cervelet est l'organe de l'instinct de la propagation.

A peine la force des faits m'eut-elle suggéré mes idées sur les fonctions du cervelet, que je fus frappé d'une difficulté. Les plantes se propagent; donc, il n'est besoin d'aucune partie cérébrale pour que l'acte de la propagation s'effectue.

Mais il faut bien distinguer ce qui, dans la propagation, appartient à la vie purement organique, de ce qui appartient à la vie animale.

La vie organique forme les principes d'êtres de son espèce, et opère la fécondation et le développement

sans conscience et sans participation de l'individu. La vie animale fait, de cette fonction sans conscience, une fonction accompagnée de conscience; cette fonction devient un besoin, un penchant extrêmement actif, et le satisfaire produit le sentiment de la volupté.

Dans les animaux plus parfaits, ces deux fonctions se trouvent réunies. La fonction organique est en rapport avec la fonction animale, de manière cependant que dans l'acte de la propagation, chacune d'elles joue un rôle qui peut être indépendant de celui de l'autre.

Les expériences de quelques naturalistes paraissent prouver, que l'on peut féconder les œufs de femelles de certaines espèces avec la liqueur séminale prise du mâle, de la même manière que les germes des plantes avec le pollen pris sur les étamines. Des conceptions qui ont eu lieu pendant la défaillance, pendant l'ivresse, ou un autre étourdissement qui abolissait la conscience, ne sont peut-être pas des événemens absolument rares. Les instrumens organiques de la propagation ont leur vie à eux, et ils entrent en activité indépendamment de la conscience de l'animal. Le coït exercé par la violence, l'approche d'un homme, accompagné de dégoût et d'horreur même de la part de la femme, ont la conception pour suite. Je connais des femmes qui, dans aucune période de leur vie, n'ont senti le moindre penchant pour les hommes, qui étaient incapables de comprendre comment un homme peut inspirer à une femme d'autres sentimens qu'un enfant ou une autre femme, qui ne cédaient aux désirs de leurs maris que par devoir, et qui, quoiqu'elles fussent devenues mères plusieurs fois, n'ont jamais éprouvé la moindre sensation de volupté.

Tout le monde sait qu'il n'existe aucune proportion entre la fécondité et le penchant à exercer le coït. Combien de fois les vœux des plus tendres époux manquent-ils d'être remplis! Il paraît même que, dans certains cas, un amour trop ardent peut mettre

obstacle à la fécondation. L'on a coutume de modérer l'ardeur des jumens, en les frappant, en les fatiguant, avant de les mener à l'étalon, ou en jetant sur elles de l'eau froide. J'ai eu plusieurs fois des métis femelles d'oiseaux, qui sollicitaient avec ardeur l'amour de tous les mêles, qui construisaient leur nid avec une activité infatigable, pondaient, couvaient avec une persévérance exemplaire, et qui lorsqu'elles voyaient leurs espérances déçues, s'abandonnaient à une profonde tristesse. Tout le monde connaît l'ardeur amoureuse aussi violente que stérile du mulet.

Comme donc la fécondité organique est absolument indépendante de l'accouplement animal, l'existence de la fécondation sans partie cérébrale ne peut nullement être alléguée pour prouver, que l'instinct de la reproduction est possible sans le concours du cerveau.

2. Dans la description du cervelet,* j'ai montré que chez la mammifères, il est composé d'une partie moyenne (la partie fondamentale), et des parties latérales, les lobes.

Chez tous les ovipares, chez les insectes, les poissons et les amphibies, la partie fondamentale constitue tout le cervelet.

Les oiseaux, (Pl. I. fig. 2. 5. 7. 6. n'ont que cette partie intégrante du cervelet que j'appelle partie fondamentale ou primitive, et que d'autres ont appelée *éminence vermiculaire* (PROCESSUS VERMIFORMIS.)

Chez tous les mammifères, au contraire, les deux parties latérales existent ; ells ont cependant, comme la partie fondamentale, différentes formes chez les différentes espêces, (Pl. III. 1. et IV. 1. représentent la surface inférieure du cervelet, et Pl. XVI. sa surface supérieure.

Cette différence essentielle du cervelet dans des espèces d'animaux qui diffèrent essentiellement par leur mode de propagation, fait présumer qu'il existe une connexion intime entre le cervelet et l'acte de la

* Tome 1 de mon grand ouvrage, p. 149, in-4o, et p. 176, in-fol.

propagation. Mais je passe à des preuves plus rigoureuses.

3. La manifestation successive, la croissance et la décroissance de l'instinct de la propagation, sont dans un rapport direct avec le développement et la décroissance du cervelet.

Chez l'enfant nouveau-né, le cervelet est, de toutes les parties cérébrales, la moins développée, à la vérité, sa proportion au cerveau est différente dans chaque individu; elle est tantôt, à-peu-près comme un à neuf, tantôt comme un à vingt, et quelquefois plus petite encore. Dans l'adulte, au contraire, elle est comme un à cinq, tout au moins comme un à sept. Les fibres nerveuses du cervelet sont, de tout l'encéphale, celles qui, les dernières, se montrent bien distinctes. Le cervelet acquiert son plus haut degré de développement vers la dix-huitième ou la vingt-sixième année.

Et c'est dans le même ordre que se développe le penchant de l'amour qui se glisse imperceptiblement dans le sein du jeune homme et de la jeune fille; les yeux deviennent plus brillans, le regard plus expressif, la démarche acquiert de la prétention, l'un et l'autre tombent dans une inexplicable mélancolie enfantine; l'un et l'autre sentent un besoin dont ils ne sauraient se rendre compte, des désirs confus, jusqu'à ce qu'enfin la présence de l'objet aimé donne le mot de l'énigme, et répande sur l'âme tout entière des torrens de délices. La jeune fille et le jeune homme se trouvent élevés par la sentiment qui les domine au-dessus même de l'idéal de toute perfection; la résistance faible et involontaire que toute personne du sexe oppose aux premières entreprises d'un homme, devient une vertu angélique, et prête une magie nouvelle à l'amour, jusqu'à ce qu'enfin l'homme et la femme aient goûté, dans les bras l'un de l'autre, le suprême bonheur.

M. Sœmmerring, Ackermann, les frères Wenzel et d'autres, soutiennent qu'à l'âge de deux ou trois ans, tout au plus, le cervelet, tout comme le cerveau, ont acquis leur croissance complète.

M. Sœmmerring, que les autres auteures ont copie, s'est trompé ; il fonde son assertion sur ce qu'el a trouvé le cerveau d'un garçon de deux ans aussi grand que celui d'un adulte dont il fit l'ouverture en même temps. Il supposait que tous les individus humains ont une masse encéphalique à-peu-près égale ; et dans cette hypothèse, sa conclusion serait juste. Mais comme le poids de la masse cérébrale varie dans les adultes, qu'il est tantôt de deux livres, tantôt de deux livres et demie, de trois livres, et quelquefois plus considérable encore, il peut bien arriver qu'un garçon de deux à trois ans, organisé de manière à acquérir de grandes qualités et de grandes facultés, ait une masse cérébrale plus grande qu'un adulte doué de qualités et de facultiés très médiocres.

Dans nos nombreuses dissections du cerveau, nous avons toujours été très particulièrement attentifs au cervelet. Mais si j'en excepte quelques cas extraordinaires, nous n'avons jamais, jusqu'à l'âge de seize à vingt ans, trouvé la même proportion entre le cervelet et le cerveau que chez les adultes. Il est facile de constater la vérité de ce fait, en comparant des crânes de jeunes garçons et de jeunes filles, avec des crânes d'hommes et de femmes. Quelle différence déjà entre le crâne d'un garçon de dix à douze ans, (Pl. XXXVII.,) et celui d'un enfant nouveau-né, (Pl. XLI.!) Chez l'enfant nouveau-né, (Pl, XLI.,) toute la base du crâne est encore rétrécie en un cône tronqué ; les procès mastoïdiens sont encore très rapprochés l'un de l'autre ; les bosses occipitales ne sont point encore proéminentes, elles sont plates. Dans la deuxième année, les procés mastoïdiens s'écartent davantage l'un de l'autre ; les fosses occipitales se creusent davantage en segment de sphère. Tous ces changemens sont encore bien plus sensibles dans le crâne du garçon de dix a douze ans. On remarque de même ce développement encore imparfait du cervelet, dans le crâne de la jeune fille de six ans, (Pl. XXXVIII.) En tournant vers soi la base du crâne d'un sujet impubère, on voit de suite que la

distance d'un procès mastoïdien à l'autre, distance qui détermine le diamètre du cervelet, est beaucoup moindre que celle d'un pariétal à l'autre. Chez l'adulte, au contraire, les deux distances sont, d'ordinaire, à-peu-prés les mêmes. Aussi ces faits ont-ils déterminé M. Chaussier à accorder enfin que le cervelet ne se développe que vers l'âge de l'adolescence.

A l'approche de la vieillesse, la turgescence nerveuse du cervelet diminue, et dans la même proportion, l'homme et la femme deviennent peu à peu étrangers à leur destination, jusqu'à ce qu'enfin l'un comme l'autre se trouvent isolés et sans but.

M. Rudolphi assure n'avoir jamais trouvé le cervelet plus petit chez les sujets âgés que chez les adultes.

Comme dans l'âge avancé toute la masse des nerfs éprouve une diminution, pourquoi le cervelet ferait-il seul exception à cette règle? Que l'on compare encore les fosses occipitales chez des adultes et chez des sujets très âgés. A moins que tous les os craniens ne soient déjà amincis par l'effet de la décrépitude, on trouvera les fosses occipitales moins transparentes chez les sujets âgés que chez les adultes, et cela parce qu'il s'est déposé de la masse osseuse à leur surface interne, au fur et à mesure que le cervelet s'est rapetissé. J'ai dans ma collection des crânes où le cervelet s'était rapetissé presque jusqu'aux dimensions de celui d'un enfant nouveau-né, et où l'espace qu'il occupait a été resserré beaucoup, non-seulement par l'épaississement des parois des fosses occipitales, mais encore par celui des rochers.

"4. La nature ne suit pas de marche uniforme dans le développement du cervelet. L'on sait quelle est l'influence du climat sur l'époque à laquelle les deux sexes deviennent capables de l'acte de la génération. Mais il existe encore de grandes différences à cet égard d'individu à individu, dans le même lieu et dans la même famille. Tel garçon montre déjà de l'intérêt pour le sexe dès l'âge de trois à quatre ans; chez d'autres, cet instinct dort jusqu'à la quatorzième ou quinzième année.

La même différences se manifeste sur le retour de l'âge. Chez tel homme la puissance virile est anéantie dès l'age de quarante ans; chez tel autre, elle fait entendre encore le chant du cygne à soixante-dix, à quatre-vingts ans.

Il n'est par rare que l'instinct de la propagation se manifeste avant l'âge ordinaire, de la manière la plus prononcée. J'ai vu à Paris un garçon de cinq ans qui, sous le rapport des forces corporelles, paraissait en avoir seize; ses parties sexuelles étaient entièrement développées; il avait une forte barbe, une voix rauque et mâle, en un mot tous les signes d'une virilité pleine et entière. Depuis quelques années déjà il avail satisfait, avec des femmes, l'instinct de la propagation. Je ne m'en laissai pas imposer par ces signes extérieurs. Je n'attribuai pas la manifestation précoce de l'instinct de la propagation au développement prématuré des parties sexuelles; car peu auparavant j'avais vu une fille de neuf ans qui paraissait être une femme toute formée. Elle ne manifesta que l'indifférence d'un enfant lorsque ses parens me la montrèrent, et jamais elle n'avait témoigné le plus léger intérêt pour rien de ce qui a rapport à l'amour physique. On trouve dans Buffon et ailleurs des exemples semblables de grands enfans qui avaient toutes les marques de la puberté, sans que l'on remarquât rien en aux qui eût rapport à l'instinct de la propagation. Chez la fille en question, le cervelet n'avait qu'un développement très insignifiant; mais il en est tout autrement du garçon de cinq ans: sa nuque était large, bombée et robuste, quoique le reste de sa tête eût acquis à peine les dimensions ordinaries à son âge: aussi ce garçon etait-il enfant sous tous les autres rapports.

Nous trouvâmes le cervelet tout aussi développé chez un garçon de dix ans qui était détenu dans une maison de correction, à Leipzig, pour avoir violé une jeune fille. A Paris, j'ai vu le garçon d'une mulâtre, âgé de moins de trois ans; il se jetait non-seulement sur de petites filles, mais sur des femmes, et les som-

mait avec audace et avec opiniâtreté de satisfaire ses désirs. Il ressentait dans les parties sexuelles, qui n'étaient point prématurément développées, mais qui présentaient des dimensions proportionnées à son âge, des erections plus que momentanées. Comme il était environné de filles qui se prêtaient à satisfaire ses désirs, comme a un jeu piquant pour elles, par sa singularité, il mourut de consomption avant d'avoir atteint la fin de sa quatrième année. Son cervelet était extraordinairement développé ; le reste de sa tête avait les dimensions ordinaries à son âge. Aussi ce n'était, sous tous les autres rapports, qu'un enfant mal élevé et gâté.

Il est réellement étonnant que les médecins et les naturalistes n'aient jamais cherché le siége du penchant aux plaisirs de l'amour, ailleurs que dans les parties sexuelles. Tous les jours on voit de jeunes garçons et de jeunes filles de trois, quatre, cinq ans, se livrer avec fureur à l'onanisme, sans répandre le moindre fluide, et sans que le développement de leurs parties pût faire craindre pour eux un penchant à ce vice. L'on se trompe beaucoup en croyant empêcher des enfans ainsi organisés, de contracter de pernicieuses habitudes en les garantissant contre les séductions du dehors. Cette précaution est applicable aux enfans ordinaries ; mais il en est dont la nature elle-même devient le séducteur. Qui est-ce donc qui séduit les jeunes singes ? Du reste, il arrive chez les vieillards quelque chose de semblable à ce qui a lieu chez les enfans ; leurs parties sexuelles sont souvent déjà paralysées, que des désirs effrénés les dévorent encore.

Tous les faits que je viens de citer d'enfans dont les parties sexuelles étaient ou n'étaient pas développées, et qui non-seulement sentaient l'impulsion de l'instinct de la propagation, mais étaient doués aussi de la faculté de'exercer le coït, et chez lesquels le cervelet seul avait acquis un développement prématuré, prouvent, jusqu'à l'evidence, qu'il faut chercher le siége de l'instinct de la propagation, non pas dans les parties génitales, mais dans le cervelet.

5. L'energie de l'instinct de la propagation est, chez les adultes, dans un rapport direct avec le développement du cervelet.

Il est des hommes et des femmes qui n'accomplissent l'acte de la cohabitation que par manière d'acquit. Le coït leur inspire de la répugnance et du dégoût. Ceux qui y attachent un grand prix sont, à leurs yeux, des personnes sensuelles, se ravalant au-dessous de la brute. On ne remarque ni chez ces hommes, ni chez ces femmes, la moindre différence des parties génitales par laquelle ils se distinguent des autres individus ; mais dans ces cas, il y a toujours faible développement du cervelet.

Par la complaisance de M. le baron Larrey, j'ai vu un soldat chez qui l'antipathie pour les femmes était dégénérée en véritable manie. L'aspect d'une femme produisait en lui des convulsions violentes, et le faisait presque entrer en fureur. M. le docteur Spurzheim a vu un example semblable en Angleterre. Chez l'un et l'autre de ces sujects, le développement du cervelet était absolument resté en arrière.* Un médecin de Vienna, doué de talens très distingués, montrait une antipathie marquée pour les femmes, singularité que, dans le tems, nous attribuâmes à son goût pour la solitude. Quelques années après il mourut de la phthisie pulmonaire. Dans son crâne très volumineux (Pl. XLIV. 1. 1. 1. 1.) l' espace pour le cervelet est extrêmement petit ; la distance d'un procès mastoïdien a l'autre est à peine de trois pouces : les bosses occipitales, au lieu d'être bombées, sont en partie tout-a-fait plates, en partie même déprimées, et par cela même d'une surface inégale.

Dans un abbé français, qui vivait à Vienna, nous admirions d'autant plus une continence exemplaire, et une conduite singuliérement réservée vis-à-vis des

* On m'a objecté qu'un organe ne saurait produire un effet opposé à ses fonctions. Mais l'estomac n'est. Il pas l'organe de l'appétit, et n'arrive-t-il pas qu'à raison d'une affection maladive de ce viscère, nous avous du dégoût pour tous les alimens ?

dames, qu'il aimait la parure comme une femme, et passait la journée à aller d'une société dans une autre. Il mourut, et son crâne est du nombre de ceux que je conserve comme exemple d'un très faible développement du cervelet. Les bosses occipitales sont tellement plates, que l'on dirait que l'on a coupé la partie inférieure de l'occipital, (Pl. XLVIII. 1. 1.)

La dame dont j'ai parlé plus haut, p. 159, a la tête grande et belle comme celle d'un homme ; elle possède des talens distingués ; mais sa nuque a tres peu de largeur au-dessous des oreilles, ce qui indique un faible developpement du cervelet. C'est cette conformation que j'ai trouvée jusqu'ici chez toutes les personnes à qui la nature a refusé entièrement, ou auxquelles elle a accordé à un faible degré le besoin de l'amour physique et le plaisir pendant l'acte vénérien.

Une semblable organisation n'emporte pas de points de contact avec le beau sexe. Les portraits de Charles XII. (Pl. LXI. fig. 1.) de Newton, de Kant montrent, et certainement sans l'intention des artistes, que le cou de ces hommes célèbres était peu large, et par conséquent leur cervelet très peu développé. Est-il étonnant après cela que Saint-Thomas à Kempis, dans le portrait duquel je reconnais les mêmes caractères, se soit armé d'un tison pour repousser loin de lui une jeune fille remplie d'attraits ?

Voilà les hommes que la nature appelle au célibat.

Pour se faire une idée de la différence qui existe entre un faible développement et un développement considerable du cervelet, que l'on compare le crâne (Pl. VIII.) avec ceux dont je viens de parler tout-à-l'heure, et encore avec ceux où cet organe a acquis un développement extraordinaire, (Pl. XXXIX. et XL.)

A Vienne, une diseuse de bonne aventure, dévote et superstitieuse, quoique déjà âgée, entretenait toujours deux amans. Dans son petit crâne sphérique, (Pl. L. 1.) les bosses occipitales sont tres larges, très bombés, et très proéminentes vers le bas. La même conformation a lieu dans le crâne très large, (Pl. XXVII.) d'une femme

qui a été détenue pour vol dans la maison de correction de Grætz, en Stirie, et qui auparavant suivait les armées comme fille de joie. Un maître de langue qui, sous tous les autres rapports, menait une vie forte régulière, assurait qu'il ne pouvait jamais se rassasier de jouissances avec les femmes. La partie postérieure inférieure de son crâne, (Pl. XXXIX. 1. 1.) est très large, et tellement bombée de haut en bas, qu'il descend de plus d'un pouce plus bas au-dessous du méat auditif extérieur, que le crâne du jeune médecin solitaire, et du chaste abbé français. Le même conformation se trouve encore chez un médicin célèbre qui, en très peu de temps, avait mis au tombeau, l'une apres l'autre, trois épouses jeunes et robustes, et qui, à l'âge d'à-peu-près cinquante ans, crut devoir prendre le parti d'entretenir dans sa maison quatre filles vigoureuses. Ce qu'il y a de plus remarquable, c'est qu'il n'existait pas la moindre trace de jalousie entre ces personnes, probablement par la raison que, comme elles me l'ont dit, elles étaient toutes les quatre plus que rassasiées de jouissance.

Que l'on compare aussi aux portraits de Charles XII, de Newton et de Kant, ceux de Piron et de Mirabeau, (Pl. LXI. fig. 2,) l'un et l'autre très sensuels; de Nicolas Chorier, auteur de l'ouvrage intitulé; *Meursii elegantiæ latini sermonis*, traduit en français sous le titre d' *Academié des Dames;* de l'Arétin, aussi voluptueux que caustique; de François Ier., qui avait coutume de dire qu'*une cour sans femmes est une année sans printemps, et un printemps sans roses.* Les anciens sculpteurs donnent cette même nuque large et forte à Epicure, en quoi ils n'avaient certainement pas l'intention de lui attribuer les forces d'Hercule. L'on peut constater tous les jours cette observation dans la société.

Lorsque le cervelet acquiert un développement excessif, au point que la nuque forme, de haut en bas, une espèce de large poche bombée, l'instinct doit acquérir aussi une force d'impulsion désordonnée. Dans

ce cas, lorsque des motifs d'un ordre supérieur, et des qualités et des facultés éminentes ne viennent pas au secours d'individus ainsi organisés, les jouissances avec l'autre sexe, conformes aux intentions de la nature, ne suffisent point pour satisfaire leurs desirs et leur paraissent fades ; ils ne brûlent que d'un feu semblable à celui auquel se trouvent d'ordinaire réduits, par la réclusion, les membres des nombreuses communautés d'un même sexe.

J'ai eu occasion d'observer plusieurs hommes et plusieurs femmes qui étaient les esclaves de ce goût dépravé. La nuque large et voûtée frappe surtout chez les femmes. Presque toutes les femmes livrées à ce penchant ont, en même temps, une constitution robuste et mâle. Les hommes, au contraire, ont un physique efféminé, les membres arrondis, gras, potelés et petits, les mamelles très apparentes. Les anciens historiens disent de Néron, livré aux plus sales voluptés : " que ses inclinations étaient peintes sur sa figure ; qu'il avait les yeux petits, entourés de graisse, LE COU GRAS, le ventre gros et les jambes minces ; que ses cheveux blonds et son visage plutôt délicat que majestueux, le faisaient d'abord reconnaître pour un efféminé." J'ai trouvé cependant quelques exceptions à cette règle.

En Hollande nous vîmes, dans une maison de correction, quelques hommes déjà âgés qui, avec une organisation avantageuse, du reste, s'étaient livrés à de semblables désordres. Ils avouaient leur impuissance de résister à l'impétuosité de leur penchant, et plusieurs fois déjà ils étaient retombés dans le même vice ; ils étaient convaincus que leur conduite était blâmable et indécente ; mais ils demandaient qu'on ne les relachât pas, parce que, s'ils recouvraient la liberté, disaient-ils, leur passion les entraînerait encore. Nous fîmes remarquer à ceux qui nous accompagnaient le développement excessif du cervelet chez ces individus.

Que l'on me permette de faire ici une observation.

La personne qui vit dans un état peu conforme à sa vocation, se trouve en contradiction avec son état et avec elle-même. Est-il prudent, est-il juste de surprendre à des jeunes gens dans le cœur desquels couve peut-être sous la cendre un feu qu'ils méconnaissent, des vœux qui pendant toute leur vie les mettront en contradiction avec eux-mêmes? Les différens états, dans la société, ne devraient-ils pas résulter de la différente organisation des individus qui s'y vouent? Voulez-vous des Vestales et des Cénobites, choisissez ceux *qui sont sortis eunuques du ventre de leur mère.*

Ce que j'ai dit de l'espèce humaine, a lieu également chez les animaux. Il y a des chiens, des chevaux, etc., qui ne s'accouplent jamais; il y a des femelles qui, quoique leurs parties sexuelles offrent tous les signes de la chaleur, ne permettent pas l'accès au mâle. Là aussi la cause de cette anomalie se trouve toujours dans le développement défectueux du cervelet. Près de Berlin, on nous conduisit dans une étable ou se trouvaient cinq taureaux: chez l'un d'eux, nous ne trouvâmes pas la nuque à beaucoup près aussi large ni aussi robuste que chez les autres; et nous déclarâmes que ce taureau ne devait pas être, à beaucoup près, aussi bon mâle que les autres. "Vous avez raison, nous dit le propriétaire, M. de Beyme, ci-devant ministre d'état: on l'engraisse parce qu'il n'est pas bon à la tête du troupeau."

Les taureaux, les étalons et les béliers, sont d'autant plus ardens, au contraire, que leur nuque est plus large, plus arrondie et plus robuste. A Vienne, tous les amateurs de pigeons savent que les pigeons mâles qui ont la nuque la plus forte, sont ceux qui poursuivent les femelles avec le plus d'ardeur, et l'on profite de cette circonstance pour enlever les pigeons femelles du voisin, et les faire venir à son colombier. On prive de sa femelle le pigeon mâle le plus ardent; alors il fait des excursions dans les autres colombiers, y enlève des femelles, et les force à le suivre chez lui; bientôt le mâle de la colombe enlevée suit sa femelle, et c'est

ainsi que les enlèvemens se succèdent jusqu'à ce que le propriétaire dépouillé mette fin à ce jeu par la mort du ravisseur. Les rats, les souris, la taupe, le cochon-d'Inde, ont le cervelet très grand, et c'est pour cela même que l'instinct de la propagation est chez eux très actif.

Chez des animaux nourris abondammcnt, chez des serins jaunes, surtout chez des pigeons et des ranards de l'un et l'autre sexe, chez des chiens, des jumens, des étalons, des singes, on remarque assez souvent la même dépravation dont je viens de parler comme ayant lieu chez l'espèce humaine.

Tout autant de preuves que l'instinct de la propagation est dans une proportion directe avec le degré de développement du cervelet, et que par conséquent cette partie cérébrale doit être considérée comme l'organe de cet instinct.

6. La différence qui existe dans les deux sexes, pour le degré auquel se manifeste chez eux l'instinct de la propagation, dépend encore du degré de développement du cervelet.

C'est une question de savoir si, tant chez l'homme que chez les animaux, l'instinct de la propagation a un degré d'activité plus grand chez le mâle ou chez la femelle ?

J'accorde qu'il existe des exceptions pour certains individus ; mais en général l'homme est doué d'un instinct de la propagation bien plus impérieux que la femme ; et les observations suivantes vont prouver la vérité de ce que j'avance.

Chez les animaux, les femelles de plusieurs espèces, telles que los chiennes, les jumens, les vaches, sont restreintes, pour la manifestation de l'instinct de la propagation, à certaines saisons, à certaines périodes, tandis que les mâles sont disposés toute l'année à se livrer à l'amour. L'état habituel de ces femelles ne suffit donc pas pour entretenir en activité l'instinct de la propagation. Il faut qu'il survienne, en outre, une circonstance qui irrite leurs organes pour leur faire souffrir ou desirer l'approche du mâle.

Même chez ceux des animaux qui vivent dans un mariage aussi durable que le vie, comme la plupart des espèces d'oiseaux, les martres, les renards, les mâles sont plus ardens et plus disposés aux infidélités que les femelles. De-là, chez ces animaux, les jalousies et les combats perpetuels. Il est à remarquer que dans certaines espèces les femelles sont très jalouses, tandis que dans d'autres elles ne donnent aucune marque de jalousie.

Dans notre espèce aussi, l'homme est entraîné aux plaisirs de l'amour avec plus d'impétuosité que la femme. Hippocrate déjà avait consigné cette vérité. La nature a imposé à la femme les incommodités de la grossesse, les douleurs de l'enfantement, le devoir d'allaiter et de soigner les enfans. Elle a organisé la femme tout entière pour parvenir à ce but important et élevé. Chez l'homme, au contraire, tout ce qui a rapport à la propagation est restreint à la seule fécondation. Les plaisirs de l'amour sont un besoin impérieux pour le jeune homme, pour l'homme fait, et souvent encore pour le vieillard. Toutes les institutions sociales attestent l'abus que fait notre sexe de la supériorité de ses forces, et portent l'empreinte de son penchant jaloux pour la volupté.

Voyons maintenant si ces phénomènes s'expliquent par son organisation.

On pensait jusqu'ici que l'homme étant généralement plus fort, ses penchans doivent être plus violens par cela seul. Mais j'ai prouvé, dans la section sur l'organe de l'âme, qu'il n'existe absolument pas de proportion directe entre la violence des penchans, et l'activité des facultés d'un côté, et la force de la constitution prise collectivement de l'autre. Les animaux petits sont, d'ordinaire, plus ardens pour l'amour que les grands. Qui ne sait que souvent des hommes grands et des femmes grandes sont très indolens, et des personnes petites et faibles très ardentes dans la jouissance de volupté?

La différence de l'éducation n'explique rien non plus;

car d'abord son influence ne va pas jusqu'à détruire les dispositions naturelles. En second lieu, l'on ne doit pas oublier que même l'éducation, les institutions et les lois sont un résultat de notre organisation; ce n'est pas nous qui produisons tout cela, c'est l'auteur de notre être qui le produit par nous. En troisième lieu enfin, comment chez les animaux la différence de la manifestation de l'instinct de la propagation dans les deux sexes, pourrait-elle être produite par l'éducation?

Non, il en est tout autrement; une loi éternelle de la nature doit être fondée sur une base toute différente. Aussi en général le cervelet est-il sensiblement plus grand chez les mâles que chez les femelles. Dans la plupart des cas, lorsque l'on place des cerveaux d'homme et de femme, ou d'animaux mâles et d'animaux femelles à côte l'un de l'autre, celui de l'homme ou du mâle se distingue par un plus grand cervelet. La meilleure manière de rendre cette différence sensible, c'est de placer les encéphales dans l'eau afin qu'ils conservent leur forme, et ne s'applatissent pas par leur propre poids.

Cette observation s'est confirmée sur tous les animaux que j'ai été à même d'examiner, depuis la musaraigne jusqu'à l'éléphant.

Il paraîtrait presque que cette différence est plus marquée dans l'espèce humaine que dans les autres espèces d'animaux. Aussi n'existe-t-il guère d'animal avec lequel l'homme doive être tenté de troquer, si l'on met dans la balance qu'il est à même de jouir toute sa vie et dans toutes les saisons, que sa jouissance est la plus parfaite, etc. Que l'on compare les cervelets de femmes, PL. IV. X. XIII. avec les cervelets d'hommes, PL. V. VIII XI. XII. XV. ainsi que tous les crânes de femmes avec les crânes d'hommes.

On pourrait objecter que l'homme ayant en général une masse cérébrale plus considérable que la femme, doit avoir aussi un plus grand cervelet.

Mais j'ai montré qu'il n'existe pas de proportion fixe des parties cérébrales entre elles. Le cervelet est

indépendant du cerveau, et forme un organe propre. Quelquefois il existe, chez le même sujet, un grand cerveau et un cervelet extrêmement petit ; d'autres fois le cervelet est très développé, et le cerveau très petit. Le jeune médecin dont j'ai parlé plus haut, qui fuyait les femmes, avait l'une des plus grosses têtes et l'un des plus grands cerveaux, et son cervelet était très petit. La diseuse de bonne aventure superstitieuse, au contraire, n'avait pas la moitié autant de cerveau que le jeune médicin, et son cervelet était beaucoup plus grand. En traitant de l'organe de l'amour de la progéniture, je montrerai que certaines parties cérébrales sont plus développées chez la femme que chez l'homme. Par conséquent cette objection se réduit à rien.

Pour faire cette observation sur les animaux, il faut connaître très exactment la situation du cervelet dans le crâne. Dans plusieures animaux, surtout chez les espèces qui ne marchent jamais debout, le cervelet est placé horizontalement et presque en totalité derrière le cerveau. Voyez Pl. XXXIII. les cerveaux du cangourou, fig. 3, du tigre, fig. 5. Chez ces animaux-là, on reconnaît le degré de son développement à la partie postérieure du crâne, au-dessus et des deux côtés du trou occipital.

Dans d'autres, le cervelet est à-peu-près comme chez l'homme, recouvert, en entier ou en partie, par les lobes postérieures du cerveau, et ce n'est que par l'inspection de la base du crâne que l'on peut s'assurer de son plus ou moins de développement. Voyez Pl. XXXIII. fig. 4, le cerveau du lion, et Pl. XXXIV. celui du singe, fig. 1, et de l'orang-outang. fig. 2 et 3.

Chez les oiseaux, le cervelet formé seulement par la proéminence vermiculaire ou la partie fondamentale, s'étend de la région postérieure moyenne des deux hémisphères du cerveau, jusqu'au trou occipital, (Pl. I. fig. 11, 5, 7, 6;) mais il ne remplit que la partie moyenne de l'occipital, car les parties latérales contiennent les organes de l'ouïe. Cette partie moyenne

est constamment plus large et plus bombée chez les oiseaux mâles que chez les oiseaux femelles. La Pl. LVII. représente, fig. 1, le crâne d'un coq; fig. 2, celui d'une poule; fig. 4, celui d'une dinde, et fig. 5, celui d'un coq-d'Inde. Comparez Pl. LVIII. le crâne du rat des prés, mâle, fig. 2, avec celui de la femme, fig. 1; le crâne du chat mâle, fig. 4, avec celui de la chatte, fig. 3, et le crâne du chien mâle, fig. 6, avec celui de la chienne, fig. 7, ainsi que Pl. LIX. le crâne du veau mâle, fig. 2, avec celui du veau femelle, fig. 1.*

Il ne faut pas oublier ici que la différence des dimensions du cervelet est plus grande, d'un sexe à l'autre, chez les espèces dans lesquelles les mâles sont, en tout temps, capables de s'accoupler, et où les femelles sont restreintes à cet égard à de certaines périodes, que chez les espèces dans lesquelles le mâle et la femelle sont l'un comme l'autre sous la même influence périodique.

Ainsi donc, la conformation du cervelet chez les deux sexes, s'accorde parfaitement avec ce phénomène physiologique, que l'instinct de la propagation est plus puissant chez les mâles que chez les femelles, et cet accord prouve encore que le cervelet est l'organe de cet instinct.

7. Le genre de caresses que se font certains animaux, aurait dû réveiller, depuis long-temps, l'attention des naturalistes. Tantôt c'est le mâle, tantôt la femelle, qui a l'habitude d'irriter la nuque de l'objet de ses désirs. Long-temps avant l'accouplement, le chat mâle mord amoureusement la nuque de la chatte, et quelquefois il continue ce jeu pendant une journée entière. J'ai vu souvent des chiennes en chaleur, donner à des chiens, peu ardens, des coupes de museau dans la nuque, pour les provoquer à l'accouplement. Le canard mâle, avant de procéder à l'acte de la fécondation, monte tranquillement sur la canne et lui passe trois ou quatre fois le bec sur la nuque, ce n'est qu'alors que la canne se blottit, et que l'accouplement a lieu.

* Dans toutes les figures des Planches LVII. et LVIII., les bosses occipitales sont marquées 1. 1.

Au printemps, j'ai l'occasion d'observer, à mon aise, les amours des moineaux, d'une chaumière placée dans mon jardin. Le mâle, en poussant des cris, expression de l'ardeur qu'il ressent, fait des sauts autour de la femelle, la tête fortement retirée en arrière, et les ailes déployées; la femelle paraît poursuivre le mâle et saute à tous momens sur lui, en lui donnant de forts coups de bec dans la nuque; après ce prélude, tous les deux gagnent en toute hâte un arbre où ils s'accouplent.

Les preuves que j'ai alléguées jusqu'ici sont suffisantes pour établir que le cervelet est l'organe de l'instinct de la propagation. J'en ai encore quelques autres, mais je me réserve de les exposer plus bas.

Observations générales sur l'organe de l'instinct de la propagation, et sur cet instinct lui-même dans l'état de santé.

Les Grecs, les Arabes, et quelques pédagogues modernes, ont regardé le cervelet comme le siége de la mémoire. Willis déduisait le talent pour la musique, de la mollesse de sa structure; et Malacarne veut déterminer le degré des facultés intellectuelles, d'après le nombre de ses feuillets. M. Portal croit que le cervelet sécrète les esprits animaux, ou qu'il est destiné à remplir les fonctions du cerveau, dans le cas où celui-ci serait attaqué de maladie. Reil le considère comme une pile voltaïque. Plusieurs physiologistes le regardent comme la source de la vie organique: hypothèses qui ne sont appuyées sur aucun fait.

Tout comme la force de l'instinct de la propagation n'est dans aucune proportion avec la fécondité, de même il n'y a non plus aucune proportion entre le développement du cervelet et celui des parties sexuelles.

Il est indubitable que l'organe de l'instinct de la propagation fait discerner à chaque animal, le mâle et

la femelle de son espèce ; on serait même tenté, dans certains cas, d'admettre qu'il établit dans la nature une paix générale entre tout ce qui est mâle avec tout se qui est femelle. On sait que beaucoup d'animaux mâles, surtout les singes, les chiens, les étalons, les perroquets, déposent leur méchanceté habituellé, et oublient même leur colère devant les femmes. Les animaux femelles, au contraire, paraissent avoir des préférences pour les hommes. J'ai vu les taureaux les plus furieux, qui n'avaient pu être domptés ni par des chiens ni par des hommes, céder à une servante qui accourait le fouet à la main. D'un autre côté, j'eus beaucoup de peine, un jour, à sauver de la fureur d'une vache une dame avec laquelle je me promenais dans une prairie. Cette vache portait une haine indomptable aux femmes.

Peut-être, quelques-uns de mes lecteurs pensent-ils qu'on ne saurait admettre un organe de l'instinct de la propagation dans le cerveau, parce que chez beaucoup d'animaux l'activité de cet instinct est circonscrite à certaines périodes, et que chez eux, tantôt il semble ne pas exister du tout, et que tantôt il domine impérieusement l'animal. Mais, dans beaucoup de cas, cette objection serait applicable aussi aux parties sexuelles ; et du reste, il y a beaucoup d'autres instincts qui dorment dans certaines saisons, et qui se réveillent dans d'autres ; cependant, comme je ne tarderai pas de le prouver, leur organe existe toujours dans le cerveau.

Ce phénomène peut même s'expliquer en faveur de l'idée que le cervelet est l'organe de l'instinct de la propagation. J'ai rassemblé beaucoup de têtes d'oiseaux, au commencement du printemps, saison de leurs amours les plus ardentes ; j'en ai rassemblé d'autres au commencement d l'hiver, époque, où tout ce qui a rapport à la propagation est épuisé. Dans les têtes rassemblées au printemps, le cervelet est plus large et plus turgescent ; dans les crânes, la proéminence qui y correspond, est manifestement plus large et plus bombée que dans ceux recueillis au commencement de l'hiver.

Au printemps, toutes les parties situées à l'entour de la nuque reçoivent en abondance l'afflus du sang et une turgescence nerveuse propre. Le gosier se développe, et, en général, ces parties sont, pendant tout le temps des amours, dans un état de surirritation. Chez les chameaux femelles, il se forme à cette époque une tumeur qui suppure ou laisse suinter pendant tout le temps du rut, une liqueur d'une odeur très forte. Tout ceci prouve que les testicules et les ovaires ne sont pas les seules parties qui, dans la période du repos de l'instinct de la propagation, diminuent, et qui, dans la saison des amours, reprennent plus de plénitude.

De tous ces phénomènes, je conclus qu'il existe une réaction réciproque entre le cervelet et les parties qui l'environnent immédiatement, ainsi qu'entre lui et les parties sexuelles elles-mêmes. En traitant de l'etat de maladie, je fournirai, en faveur de cette assertion, des preuves plus convaincantes encore.

Voici encore une objection tirée du *Dictionnaire des Sciences Medicales*, t. XXXVII. p. 267 : "Pourquoi donc la protubérance affectée à tel sentiment ou à telle passion particulière, restant la même, y a-t-il tant et de si continuelles vicissitudes dans l'affection ou disposition sensitive correspondante ? Si l'amour physique ou l'appétit vénérien a son siége organique situé derrière la tête, pourquoi l'intermittence, les variations, les degrés d'énergie ou d'affaiblissement d'une telle passion, se proportionnent-ils toujours à l'état d'irritation ou d'action d'un foyer particulier de sensibilité, ou d'un appareil nerveux dont l'influence est assez connue ? Si c'est la prédominence d'un tel foyer, son excitation actuelle par le fluide séminal qui l'impressionne et l'irrite, qui détermine l'appétit et fait naître la passion physique de l'amour, pourquoi ne serait-ce pas là aussi qu'elle aurait son organe ou son siége propre ?"

Lorsque M. Delpit a fait imprimer cet article l'an 1819, mon *Traité sur l'instinct de la propagation* était déjà imprimé l'an 1818, et mes idées étaient connues

par mes leçons publiques et par tous les ouvrages de mes élèves. Pourquoi M. Delpit ne s'attache-t-il pas à reproduire toutes mes preuves et à les infirmer ou réfuter toutes les unes après les autres? Ces Messieurs ont la prétention de détruire les preuves les plus nombreuses de tout genre par une seule remarque, quelque hasardée qu'elle soit. Cela s'appelle bien, comme s'exprime Cabanis sur les facultés des femmes, enlever, avec un talent facile, légèrement la superficie des objects. Les collaborateurs d'un dictionaire ont pris l'obligation de transmettre à la postérité les connaissances de leur temps. Mais tous ceux qui ont parlé dans le *Dictionaire des Sciences Médicales* soit sur l'anatomie, soit sur la physiologie du cerveau, se sont permis, souvent même avec mauvaise foi, les plus puériles inexactitudes. D'abord pourquoi M. Delpit, dit-il, si l'appétit vénérien a son siége organique situé *derrière la tête?* Pourquoi ne dit-il pas avec nous *a son siége dans le cervelet?* N'y aurait-il pas là tant soit peu de malice? En second lieu, si M. Delpit et son commité s'étaient bien imbus de leur objet, ils auraient trouvé dans presque tous les traités sur cet instinct, que ses intermittences, ses variations, ses degrés d'énergie et d'affaiblissement ne se proportionnent nullement à l'irritation des parties sexuelles. Ils auraient trouvé que cet instinct est quelquefois très énergique, avant qu'il n'existe la moindre irritation dans les parties de la génération; ils auraient trouvé que cet instinct est encore trop souvent très actif, quand les parties sexuelles ne se prêtent plus à aucune irritation vénérienne; ils auraient trouvé que cet instinct existe quelquefois dans les castrats ou même dans des personnes mutilées ainsi par un défaut d'organisation primitive; ils auraient encore trouvé que c'est beaucoup plus l'action cérébrale que l'excitation des parties sexuelles par le fluide séminal, qui détermine l'appétit vénérien. Enfin ils auraient senti que, pour s'immiscer avec quelque espoir de succès dans les discussions sur la haute physiologie, il faut au moins avoir quelque

idée de la difference qui existe entre un organe législateur, regulateur, et ses instrumens d'exécution.

Preuves, prises de l'état de maladie, en faveur de l'assertion que le cervelet est l'organe de l'instinct de la propagation.

Influence de la castration sur le cervelet.

On opère la castration, ou dans la première jeunesse, ou dans l'âge adulte.

Dans le premier cas, l'influence de cette opération, sur la constitution tout entière, sur les instincts, les penchans et les facultés, est plus générale et plus marqués que dans le second. L'animal mâle quelconque, tout comme l'homme, qui l'a subie, prend les formes féminines. Chez l'homme, la barbe ne pousse pas, le gosier ne se développe point, et, par cette raison, le sujet n'acquiert jamais une voix mâle, etc. Voilà des phénomènes que tout le monde connaît; mais on n'a point fait attention au plus essentiel de tous, qui est le défaut de developpement du cervelet.

Le cervelet est arrêté dans son développement, et n'acquiert pas, à beaucoup près, les dimensions auxquelles il fût parvenu, si la castration n'avait pas été enterprise. Si l'on examine dans les crânes de hommes et d'animaux, châtrés jeunes, la place du cervelet, elle paraît comme *ratatinée;* elle est beaucoup moins large et moins profonde; même les os crâniens immédiatement contigus, sont plus épais, moins transparens et plus raboteux que dans les sujets non-châtrés. Que l'on compare (Pl. LVIII.) le crâne du chat coupé, fig. 5, avec le crâne du chat entier, fig. 2. Que l'on compare les crânes de lapins coupés, de moutons, de chevaux hongres, avec les crânes d'animaux mâles entiers de la même espèce. La différence frappe au premier coup-d'œil, et devient bien plus sensible encore lorsque l'on mesure les cavités qui renferment le cervelet, les fosses occipitales dans toutes leurs dimensions.

C'est de ce défaut de développement du cervelet, et point du tout de la moindre saillie des muscles, qu'il résulte, comme je l'ai prouvé dans la section de l'influence du cerveau sur la forme du crâne, que tous les animaux coupés ont une nuque moins large et plus grêle que les animaux entiers, tels que le bélier, le taureau, etc. Cette différence est très marquée, même chez le coq et le chapon, quoique dans cette espèce le cervelet soit placé dans le milieu de la partie postérieure du crâne. Voy. (Pl. LVII.) le crâne du chapon, fig. 3, et celui du coq, fig. 1.

Ce développement imparfait du cervelet est aussi la seule cause pour laquelle l'instinct de la propagation ne se manifeste pas, ou se manifeste d'une manière très imparfaite. Si Boileau n'avait pas été privé de la virilité par le coup de bec qu'un coq-d'Inde lui donna dans son enfance, il n'eût certainement pas épanché sa bile castique sur le beau sexe ; et la cruauté avec laquelle les eunuques, à ce que l'on dit, traitent les femmes, prendrait du moins une autre direction, si l'on n'avait pas, dès leur enfance, arrêté le développement de leur cervelet.

Lorsque la castration a lieu après la fin de la croissance, ou du moins à une époque où le cervelet est en grande partie développé, elle n'empêche ni la manifestation de l'instinct de la propagation, ni ne détruit la faculté d'exercer le coït. Preuve certaine que l'instinct de la propagation dépend d'autres conditions que de l'existence des parties génitales, et de la liqueur séminale.

Quelques physiologistes qui déduisent l'instinct de la propagation d'une propriété irritante de la liqueur prolifique, soutiennent que chez les châtrés la semence reste dans le sang, et que c'est là ce qui explique tous les phénomènes qui ont lieu encore chez les eunuques.

Cette explication suppose qu'il peut exister dans le sang une véritable liqueur spermatique qui n'aurait pas été sécretée par les testicules, reçue dans les vésicules séminales, et absorbée de là ; mais cette hypo-

thèse est en contradiction avec les principes de l'anatomie et de la physiologie. Dans la manière de voir de ces physiologistes, la liqueur séminale existerait également dans les alimens. Et pourquoi donc n'en existerait-il pas dans le sang des animaux qui ont été coupés dans un âge tendre, dans le sang des femelles et des femmes?

Pour se tirer d'embarras, ils ont recours à la liqueur des prostates; c'est elle qui, à les en croire, produit chez les eunuques, non-seulement l'instinct de la propagation, mais qui les rend encore propres à en exercer l'acte.

Mais on sait que la sécrétion de cette liqueur a encore lieu chez des sujets décrépits, et qu'elle n'existe pas du tout chez les enfans, qui cependant ont de fréquentes érections.

Il paraît pourtant que les suites de la castration ne sont pas les mêmes ches tous les sujets. Chez quelques-uns, les poils de la barbe tombent pour ne plus repousser; le gosier qui était déjà développé, se contracte de nouveau, et la voix redevient celle d'un garçon impubère. Dans ce cas, et je suis tenté de dire dans tous les cas, l'influence de l'opération finit par se manifester sur le cervelet. Il ne diminue pas toujours au point de devenir aussi petit que si son développement avait été empêché dans l'enfance; mais il se rapetisse et s'aplatit considérablement; les bosses occcipitales aussi, qui déjà étaient très bombées s'aplatissent, et l'intervalle entre les procès mastoïdiens se resserre. Ces changemens sont suivis de plus de calme du tempérament, et enfin de l'impuissance.

Ainsi donc, l'observation faite sur les eunuques, prouve que l'instinct vénérien ne dépend point des parties génitales, mais du cervelet.

Tout cela n'empêche pas M. Richerand de dire:

"Le cranioscope fait, du cervelet, l'organe de l'amour physique, c'est-à-dire qu'il y loge la faculté génératrice: c'est en vain qu'on lui objectera que le

cervelet des eunuques est aussi volumineux que celui des autres hommes; que l'amputation des organes génitaux, faite de bonne heure, éteint les désirs amoureux, sans empêcher pour cela le cervelet de s'accroître; qu'il est très difficile, pour ne pas dire impossible, de juger sur une tête entière, et non dépouillée de ses chairs, de la saillie plus ou moins forte des bosses occipitales inférieures, correspondantes au cervelet; que les blessures de cette région, comme toutes celles de la moelle de l'épine, doivent diminuer la faculté génératrice, de même qu'elles affaiblissent toutes les autres facultés; que les médecins de cet évêque d'Allemagne, atteint d'une folie amoureuse, dont il raconte l'histoire dans ses leçons, le guérirent par la castration, et non en lui faisant une blessure à la nuque; que ce n'était point par l'effet d'une plaie du cervelet que les Scythes, dont parle Hippocrate dans son immortel ouvrage, *de l'air, des eaux et des lieux*, devenaient inhabiles à la génération, qu'en général les animaux ont le cervelet plus volumineux que l'homme, quoique le plus grande nombre soit privé de la faculté de faire l'amour en tout temps, et présente moins de salicité..... .....M. Gall ne tient aucun compte de toutes ces observations, et poursuit sa carrière sans daigner y répondre.

"Tel un âne broute l'herbe naissante,
Malgré les cris du maître et des servantes." *

Après ce qui a été dit jusqu'ici, je peux me contenter de faire remarquer qu'il est absolument faux de dire que les animaux ont, en général, le cervelet plus grand que l'homme. Le bœuf, le cheval, l'âne, le cochon, et une infinité d'autres, l'ont manifestement bien plus petit. Il n'y a que l'éléphant et les grands mammifères aquatiques qui l'aient plus grand.

* *Des Erreurs populaires relatives à la médicine*, seconde édition, p. 265.

Influence de la castration unilatérale sur le cervelet.

De tous les faits qui prouvent que le cervelet est l'organe de l'amour physique, l'effet produit par l'ablation d'un seul testicule est, sans contredit, le plus péremptoire.

Toutes les fois qu'on a enlevé un seul testicule à un animal, de quelque espèce qu'il soit, le lobe du cervelet, du côté opposé s'atrophie visiblement, ou est altéré dans sa substance d'une manière quelconque.

M. Dannecy m'a communiqué le fait suivant, qu'il a observé lui-même à l'hospice de l'Ecole de Médecine, en présence de M. Patrix, chirurgien en second de l'établissement, et de plusieurs élèves : il est consigné sous le n°. 108 (15 juillet 1817,) dans le cahier d'annotations pathologiques de l'hospice. Dans l'autopsie de Jean-Michel Brigaud, mort le 14 juillet 1817, après avoir été opéré d'un sarcocèle, du côté droit, le 30 décembre 1815, on remarqua ce qui suit : Le cerveau et le cervelet étaient couverts d'une couche légère, d'une substance blanche albumineuse transparente. Le lobe gauche du cervelet était beaucoup plus mou et plus flasque que le lobe droit. Ses circonvolutions, ou plis, paraissaient aussi plus affaissés du même côté. Chacun de ces lobes ayant été ouvert exactement à six lignes de la partie latérale correspondante à la moelle allongée, on a été surpris de voir combien la proportion de la matière blanche et de la matière grise était supérieure dans le lobe droit : la différence, en plus, a été estimée à plus d'un tiers ; aussi la développement intérieur du crâne correspondait à cette différence.

M. le baron Larrey m'envoya un soldat qui, dans l'operation d'une hernie, avait perdu le testicule droit. Plusieurs années après, son œil droit s'affaiblit, it commença à loucher de l'œil malade, et ne pouvait presque plus distinguer les objets de cet œil. J'examinai sa nuque en présence des deux médecins qui me l'avaient amené, et j'y trouvai la bosse occipitale, du côté

gauche, beaucoup moins saillante que celle du côte droit ; la différence était tellement sensible, que les deux médecins en furent frappés au premier coup-d'œil.

J'ai fait châtrer unilatéralement, plusieurs lapins, les uns du côté droit, les autres du côté gauche. Les ayant fait tuer six à huit mois après, j'ai trouvé, sans exception, le lobe du cervelet, du côté opposé à celui où la castration avait été opérée, plus petit, et la bosse occipitale plus aplatie que l'autre.

Je connais, il est vrai, un homme qui a perdu un testicule, il y a quatre ans ; et à l'heure qu'il est, on ne remarque aucune différence entre ses bosses occipitales ; mais ce fait ne prouve rien contre ce que j'ai avancé plus haut, car le changement peut exister dans l'intérieur, sans être, jusqu'ici, devenu sensible au dehors.

Influence de la lésion des parties sexuelles sur le cervelet.

Depuis long-temps, les chasseurs ont observé que les lésions des testicules ont, chez les chevreuils et les cerfs, une influence remarquable sur le bois. L'animal ne le jette plus, et il se déforme de différentes manières ; il y naît des excroissances fongueuses, ou en choux-fleur. Nous vîmes, à Marbourg, une collection considérable de bois ainsi déformés. Tout le monde connaît la différence des cornes des bœufs, avec celles des taureaux.

D'après quelles lois ces phénomènes ont-ils lieu ? C'est là une question qui peut donner lieu à des opinions très divergentes. En conséquence de ce que j'ai dit plus haut, en parlant de l'influence du cerveau sur le crâne, dans l'état de maladie, je soutiens que dans tous ces cas, il s'opère d'abord un changement dans le cervelet ; qu'il y a dans cette partie diminution de la plénitude nerveuse. J'ai prouvé, dans la même sec-

tion, en alléguant des faits nombreux, que la substance osseuse du crâne devient ou plus dense ou plus épaisse, toutes les fois que le cerveau a commencé à diminuer, soit par suite d'une longue maladie cérébrale, soit par suite de la vieillesse. Ce n'est que de cette manière que l'on peut concevoir, après la lésion des testicules, l'excessive croissance du bois, comme une suite de la diminution du cervelet, produite par ces lésions.

Une autre observation, faite également sur les cerfs, paraît constater l'influence réciproque du cervelet et du bois. Lorsqu' immédiatement avant l'époque du rut, on scie le bois tout près de la couronne, la saillie du cerf devient inféconde. Cependant on dit qu'un daim, qui était abondamment nourri dans un parc, a fait exception à cette règle.

J'en viens maintenant à des faits que j'ai observés sur l'homme même, et qui ne laissent aucun doute sur l'influence nuisible des lésions des testicules sur le cervelet.

Un homme de trente ans s'était froissé le testicule gauche, à l'âge d'à-peu-près vingt-quatre ans; peu à peu, ce testicule s'était atrophié, et avait pris la consistance d'une petite pelotte de coton. Après avoir suivi mes leçons, il fut curieux de savoir si cet accident avait eu quelque influence sur son cervelet; et il ne tarda pas de s'apercevoir que sa bosse occipitale droite, était beaucoup moins bombée que la gauche. J'ai moi-même examiné soigneusement ce sujet, et j'ai trouvé perfaitement confirmées, tant l'atrophie du testicule gauche, que celle du côté droit du cervelet.

Peu après, un domestique vint me trouver, et se plaignit à moi d'être depuis quelque temps beaucoup plus indifférent pour les femmes qu'à son ordinaire, indifférence qu'il attribuait à un coup qu'il avait reçu aux testicules quelques années auparavant. Chez lui aussi je trouvai le testicule gauche presque entièrement atrophié; de suite je portai la main à sa nuque, et je sentis que la bosse occipitale droite était entièrement aplatie; la gauche, au contraire, était assez bombée.

Par hasard, l'un de mes auditeurs se trouvait dans ma maison ; je le fis entrer sans lui dire un seul mot. Dès qu'il eut examiné la nuque du domestique, il lui demanda s'il avait un testicule plus petit que l'autre : question qui jeta cet homme dans un grand étonnement. Voilà donc deux cas d'atrophie du lobe du cervelet, du côté opposé à celui où il y a eu lèsion d'un testicule. Je rapporterai encore quelques observations qui nous autorisent à conclure que les fibres médullaires, remontant des parties génitales le long de la moelle épinière jusqu'au cervelet, s'entrecroisent avec les fibres médullaires de cette partie, tout comme une grande partie de la moelle allongée s'entrecroise avec une grande partie du cerveau.*

M. le baron Larrey m'envoya un soldat âgé de trente ans qui, il y a neuf ans, s'était froissé les testicules contre la palette de la selle, à la suite de quoi ils s'étaient enflés, et étaient devenus très douloureux ; peu de temps après, ils commencèrent à s'atrophier de manière qu'il n'en resta plus que de petites pelottes membraneuses. Les bosses occipitales sont étroites, renfoncées et raboteuses ; il ne sont pas la moindre irritation dans son flasque membre viril, et les femmes lui sont maintenant tout-à-fait indifférentes, quoique autrefois il y fût très adonné.

Les faits suivans consignés dans les cahiers d'anatomie pathologique de l'Hôtel-Dieu, m'ont été communiqués par M. Rousseau, chargé de la rédaction de ce recueil.

Le nommé Florat, âgé d'environ soixante ans, mourut le 19 mars 1818, d'un cystite avec inflammation et suppuration de la prostrate. Le testicule gauche avait un volume un peu moindre que le droit ; l'épididyme gauche était gonflé, endurci, et contenait un peu de pus ; le lobe droit du cervelet était moins considérable que le gauche.

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* En opposition avec ce que nous avons dit, vol. 1.

Une femme mourut d'une péritonite aiguë, qui avait été précédée d'un hydropisie de l'ovaire droit, et ensuite d'une ascite; on avait procédé plusieurs fois à la ponction. A l'autopsie, on trouva l'ovaire converti en trois vastes kystes remplis de sérosité: le lobe gauche du cervelet était sensiblement atrophié.

Chez un autre femme, morte le 11 novembre 1818, on trouva à l'autopsie cadavérique, dans l'ovaire droit, un kyste contenant environ une cuillerée à café de sérosité limpide; l'ovaire gauche était sain. Le cerveau n'offrait rien de remarquable, mais le lobe gauche du cervelet était d'un tiers environ plus petit que le droit.

Un jeune homme de vingt-un ans, grand, d'une constitution sèche, entra à la Charité dans la première quinzaine du mois d'août 1822. Il avait l'air hébêté, parlait à peine, et se plaignait d'une douleur profonde et continue à la partie postérieure de la tête du côte droit. Il avait les yeux saillans, et la peau de la figure ainsi que celle de tout le corps, sale, sèche et comme terreuse. Il restait couché sur le dos et se remuait difficilement, quoiqu'il ne fût paralysé ni du sentiment, ni du movement, mais sa sensibilité était fort obtuse. Depuis qu'il était malade il n'avait eu aucune érection. Le testicule droit était d'un volume ordinaire. Le côté gauche des bourses était plus volumineux; il y avait un hydrocèle qui empêchait d'apprécier le volume du testicule de ce côté.

Ce malade mourut le 6 septembre, on l'ouvrit le 7. On trouva le lobe droit du cervelet plus gros que l'autre, et l'on voyait une saillie bien marquée à sa face supérieure. On incisa de côté sur cette saillie, et on trouva une tumeur rougeâtre, d'apparence charnue, au milieu de la substance médullaire qui offrait les changemens suivans: d'abord elle était plus large que celle du côté opposé; sa couleur était d'un jaune clair; elle avait une résistance assez grande, puisqu'on en soulevait une lame assez longue sans qu'elle se rompît; on ne pouvait pas en faire autant sur celle du lobe

gauche. J'ai dit une lame, parce que la portion de substance médullaire qui entourait immédiatement la tumeur avait l'aspect d'une membrane d'une demi-ligne d'épaisseur ; je crus même d'abord que c'était un kyste, mais elle se confondait presque partout avec la substance médullaire environnante ; en quelques points seulement on pouvait la séparer.

Sa verge était assez longue, très ridée, et le gland découvert.

Le testicule droit, comme je l'ai dit, était de volume ordinaire ; il y avait du côté gauche un hydrocèle de volume médiocre, et le testicule de ce côté était plus mou et un peu moins volumineux que l'autre.

Ces observations confirment l'idée que, dans l'état de santé aussi, le cervelet doit diminuer chez les mammifères et les oiseaux, toutes les fois qu'après le temps de la chaleur les testicules diminuent.

Influence des lésions du cervelet sur les parties génitales.

Hippocrate dit des Scythes : "Lorsqu'ils se sentent malades, ils s'ouvrent une veine derrière chaque oreille ; lorsque le sang en a coulé, ils se trouvent assoupis de faiblesse, et s'endorment ; au réveil quelques uns se trouvent guéris, mais il n'en est pas ainsi de tous. Pour moi, je pense que cette méthode curative leur est très pernicieuse, car il y a derrière les oreilles des veines dont la section entraîne l'impuissance, et c'est précisément à celles-là, je crois, qu'ils se saignent ; car lorsqu'après ils s'approchent de leurs femmes, il se trouvent dans l'impossibilité d'exercer le coït." *

Alcméon regardait aussi la liqueur séminale comme une partie constituante du cerveau. Cette opinion paraît avoir été assez généralement adoptée dans l'antiquité.

* Hipp. de aere, locis et aquis, no. 20, edit. a Foës.

On trouve dans les *Mémoires de Brantôme, contenant les vies des hommes illustres et grands capitaines de son temps*, le passage qui suit: "M. de Burie mourut sans lignée, et n'en eut jamais. Sa femme qui était naïve et libre, disait qu'il n'avait pas tenu à lui ni à elle, car ils en avaient bién fait le devoir pour en avoir, mais que son mari avait eu autrefois, aux guerres, un coup d'épée ou de masse d'arme sur la nuque du cou qui lui empêchait le conduit de la semence, si bien que la vraie crême ne pouvait ni passer, ni couler, sinon quelque petite espèce d'eau claire dans sa matrice, qui ne servait nullement pour engendrer ni concevoir."*

A Vienne, je fuis consulté par deux officiers devenus impuissans à la suite de coups de feu qui leur avaient rasé la nuque. L'un d'eux recouvra peu à peu la faculté génératrice, se maria, et fut père de plusieurs enfans. A cette époque, je n'étais pas encore attentif aux changemens que subit la nuque elle-même après de semblables lésions.

A Berlin, M. le docteur Formey nous parla d'un homme qui, à la suite d'une blessure à la nuque, eut d'abord des érections désordonnées, après quoi il tomba dans une impuissance complète; il recouvra cependant la virilité après six mois. Dans ce cas, l'inflammation causée par la blessure, avait d'abord produit une irritation dans le cervelet; cette irritation fut suivie de faiblesse, comme le sont d'ordinaire toutes les inflammations et toutes les suirritations; de-là d'abord impuissance, et puis retour des forces, retour de la virilité.

Un cocher qui jusque-là avait été un vaillant champion au champ d'amour, se frappa la nuque contre une poutre; depuis cet accident, sa femme se plaignit à moi de ce que les forces de son mari s'éteignaient davantage de jour en jour, et de ce qu'il était devenu complétement nul. M. le baron Larrey a trouvé la

* Edition in-12, Londres, 1739, t. II, p. 182.

remarque qu'Hippocrate fait sur les Scythes, confirmée chez les Egyptiens : ils s'appliquent fréquemment des ventouses dans la nuque, et des observations multiplées ont convaincu M. Larrey que ces saignées souvent répétées, affaiblissent considérablement les soldats, sous le rapport de l'acte de la cohabitation.

Ce savant a eu la complaisance de me communiquer les faits qui suivent, relatifs à l'influence des lésions de la nuque sur l'instinct de la propagation.

Il m'a fait voir, avant son départ pour l'Espagne, un soldat de la garde impériale, jugé dans le cas de réforme, pour une faiblesse générale de tous les organes, et notamment pour la nullité d'action des parties génitales. Ce sujet avait été blessé à la nuque, par un éclat d'affût de canon, à la prise d'Alexandrie, lors de la descente de l'armée française en Egypte. Il était pour lors âgé de dix-huit ans. Après une suite d'accidens graves, qui accompagnèrent cette blessure, et pour lesquels il resta á l'hôpital l'espace de trois ou quatre mois, ses parties génitales tombèrent dans un état d'atrophie, et il perdit avec leurs fonctions physiques, l'érection du membre viril, et le désir de voir des femmes. Ce jeune homme est resté imberbe, frêle, décoloré, faible, languissant, et parlant comme une femme. Il était parvenu à l'âge de trente-deux ans, lorsqu'il a été réformé, et il ne paraissait en avoir que dix-huit.

Un autre garde impérial, du corps des chasseurs à cheval, s'est présenté à M. Larrey, avec une cicatrice qui coup transversalement la bosse occiptale, résultat d'un coup de sabre qu'il a reçu à la bataille de Wagram. Jusqu'alors ce chasseur avait fréquenté les femmes comme tous ses camarades. Depuis ce moment, il a été privé non seulement de tout érection, mais encore il a perdu tout désir.

Auguste François, maréchal-des-logis des cannonniers à cheval de la garde, reçut, au combat de Benevente, un coup de balle de mousquet qui traversa, d'un côté à l'autre, les attaches des muscles exten-

seures de la tête, en effleurant les bosses occipitales inférieurs, très saillantes chez ce sujet, lesquelles furent dénudées des attaches aponévrotiques. M. Larrey brida les deux overtures produites par la balle, et il retira une portion de la chemise de ce cannonnier, restée dans le trajet de la plaie que l'on pansa avec les émolliens. Le blessé éprouva d'abord des douleurs vives à l'occiput, de la pesanteur, et un engourdissement dans les membres inférieurs; la vue et l'ouïe s'affaiblirent au point qu'il pouvait à peine distinguer les gros objets, et entendre les sons les plus aigus. Les testicules se réduisirent, et tombèrent dans un état d'atrophie; le membre viril se flétrit aussi, et resta sans action. Cependant les plaies se détergèrent ; les accidens locaux se disipèrent, et le blessé se trouva guéri avant le cinquantième jour.

René Bigot, chasseur à cheval, d'une forte constitution, et très passionné pour les femmes, avait reçu, au même combat de Benevente, un coup de sabre qui avait coupé la peau et toute la portion convexe ou saillante de l'occipital jusqu'à la dure-mère, dont une portion avait été entamée. On voyait le lobe droit du cervelet à travers l'ouverture de la dure-mère. Le plus léger attouchement sur cet organe causait des vertiges, des syncopes et des mouvemens convulsifs, sans qu'il donnât le moindre signe de douleur. M. Larrey détacha la portion osseuse de l'occipital, laquelle était restée adhérente au lambeau qu'il appliqua doucement sur l'excavation du crâne, ayant eu soin de faire une incision à la base de ce lambeau pour favoriser l'issue des fluides. La portion correspondante à l'ouverture de la dure-mère, ne contracta point d'adhérence, à cause d'un suintement qui n'avait cessé de se faire de l'intérieur du crâne, où d'ailleurs il n'y avait point d'épanchement. Ces fluides sortaient, à chaque pansement, par petites bulles qui produisaient un léger sifflement, que l'on attribua à l'air extérieur qui entrait et sortait par lar même ouverture.

Dès les premiers jours, le blessé perdit la vue et

l'ouïe du côté droit. Il éprouvait, en même temps, des douleurs vives sur le trajet de l'épine dorsale, et une sorte de fourmillement dans les testicules qui diminuèrent sensiblement, et furent réduits, surtout celui du côté gauche, au volume d'une fève de marais en moins de quinze jours. Bientôt après il perdit l'idée ou le souvenir des jouissances qu'il avait goûtées auprès d'un grand nombre de femmes.

Il avait très bien supporté le voyage de Benevente à Valladolid. D'ailleurs la plaie était en fort bon état, et donnait des espérances de guérison, si l'on excepte que les fonctions de la vue, de l'ouïe et de la génération paraissaient abolies pour toujours, lorsque des symptômes d'inflammation se déclarèrent et allèrent en augmentant progressivement, malgré les moyens qu'employa M. Larrey pour les combattre. Les douleurs de la tête et de l'épine faisaient jeter au malade des cris lugubres. Il était constamment couché dans son lit, sur le côté droit. Le moindre movement lui donnait des convulsions, et lorsqu'il se levait pour prendre du bouillon ou quelque médicament, il tombait dans des syncopes effrayantes.

M. Larrey fit appliquer un large vésicatoire à la tête ; il prescrivit les boissons rafraîchissantes, et tout ce qui était indiqué ; mais le mal empira de plus en plus, et le blessé mourut dans un état tétanique, le 7 février 1809, trente-huit jours après l'accident arrivé le 29 décembre 1808.

L'autopsie cadavérique fit reconnaître les symptômes suivans : il y avait eu une grande déperdition de substance à l'occipital ; l'ouverture dont nous avons parlé à la partie de la dure-mère, correspondante au lobe droit du cervelet qui était affaissé, était de couleur jaunâtre, sans suppuration ni épanchement ; les moelles allongée et épinière étaient d'un blanc terne, d'une consistance plus ferme que dans l'état naturel, et réduites d'un quart de leur volume ; les nerfs qui en émanent parurent également atrophiés.

Baptiste Vallet, âgé de quarante ans, d'une constitution athlétique, soldat au 5e. régiment d'infanterie de la garde, entre à l'hôpital du Gros-Caillou le 28 août 1821, atteint d'hémiplégie complète de tout le côté droit du corps; le membre superieur ne conservait aucun mouvement et était privé de sa sensibilité. L'inferieur pouvait encore un peu servir à la marche, quoique d'une manière pénible. Cette hémiplégie reconnaisait pour cause une chute faite de cinq pieds de haut, il y avait environ un mois, sur la partie latérale gauche et antérieure de la tête. La céphalalgie, premier résultat de cette chute, avait pris en quelques jours une telle intensité que Vallet avait été contraint d'entrer à cette époque à l'hôpital, et avait été placé dans les salles des fiévreux. Des bains de jambes sinapisés, une saignée, six sangsues aux tempes, un vésicatoire au bras droit, avaient été les moyens mis en usage. La céphalalgie avait en effet cédé à l'influence de ces moyens; l'hémiplégie, qui ne commençait que de se développer, ne fut point combattue. D'ailleurs le malade était sorti quinze jours après son entrée, dans l'espérance que la marche, l'exercice, un air plus pur, pouvaient lui être favorables. Cet espoir ayant été deçu, car à l'hémiplégie qui s'était prononcée de plus en plus, il s'était joint un trouble et une faiblesse notables dans la vue de l'œil droit, un commencement de paralysie dans la langue, et une difficulté assez grande dans la prononciation; Vallet rentra alors, comme nous l'avons indiqué, le 28 août, et fut placé dans les salles des blessés.

M. le baron Larrey, après un examen attentif de ce sujet, reconnut une exubérance contre nature dans la région latérale gauche et supérieure du crâne. Quelques questions faites au malade, relatives aux causes de ces phénomenes, amenèrent Vallet à parler de sa chute. Dès-lors M. Larrey reconnut facilement que tous les accidens que le malade avait présentés et présentait encore, étaient dus à la commotion du cerveau et à l'altération des os du crâne, des méninges, et sans

doute de la masse encéphalique. Il se détermina en conséquence à attaquer le mal à sa source même. Après avoir fait désemplir les vaisseaux cérébraux au moyen d'une saignée à la veine jugulaire, il fit raser entièrement la tête et appliquer un large vésicatoire sur tout le côté gauche de cette partie. Quatre jours après, Vallet allait déjà mieux; les doigts avaient repris quelques-uns de leurs mouvemens, l'avant-bras commençait à se fléchir sur le bras. Un second et un troisième vésicatoires appliqués à quelque distance d'intervalle, une huitaine de jours, entretinrent ce mieux sensible; quelques pillules de calomel, une potion de valériane pour la nuit, des frictions d'huile de camomille camphrée sur les membres paralysés, étaient les autres moyens qu'on employait. Le 17 septembre, un premier moxa fut appliqué sur les parties latérales et supérieures du cou, et quelques jours plus tard on établit deux exutoires au moyen de la potasse, un de chaque côté de la base du crâne, entre les apophises mastoïdes et les bosses occipitales supérieures. Les mouvemens des extrémités furent alors à moitié rétablis, le malade pouvait se lever, marcher librement et prendre tout l'exercice nécessaire au maintien de cette amélioration. La parole restait encore un peu embarrassée; les mots où se recontraient desir, étaient ceux qu'il prononçait le plus parfaitement et qu'il choisissait pour ainsi dire instinctivement. Déjà chez plusieurs autres malades atteints d'affections cérébrales de cette nature, nous avions remarqué ce choix de mots et cette plus grande facilité à les prononcer. Plusieurs autres moxas, au nombre de dix ou douze, ont été appliqués successivement et à des distances convenables sur le trajet des branches du nerf facial et des paires cervicales qui vont former le plexus brachial droit, pour achever la guérison. Elle eut lieu en effet vers le commencement de novembre, mais elle n'était point encore assez consolidée pour qu'on ne craignît pas le retour de l'hemiplégie. Néanmoins Vallet qui était d'un caractère

obstiné, et chez qui d'ailleurs l'intellect était peu développé, content de sa situation présente, ne voulut pas continuer à supporter l'application de nouveaux moxas, et se livra à l'intempérance ; quelques jours après, il fut puni de son entêtement et de son inexactitude à suivre le régime prescrit ; la paralysie revint accompagnée d'un embarras gastrique. On fit de nouveau raser la tête et appliquer un large vésicatoire ; une potion avec l'huile de ricin fut administrée, un scrupule d'acétate d'ammoniaque fut ajouté dans une potion anti-spasmodique, de nouveaux moxas furent appliqués à la base du crâne du côté opposé à la paralysie et sur les paires cervicales du même côté. Cette rechute fut encore combattue avec succès par ces moyens, et la force étant tout-à-fait revenue dans les extrémités droites, le malade sortit enfin le 19 octobre, parfaitement guéri.

Quatre mois après, nous apprîmes que Vallet, rentré depuis quelque temps à l'hôpital dans la division des fiévreux, pour une affection catharrale avec céphalalgie et adynamie générale, y était mort le 7 février. Le lendemain on fit l'ouverture de son corps.

Le crâne scié circulairement et enlevé avec précaution, nous observâmes que le côté gauche de cette voûte était moins profond que le droit. La surface de la dure-mère légèrement injectée et d'une teinte jaunâtre offrait les traces d'une inflammation chronique. L'arachnoïde était saine ; soulevée à l'aide d'un chalumeau, on distinguait très bien que cette membrane n'était nullement enflammée ; ce qu'on aurait pu croire sans cette précaution, car à la première vue on voyait une injection très belle, une inflammation très prononcée, mais qui appartenaient l'une et l'autre à la pie-mère et non à l'archnoïde, dont la présence semblait disparaître sous une teinte aussi rouge. Tous les principaux vaisseaux étaient très distendus et gorgés de sang noirâtre. En soulevant le cerveau de la base du crâne, on aperçut le nerf optique droite plus gros, plus dense que le gauche ; il était aussi d'une couleur

rougeâtre; un tubercule stéatomateux en suppuration entourait l'artère basilaire avant sa bifurcation, et rendait son diamètre plus petit. Ce tubercule avait même contracté un point d'adhérence sur le pont de varole. Toute la substance médullaire du cerveau, principalement de l'hémisphère gauche, était engorgée, d'une consistance plus ferme et d'un aspect plus gris que l'état naturel. L'hémisphère droit se rapprochait davantage de cet état par sa mollesse et sa blancheur. Dans la protubérance annulaire même, le côté gauche était également plus dense que le droit, il ne cédait que très difficilement à de forts degrés de pression. Les circonvolutions du cerveau étaient aussi plus profondes et plus minces à gauche.

Quand on eût achevé l'examen du cerveau et qu'on porta ses regards sur la base du crâne, on fut frappé de l'extrême différence que présentaient les fosses moyennes; la droite était presque de moitié plus large que le gauche; les fosses antérieures avaient une différence bien moins prononcée. Quant aux fosses postérieures, celles qui logent le cervelet, leur petitesse et leur peu de profondeur excitèrent l'étonnement; elles engagèrent à remarquer le cervelet et les organes génitaux pour voir quels rapports existaient entre eux. Les deux lobes du cervelet, d'une égale forme, étaient en effet de la moitié moins volumineux qu'on ne l'observe ordinairement chez un sujet de la même grandeur, et les testicules réduits au volume d'une fève de haricot, n'offraient presque aucune consistance. Le pénis n'avait que six lignes de longueur. (La tête de Vallet qu'on prépare en ce moment, sera remise à M. le docteur Gall.)

La cavité thorachique nous a aussi présenté des phénomènes intéressans et analogues à ceux des os du crâne. La cavité droite etait beaucoup plus petite que la gauche; le poumon de ce côté était très petit, adhérent aux deux côtés et dans un état d'inflammation récente; le foie, très volumineux, montait dans cette cavité et avait dû contribuer encore à rapetisser

le poumon de ce côté. Le droit au contraire était très ample, ainsi que la cavité qui le contient. Le cœur avait un volume ordinaire, les oreillettes étaient gorgées de sang. L'abdomen n'offrait aucun état d'altération.

M. le baron Larrey attribue la réduction osseuse qu'on a remarquée à l'influence, à l'action énergique des topiques révulsifs appliqués, et sur l'emploi desquels on a insisté le plus long-temps possible, puisqu'à l'entrée de Vallet à l'hôpital, cette partie gauche du crâne offrait au contraire une exubérance manifeste. Cette assertion a été d'ailleurs discutée et prouvée par cet habile praticien dans de semblables circonstances et dans d'autres affections cérébrales, l'épilepsie par exemple.

Le docteur Thouvenelle m'a communiqué un cas de blessure tout semblable, et qui eut les mêmes suites.

Je fais observer encore ici que chez Bigot, c'est surtout le testicule gauche qui s'atrophia, au point de se réduire aux dimensions d'une fève de marais, tandis que c'est l'hémisphère droit du cervelet qui avait été lésé. M. Larrey me fit voir des blessés semblables, dans l'hôpital de la garde, et me donna deux crânes dans lesquels la marque des coups de sabre sur les fosses occipitales atteste la lésion du cervelet ; chez tous ces sujets, il y avait eu atrophie et ramollissement des testicules.

Je vais rapporter encore un exemple fort remarquable, quoique je n'ose das décider ce qui, dans ce cas, a souffert le premier, des testicules ou du cervelet. Un garçon de treize ans se livrait depuis quelque temps à l'onanisme avec tant de fureur, que tous les moyens que l'on employa pour le corriger de ce vice, furent infructueux ; enfin il fut attaqué d'une incontinence d'urine et de vomissemens très opiniâtres. Dès le commencement de sa maladie, il ne se traînait qu'à peine, et au bout de quelques mois il fut paralysé des extrémités inférieures, sa pupille perdit la faculte de se

contracter; pendant long-temps il y voyait encore un peu vers l'angle interne des yeux, mais il finit par perdre complétement la vue; des convulsions ne tardèrent pas à se manifester autour des yeux et de la bouche. La paralysie devint complète, les poumons mêmes perdirent leur action, et il mourut suffoqué. A l'autopsie je trouvai plus d'une livre d'eau limpide dans les cavités cérébrales. L'un et l'autre lobe du cervelet étaient remplis de plus à l'intérieur; cependant la suppuration avait fait bien plus de ravages dans le lobe gauche que dans le droit. La commissure des deux lobes du cervelet (le pont), était singulièrement diminuée par l'atrophie, et d'une couleur jaunâtre. L'un et l'autre testicule étaient trés petits; celui du côté droit avait presque entièrement disparu, et était d'une consistance très molle: donc ici encore coïncidence entre la lésion des deux côtés opposés.

Il existait, dans la famille de ce jeune homme, une disposition héréditaire à l'hydropisie cérébrale. Je suis persuadé que l'eau trouvée dans les cavités encéphaliques n'était en liaison avec l'onanisme, qu'autant que sa présence avait augmenté l'irritabilité et la sensibilité de tout le système nerveaux.

La suppuration du cervelet devait aussi être établie depuis long-temps, car le pus avait plutôt l'apparence d'un putrilage purulent, que d'un pus de bonne qualité. C'est donc une question de savoir si ce n'est pas l'état maladif du cervelet qui a entraîné à l'onanisme ce jeune homme, d'ailleurs fort raisonable et très bien élevé. Faut-il admettre au contraire que c'est l'onanisme qui a causé la maladie du cervelet? Quoi qu'il en soit, ce cas prouve l'influence que les parties génitales et le cervelet exercent réciproquement l'un sur l'autre.

De tout ce que je viens de dire, il résulte que les maladies et les lésions du cervelet ont, sur les parties génitales, une influence aussi bien prouvée que l'est l'influence des maladies et des lésions de ces dernières sur le premier: il paraîtrait même que la vie

du cervelet est plus indépendante que celle des parties génitales.

Influence des maladies du cervelet sur les parties génitales, et principalement sur l'instinct de la propagation. Manie érotique.

Je traiterai cette matière sous un double point de vue ; mon intention est, 1. de donner des preuves nouvelles en faveur de la connexion immédiate qui existe entre le cervelet et les parties sexuelles, ainsi que l'instinct de la propagation ; et 2. de mettre au jour la vraie cause et la véritable origine de la manie érotique.

Il est certaines maladies des parties génitales, qui bien qu'elles occasionnent une violente irritation dans ces organes, n'ont aucune influence sur l'instinct de la propagation. Les inflammations les plus violentes de ces parties provenant de causes extérieures, ne sont jamais accompagnées ni de manie, ni de désirs amoureux. Lorsqu'une acrimonie dartreuse se porte sur ces organes, soit chez des hommes, soit chez des femmes, elle y produit bien une chaleur brûlante et douloureuse, et une démangeaison insupportable, mais elle n'excite point de désirs. J'ai vu, dans les maladies du bas-ventre, par exemple du foie, des reins, les malades avoir, pendant des semaines entières, de violentes érections qui faisaient leur tourment, loin de provoquer le moindre désir amoureux.

M. Fodéré rapporte qu'a la suite d'une piqûre d'insecte, un homme eut de violentes érections, sans la moindre sensation voluptueuse.*

Aucune de ces observations ne peut être nouvelle pour les médecins expérimentés. Comment se fait-il donc qu'ils soutiennent presque tous, avec Cabanis, que les parties sexuelles sont souvent le siége de l'aliénation mentale ? †

* Sur le Délire, t. I, p. 316.
† Sur le rapport du physique et du moral, etc. t. I. p. 107.

Un jeune homme, robuste et pléthorique, était arrivé depuis quelque temps à Vienne. Faute de liaisons, il vivait dans une plus grande continence que de coutume, et il tomba brusquement dans une manie érotique; il avait des érections long-temps continuées; ses testicules étaient enflés et douloureux. Qu'y avait-il de plus naturel, suivant les idées reçues en médecine, que de chercher la cause de sa maladie dans l'inflammation des parties génitales? Aussi employa-t-on tous les moyens pour combattre l'inflammation locale, et pour faire cesser la surirritation des organes générateurs: mais le malade n'en resta pas moins dans le même état pendant trois semaines. Lorsque je fus appelé, je rendis mes collègues attentifs à l'inflammation du cerveau, et surtout du cervelet. Nous concertâmes notre plan curatif; en conséquence de cette idée, et en peu de jours, l'inflammation et l'enflure des parties sexuelles, ainsi que la manie, avaient disparu.

L'on peut admettre, sans balancer, que lorsqu'un état maladif des parties génitales est accompagné de manie, ces parties ne sont malades que secondairement ou par sympathie, et que le siége du mal est dans le cerveau, ou, si la manie est en particulier du genre érotique, dans le cervelet. Avant de prouver cette assertion par un tableau fidèle de la manie érotique, je ferai quelques observations sur l'origine de cette maladie.

Un jeune homme très bien élevé et rempli de talens, qui depuis son enfance s'était senti violemment entraîné aux idées érotiques, les maîtrisait jusqu'à un certain point, à l'aide de son penchant également décidé à la dévotion. Lorsque ses relations sociales lui eurent permis de se livre sans contrainte aux plaisirs de l'amour, il ne tarda pas de s'apercevoir, avec une espèce d'effroi, que souvent il lui devenait très difficile de détourner son attention des images voluptueuses qui le poursuivaient, pour la porter sur les affaires importantes et souvent pressées de son état. Tout son être était absorbé par la sensualité. Pour ne

pas succomber tout-à-fait, il se trouvait forcé de s'occuper assidûment d'objets scientifiques, ou de se créer quelque nouvelle occupation favorite; son cervelet est d'une grandeur peu ordinaire.

Une dame très spirituelle était tourmentée, également, depuis son enfance, par les désirs les plus désordonnés; l'education très soignée qu'elle avait reçue, fut seule capable de la sauver des démarches les plus inconsidérées auxquelles la portait la violence de son tempérament. Lorsque dans un âge plus mûr, elle se trouva abandonnée à elle-même, elle essaya tout pour satisfaire ses désirs brûlans mais la jouissance ne paraissant que les irriter. Souvent elle se vit sur le point de tomber dans la manie. Réduite au désespoir, elle abandonna sa maison, quitta la ville, et se réfugia chez sa mère, dans une campagne isolée, où le défaut d'objets, la plus grande sévérité de mœurs, et les soins du jardinage, prévinrent l'éclat du mal. Après avoir habité de nouveau, pendant quelque temps, une grande ville, elle se trouva menacée d'une rechute, et elle se réfugia une seconde fois auprès de sa mère. A son retour elle vint me trouver à Paris, et se plaignit à moi comme une femme au désespoir. Partout, me dit-elle, je ne vois que les images les plus lubriques; le démon de la luxure me poursuit sans relâche en tous lieux, à table, dans mon sommeil même: je suis un objet de dégout pour moi-même; oui, je le sens, je le puis plus échapper à la manie ou à la mort.

Je lui fis, en abrégé, l'histoire naturelle de l'instinct de la propagation; je la rendis attentive à la forme de sa nuque. Quoique sa tête soit tres grande, le diamètre de sa nuque surpasse la distance d'une oreille à l'autre. Elle conçut la cause de son état; je lui conseillai de continuer son voyage pour aller rejoindre sa mère, de varier ses occupations pour diminuer l'activité de son cervelet; de se faire souvent appliquer des sangsues à la nuque, pour modérer l'état d'irritation de cet organe, d'éviter tous les mets échauffans et toutes les boissons irritantes, etc.

Une homme avait vécu plusieurs années dans un mariage très bien assorti, dont il était né plusieurs enfans, et il avait acquis, par son activitè, une fortune honnête. Lorsqu'il se fut retiré des affaires, et qu'il mena une vie oisive, son penchant inné dominant gagna peu a peu le dessus. Il s'abandonna tellement à ses désirs, que jouissant encore de sa raison, il regardait toute femme comme une victime destinée à satisfaire sa sensualité. Du moment où il apercevait de la fenêtre une personne quelconque du sexe, il annonçait en toute hâte, et avec l'accent de la joie, à sa femme et à ses filles, le bonheur qui l'attendait. A la fin, cette manie partielle dégénéra en manie générale, et peu aprés il mourut dans l'hospice pour les aliénés de Vienne. Son crâne prouve que son cervelet avait acquis un développement très considérable, (Pl. XL. I. I. I. I.)

M. Pinel rapporte un exemple tout semblable: "Un homme, dit-il, avait rempli, avec éloge, jusqu'a sa cinquantième année, des fonctions publiques. Il s'excite alors une ardeur immodérée pour les plaisirs vénériens; son regard est vif et animé; il fréquente des lieux de débauche, se livre à tous les excès, et revient tour-à-tour dans la société de ses amis, leur peindre les charmes d'un amour pur et sans taches. Son égarement augmente par degrés, et on est obligé de le tenir enfermé. La solitude exalte son imagination fougueuse; il peint en traits de feu les plaisirs qu'il a goûtés avec ce qu'il appelle des beautés célestes; il s'extasie en parlant de leurs grâces et de leurs vertus; il veut faire construire un temple à l'Amour, et se croit lui-même élevé au rang des dieux: ce furent-là les préludes d'une fureur violente avec délire."*

On voit, par ces exemples, que les personnes dont le cervelet a acquis un développement plus qu'ordinaire, ont une disposition naturelle à la manie érotique; mais ces exemples montrent aussi que l'extrême ac-

* De l'aliénation mentale, deuxième édition, page 15 et 16, § 18.

tivité de cet organe ne la produit réellement que dans le cas où les personnes chez qui cette disposition a lieu, se livrent exclusivement aux jouissances de l'amour physique; tant il est sûr que les fréquentes jouissances ne sont point un remède contre cette espèce de manie.

Dans les hospices, nous avons trouvé constamment le cervelet très développé chez tous les sujets attaqués de manie érotique, et chez tous ceux qui étant atteints d'une manie totale, se livraient irrésistiblement à l'onanisme.

M. Esquirol nous fit voir le plâtre d'une femme qui avait été attaquée de manie érotique. Les bosses occipitales très saillantes annoncent un cervelet extraordinairement développé.

Il en est cependant de cet organe comme de toutes les autres parties: non-seulement une activité excessive dont il est doué primitivement, peut dégénérer en manie, c'est-à-dire en une activité tellement forte, qu'elle n'est plus soumise à l'empire de la volonté; mais d'autres causes encore peuvent exalter l'action du cervelet, au point qu'il en résulte une manie érotique, même chez des personnes qui, suivant la marche ordinaire de la nature, n'y étaient pas disposées.

Ne voit-on pas, dans des maladies aiguës, des sujets qui n'avaient auparavant aucune disposition à être métromanes ou querelleurs, faire des vers et chercher dispute à tout le monde? Ces cas, il est vrai, sont fort rares, et toujours l'historie de la vie antérieure du malade, jointe à la conformation de son cervelet, pourra donner l'explication du phénomène, et décider le médecin à avoir égard dans le choix de sa méthode curative, plus particulièrement aux causes accidentelles, ou à la disposition naturelle, à des dérangemens généraux, ou à un dérangement particl.

Je place ici le tableau que fait M. Pinel de la manie érotique, tant parce qu'il confirme ce que j'ai dit jusqui'ici de cette maladie, que parce que M. Pinel lui-même, qui cependant ne paraît attribuer ce genre de manie qu'à une espèce d'effervescence qui aurait lieu

dans les parties sexuelles, est obligé d'en revenir à une disposition particulière.

"C'est dans l'un et l'autre sexe une effervescence physique des organes générateurs, avec les gestes les plus lascifs, et les propos les plus obscènes; elle tient d'autant plus à la disposition intérieure, qu'elle ne dure qu'autant que la maladie; et j'ai vu les personnes les plus recommandables par la pureté de leurs mœurs, éprouver, pendant un temps déterminé de leur état maniaque, ce rapprochement malheureux avec des femmes de débauche; puis revenir, lors de leur convalescence, à leur caractère primitif de réserve et d'une extrême décence. J'ai vu cette affection se développer dans des cas extrêmes de la manière suivante; d'abord gaîté insignificante, regard animé, recherche voluptueuse dans la toilette, curiosité inquiète, tremblement des mains, douleurs sourdes à la matrice, chaleur brûlante dans l'intérieur des seins, mobilité extrême des yeux, impatience; l'accès est alors à son plus haut degré; babil rempli de mots sales et de propos obscènes, vociférations, gestes provocateurs, et mouvemens du corps les plus lascifs, tous les emportemens effrénés, et les illusions d'un délire érotique. Cette fougue impétueuse cède à une répression rendue nécessaire, et il succède un morne repos, ou plutôt un état de lassitude: la maigreur est alors extrême, et cette fureur interne amène l'épuisement, la stupeur et la démence; l'embonpoint se rétablit par degrés. La maladie devient quelquefois périodique, et la vie se passe dans une alternative d'un égarement érotique, et de l'apathie la plus stupide." *

Le tableau qu'on vient de lire, nous conduit naturellement à cet état d'irritation du cervelet, qui entraîne les maladies connues sous le nom de satyriasis, de priapisme et de nymphomanie. Quelque divers que puissent être les idées déréglées et les sentimens extravagans qui accompagnent ces maladies, ils ont

* De l'aliénation mentale, deuxième édition, p. 67, § 78.

toujours pour pivot l'instinct de la propagation, et ce genre d'aliénation doit être rangé, par conséquent, dans la classe de la manie érotique. Comme l'on cherchait uniquement la source de ce mal dans les parties sexuelles, l'on n'a indiqué, d'ordinaire, d'autre remède que la castration. Par cette mutilation, l'activité du cervelet se trouve affaiblie; et c'est pour cela que le mal diminue quelquefois après l'opération. Mais ce moyen n'a certainement pas toujours un effet utile; car dans les grandes maisons publiques de fous, comme l'a déjà remarqué Cabanis, on voit assez souvent ces malheureux s'arracher les testicules, sans qu'il résulte de-là le moindre changement dans l'état du cerveau. Je veux bien qu'à défaut de meillure méthode curative l'on continue, dans ces cas, de couper les étalons; mais lorsque dans notre espèce il y a encore possibilité de guérison, on l'obtiendra certainement avec moins d'inconvéniens par une méthode curative dans laquelle on aurait uniquement égard à l'état du cerveau, et surtout du cervelet.

L'on parle beaucoup d'une manie, produite ou par une trop grande continence, ou par des émissions excessives de la liqueur séminale.

Une trop grand continence, supposé qu'elle ait lieu réellement, peut, sans contredit, occasionner des maladies inflammatoires, et surtout une inflammation et une surirritation du cervelet et du cerveau entier, et produire, par conséquent, la manie érotique aiguë, ou une manie générale.

Cabanis impute les accidens qui résultent d'une continence trop sévère, tantôt à l'état des organes de la génération, tantôt à un état maladif du cerveau. S'il avait connu l'influence réciproque du cervelet sur les parties sexuelles, et de celles-ci sur le cervelet et sur le cerveau, il n'aurait certainement pas hésité entre ces deux opinions. Les dispositions extraordinaires de l'esprit, les affections et les penchans singuliers, et les bizarreries qui surviennent chez les jeunes filles et les jeunes garçons mobiles et délicats,

quand les appétits nouveaux sont trop long-temps contrariés, auraient dû le mettre sur la voie. Et lorsqu'il dit que rien n'est moins rare que de voir des femmes acquérir, dans leurs accès de vapeurs, une pénétration, une élévation d'idées, une éloquence qu'elles n'avaient pas naturellement, ne devait-il pas, en bon logicien, se décider pour le cerveau?

Il cite même, d'après Buffon, l'histoire célèbre d'un curé qui, par l'effet d'une chasteté rigoureuse, était tombé dans un délire vaporeux voisin de la manie. Pendant tout le temps que dura ce délire, le malade déploya divers talens qui n'avaient pas été cultivés en lui. Il faisait des vers et de la musique; et, ce qui est encore bien plus remarquable, sans avoir jamais touché de crayon, il dessinait avec beaucoup de correction et de vérité les objets qui se présentaient à ses yeux. La nature le guérit par des moyens très simples. Mais quoiqu'il restât toujours homme d'esprit, il avait vu s'évanouir, avec sa maladie, une grande partie des facultés merveilleuses qu'elle avait fait éclore. Qui oserait faire dériver d'un état des parties da la génération la poésie, la musique et l'art du dessin?

La maniaque dont parle M. Pinel, paraît avoir été dans le même cas.

"C'est quelquefois, dit-il, un excès opposé, c'est-a-dire, des penchans vivement irrités, et non satisfaits, qui peuvent aussi jeter dans un égarement complet de la raison. Une mélancolie tendre, et des inquiétudes vagues, dont l'objet n'était ni méconnu, ni dissimulé, distinguèrent à vingt ans une personne douée d'une constitution forte et d'une vive sensibilité; tout concourait à enflammer son imagination: lecture assidue des romans les plus galans, sorte de passion pour toutes les productions des arts dans le genre érotique, fréquentation habituelle de jeunes gens des deux sexes, dont les uns la charment par des agrémens personnels et toute la séduction de la galanterie, les autres par des exemples dangereux et des confidences indiscrètes.

La coquetterie la plus raffinée est érigée alors en principe, et devient une occupation sérieuse, son orgueil, flatté des moindres prévenances, les lui fait regarder comme un triomphe assuré, dont elle ne cessait de s'entretenir ou de faire l'objet de ses rêveries, jusqu'à ce qu'une nouvelle aventure fit oublier la première. Une faute paraissait inévitable, ou du moins très à craindre, et les parens se hâtent de conclure un mariage fondé sur certaines convenances. L'époux choisi était d'un âge mûr, et malgré les avantages de sa stature et d'une complexion forte, peut être moins propre à satisfaire qu'à irriter ses désirs. La mélancolie de la jeune dame dégénère en une sombre jalousie, et elle attribue à des infidélités ce qui n'était que l'effet de la débilité des organes. Une sorte de dépérissement succède, les traits s'altèrent, et il se déclare un babil intarissable, avec le plus grand désordre dans les idées, prélude ou plutôt signe manifeste d'une manie déclarée." *

Mais il est bien rare, je crois, que la continence soit poussée au point de produire de pareils effets. La nature a tant de moyens de diminuer la trop grande abondance de la liqueur séminale, même sans le concours de l'individu, que ce genre d'aliénation ne doit être à craindre que très rarement. Croyez-en celui qui sonde les cœurs et les reins; *il n'est pas bon que l'homme soit seul.* Souvent on articule comme cause d'une maladie, une continence excessive, lorsqu'on ne devrait en chercher la cause que dans une débauche secrète. Un évêque qui édifiait son diocèse par une vie exemplaire, tomba, vers sa soixantième année, dans une mélancolie accompagnée d'une faiblesse d'esprit manifeste. Tout le monde déplorait le malheur si peu mérité du saint homme; il mit sa confiance en moi; je sortais souvent avec lui, tant à pied qu'en voiture; toutes les fois que nous rencontrions une jeune fille, il soupirait profondément; aussi souvent qu'il

* Sur l'Alienation mentale, deuxième édition, p. 47 et 48, § 58,

voyait un couple heureux, il me serrait la main avec chaleur, en s'écriant: "Quelle est leur félicité!" J'allai au-devant des aveux qu'il pouvait avoir à me faire: je l'entretins sur le ton de l'amitié, du bonheur que goûtent des époux dans un mariage bien assorti, de l'intention du Créateur empreinte dans toutes les œuvres de la création. Le voile tomba, et me laissa voir l'homme: le pieux évêque m'avoua qu'il était du nombre de ceux *qui pèchent sept fois par jour.*

Familiarisé avec les faiblesses humaines, je suis disposé bien plutôt à attribuer la manie érotique à des excès, qu'à une trop grande continence. Ces excès produisent une irritabilité et une excitabilité du cervelet telle, qu'il n'est plus au pouvoir de l'homme d'arrêter le torrent des idées lubriques et des images voluptueuses qui vient fondre sur lui. Mais comme la cause première agit avec d'autant plus de violence que les autres facultés de l'âme sont plus affaiblies, ce genre de manie dégénère bientôt en démence, et en faiblesse générale de tout le corps. Ici encore, je cite à l'appui de mon assertion un exemple rapporté par M. Pinel.

"Un jeune homme, d'une forte constitution, et né d'un père riche, avait atteint son accroissement complet vers la dix-huitième année de l'âge, et ce fut à cette époque de l'extrême effervescence de ses sens, qu'il commença à se livrer à ses penchans avec toute l'impétuosité d'un caractère ardent, et les facilités que lui donnait un rassemblement journalier de jeunes ouvrières dans une grande manufacture. Il prend alors l'habitude de s'adonner au plaisir sans frein et sans mesure, le plus souvent à diverses heures du jour et de la nuit; il fait succéder, à l'âge de vingt ans, d'autres excès non moins destructeurs; ceux de l'intempérance et de la fréquentation répétée des lieux de débauche. Des maux vénériens, tour-à-tour guéris et de nouveau contractés, viennent se joindre à l'épuisement, et se compliquer avec d'autres affections cutanées. Des objets de commerce rendent alors néces-

saires des voyages fréquens en chaise de poste, le jour, la nuit, et dans toutes les saisons de l'année. Les traitemens au mercure sont tour-à-tour commencés, suspendus, renouvellés, sans ordre et sans règle. Déslors les symptômes les plus marqués d'une hypochondrie la plus profonde; digestions laborieuses et très imparfaites; flatuosites incommodes, rapports acides, alternatives de resserrement ou de relâchement des intestins, douleurs vives de colique devenues périodiques: frayeurs sans cause, pusillanimité extrême, dégoût de la vie, et plusieures tentatives de commettre un suicide. Une crédulité aveugle et puérile dans la vertu des médicamens, et une confiance entière accordée a toute espéce d'empiriques, se joignent déjà, à vingt-cinq ans, à la nullité entière pour un plaisir dont il a abusé à l'excès, et à une décadence de la raison qui ne fait que s'accroître." *

Tous les exemples cités jusqu'ici, prouvent qu'aucune espèce de manie érotique ne peut avoir son siége dans les parties génitales elles-mêmes; qu'il faut de toute nécessité chercher la cause de ce dérangement là, où est celle de tous les dérangemens des facultés intellectuelles.

Or, comme le cervelet est l'organe de l'instinct de la propagation, c'est de lui que doivent dépendre les surirritations et les dérangemens de cet instinct.

J'expliquerai plus bas, en traitant des autres facultés fondamentales, comment il se fait que la manie érotique est accompagnée tantôt de dévotion, tantôt d'orgueil, tantôt d'un autre sentiment exalté.† Ici, je continue de fournir les preuves de mon assertion: que le cervelet est l'organe de l'instinct de la propagation, et j'en trouve de nouvelles dans les différentes manières dont cet instinct se manifeste dans l'idotisme.

* Pinel, sur l'Alienation mentale, p. 172, § 169.
† Sur l'Alienation mentale, p. 46 et 47, § 57.

Observations sur l'activité ou l'inaction de l'instinct de la propagation dans l'idiotisme.

On a le préjugé que les idiots, les imbéciles et les crétins sont très lascifs, et en proie à tous les effets d'un tempérament lubrique. Supposé qu'il en soit réellement ainsi, je demande si les parties génitales de ces pauvres d'esprit, ont une conformation particulière? si elles sont parvenues à un développement plus exubérant, si elles sécrètent une liqueur séminale plus irritante? si elles sont capables de bercer l'imagination d'images lubriques plus vives? L'on ne saurait soutenir aucune de ces assertions.

Du reste, il s'en faut de beaucoup que l'instinct de la propagation se manifeste d'une manière très active chez tous les idiots et chez tous les crétins. J'ai soigneusement examiné un grand nombre de ces individus, et voici le résultat de mes recherches.

Que les parties génitales soient grandes ou petites, elles n'ont jamais une influence déterminée sur l'instinct de la joissance vénérienne.

Cet instinct est sans activité, toutes les fois que le cervelet n'a acquis qu'un faible degré de développement. La sauvage de l'Aveyron, qui se trouve aux Sourds-Muets, à Paris, n'avait pas témoigné encore, à l'âge de seize ans, le moindre penchant pour les femmes; aussi son cervelet était-il très faiblement développé. A Salzbourg, le professeur Hartenkeil me fit voir un crétin âgé de vingt et quelques années, chez lequel l'instinct de la propagation ne s'était jamais manifesté en aucune manière, quoiqu'il fût assez bien fait, et qu'il jouit d'une bonne santé; son cervelet était également très peu développé. Dans une autre salle, au contraire, le même savant me montra une femme tellement contrefaite, qu'au lieu de marcher elle se traînait par terre: cette malheureuse se trouvait dans une espèce de ravissement toutes les fois qu'elle apperce-

vait un homme. A peine me fus-je approché d'elle, qu'elle grimpa sur son lit, et m'invita, par les gestes les plus lascifs, à l'y suivre; elle jeta même tous ses vêtemens pour me donner l'hospitalité d'une manière plus cordiale. Ses facultés intellectuelles sont de beaucoup inférieures à celles des brutes, mais son cervelet est très développé; aussi tous ses mouvemens ne tendent-ils qu'à satisfaire sa lubricité dans la solitude même. Je pourrais rapporter un très grand nombre de cas semblable, qui tous confirment mon opinion; mais je me contenterai d'en rapporter encore quelques-uns, moins pour appuyer ma doctrine, que pour offrir au lecteur une observation morale.

Nous vîmes, à Munich, un garçon de quinze ans qui, dès sa septième année, avait voulu abuser de sa sœur, et avait manqué de l'étrangler parce qu'elle opposait de la résistance à ses désirs. Son idiotisme n'était pas des plus complets; il parlait un peu, reconnaissait les personnes, et trouvait, comme un chien, du plaisir à regarder les passans par une fenêtre. Son cervelet était extrêmement développé, aussi fallait-il soigneusement tenir éloignées de lui les femmes et les filles. A Paris, M. Savary, alors ministre de la police, et M. de Bourrienne, m'amenèrent un garçon âgé d'à-peu-près seize ans, qui ne voulait absolument rien apprendre, et dont la société devenait très pernicieuse à ses condisciples, non-seulement à raison de son défaut de susceptibilité pour l'instruction, mais encore à raison de ses goûts antiphysiques. Je rendis ces messieurs attentifs au développement très peu considérable de son front, qui expliquait l'invincible indifférence qu'il témoignait pour toute instruction; je leur fis remarquer en même temps ses bosses ocipitales très proéminentes, sa nuque large et robuste qui rendaient raison de ses désirs effrénés. L'idiotisme de se sujet était moins complet encore que celui du jeune homme de Munich, dont j'ai parlé tout-à-l'heure; ceci me conduit à faire encore une autre observation.

Dans plusieurs hospices pour les aliénés, et dans quelques maisons de correction, nous avons rencontré des sujets que l'on pretendait être devenus aliénés par suite d'émissions excessivement fréquentes de la liqueur séminale, ou que l'on vouloit punir de s'être livrés à l'onanisme.

Je suis bien loin de nier l'influence pernicieuse que l'onanisme exerce sur la manifestation des facultés intellectuelles, et plusieurs passages de mes écrits le prouvent suffisamment. Mais dans ces cas il faut d'ordinaire accuser une autre cause. La nature avait traité en marâtre, sous le rapport des facultés supérieurs, tous les sujets semblables que j'ai eu occasion d'observer. Chez eux, la partie anterieure du crâne était étroite et peu élevée, ou bien ils étaient plus ou moins hydrocéphales. Les parties postérieurs du crâne au contraire, leur nuque, leur cervelet, avaient acquis un degré de développement qui n'était dans aucune proportion avec celui des parties cérébrales affectées aux facultes intellectuelles supérieurs. L'homme ainsi organisé se trouve dans le cas de tout animal lascif; c'est un singe en chaleur. L'organe de l'instinct de la propagation le domine impérieusement, parce qu'aucun autre organe ne peut balancer l'activité du premier. Rien ce que nous appelons décence, mœurs, religion, ne peut agir sur un tel individu ; les punitions ne sauraient l'effrayer ; rien ne saurait engager à se contraindre un être ravalé au-dessous de la brute, et qui n'a pas de volonté. L'observateur philosophe reconnaît ici que la faiblesse de l'entendement est la cause de l'abandon à une sensualité brutale, tandis que, dans son erreur, le vulgaire regarde la faiblesse de l'intendement, comme une suite de l'abandon à la sensualité.

L'instinct de la propagation survit à la destruction des parties génitales, et subsiste dans l'absence de ces parties.

Une femme mariée qui mourut d'un cancer à la matrice s'était prostituée pendant la durée de sa longue maladie. Peu avant sa mort, elle exigea les approches de son mari. Une dame fut en proie pendant plus de deux ans à une maladie extrêmement douloureuse ; ce n'etait déjà plus qu'un squelette ; des écoulemens abondans et infects, une cruelle dysurie, etc., annonçaient sa mort prochaine. Malgré tout cela, quoique son état rendit absolument impossible toute approche maritale, elle désirait avec une ardeur voluptueuse les embrassemeus d'un époux qu'elle chérissait. Apres samort, arrivée peu de jours plus tard, je trouvai le vagin, la matrice et la vessie, en partie dissous en un liquide ichoreux et infect, en partie tellement rougés que les membranes et les fibres se déchiraient au moindre attouchment.

A Vienne, je donnai des soins à l'épouse d'un fabricant, laquelle, tant au physique qu'au moral, vivait avec son mari dans l'union la plus heureuse, quoiqu'elle n'eût jamais été réglée. Comme elle ne devenait jamais enceinte, et qu'elle désirait avoir des enfans, on examina sa conformation avec soin et à plusieurs reprises. La sages-femmes, ni l'accoucheur, ne purent jamais découvrir d'utérus.

M. Richerand cite aussi quelques exemples de femmes ayant le même vice de conformation, et qui malgré cela avaient du penchant pour les plaisirs de l'amour.

"L'utérus, dit-il, imprime-t-il au sexe toutes ses modifications distinctives, et doit-on dire avec Van Helmont ; PROPTER SOLUM UTERUM MULIER EST QUOD EST ; *c'est par la matrice seule que la femme est ce qu'elle est?* Quoique ce viscére réagisse sur tout le systéme féminin d'une maniére bien évidente, et semble soumettre à son empire la somme presque entière

des actions et des affections de la femme, nous pensons qu'il n'est pas à beaucoup près la cause unique des caractères qui la spécifient, puisque ces caractères sont déjà reconnaissables dès les premiers temps de la vie, lorsque le système utérin est loin d'être en activité. Une observation* très curieuse, consignée par le professeur Caillot, dans le second volume des Mémoires de la société de Paris, prouve mieux que tous les raisonnemens qu'on pourrait accumuler, jusqu'à quel point les caractères du sexe sont indépendans de l'influence de l'utérus. Une femme nait, croît et s'élève avec toutes les apparences extérieures de son sexe; arrivée à l'âge de vingt à vingt un ans elle veut obéir au penchant qui l'entraîne: vains désirs! efforts superflus! elle n'avait rien au-delà de la vulve d'ailleurs bien conformée. Un petit canal dont l'orifice n'offrait que deux lignes ou deux lignes et demie de diamètre, tenait la place du vagin, et se terminait en cul-de-sac à un pouce de profondeur. Les perquisitions les plus exactes faites en introduisant une algalie dans la vessie urinaire, et le doigt indicateur dans le rectum, ne purent faire rencontrer l'utérus. Le doigt introduit dans l'intestin sentait distinctement la convexité de la sonde placée dans la vessie, de manière qu'il était évident qu'aucun organe analogue à l'utérus ne séparait le bas-fond de ce viscère de la paroi antérieure du rectum: la jeune personne n'avait jamais été sujette à l'évacuation périodique; aucune hémorrhagie ne suppléait à cette excrétion; elle n'éprouvait aucune des indispositions qu'occasionne la non apparition des règles; elle jouissait au contraire d'une santé florissante; rien ne lui manquait de tous les caractères de son sexe, seulement son sein était peu développé. Parvenue à l'âge de vingt-six à vingt-sept ans, elle est devenue sujette à des pissemens de sang assez fréquens." †

*On trouve dans les Œuvres de la Mettrie, Système d'Epicure, § 14, une observation semblable et non moins intéressante.

† Nouveaux Elémens de Physiologie, septième édition, t. II. p. 392, § CXCV.

J'ai déjà parlé de l'instinct de la propagation subsistant encore lorsque les testicules ont été enlevés, et lorsque les fonctions de la matrice avaient complétement cessé.

Maladies particulières du cervelet.

J'ai eu occasion d'observer une maladie toute particulière du cervelet.

A Vienne, le comte Philippe H....., âgé de quarante et quelques années se plaignait, depuis quelques mois, de douleurs hémorrhoïdales; outre cela il éprouvait des nausées continuelles, une pression très désagréable dans la nuque, et une tendance à tomber en avant comme s'il voyait un précipice à ses pieds. Plusieurs médicins attribuèrent tous ces symptômes aux hémorrhoïdes; pour moi, j'en conclus qu'il existait un vice organique dans le cerveau. Quelques mois après, le malade mourut, et nous trouvâmes sur la tente (*tentorium*) une masse charnue de deux pouces de diamètre qui avait comprimé le cervelet. Plus tard, je lus, dans les ouvrages de Hahnemann, la description des mêmes symptômes; à l'autopsie cadavérique on avait trouvé le cervelet en pleine suppuration. A cette époque, je n'avais point encore fait attention à l'influence du cervelet sur l'instinct de la propagation, et sur les parties sexuelles.

Pour compléter les preuves de l'influence du cervelet sur les parties sexuelles, je vais copier les recherches sur les maladies organiques du cervelet, imprimées dans le *Journal de Physiologie expérimentale et pathologique*, par F. Magendie, membre de l'Institut, 1822, Nos. 2 et 3; par M. B. A. Serres, chevalier de la Légion-d'Honneur, l'un des médecins de l'hôpital de la Pitié, chef des travaux anatomiques des hôpitaux, etc.

Dans ce mémoire, M. Serres se propose de fixer l'attention des observateurs sur les apoplexies cérébel-

leuses. Comme toutes ses observations sont des preuves pathologiques du rapport qui existe entre le cervelet et l'instinct de la propagation, elles doivent faire partie de mon traité sur la fonction animale du cervelet.

Observation première.

Un homme âgé de trente-deux ans, fut apporté la nuit à l'Hôtel-Dieu, par la garde nationale de Paris, au mois d'avril 1814. Ceux qui conduisaient le malade nous apprirent qu'il avait été trouvé sur le quai avec des filles publiques, dont une, présente à sa réception, déclara que c'était dans l'acte du coït, et après avoir considérablement bu, que le malade était tombé dans l'état où nous le voyions.

La face était extrêmement rouge, la chaleur de la tête et du cou très élevée, le pouls était très fort et fréquent, quatre-vingt-dix pulsations par minute. La respiration était entrecoupée et lente, neuf, dix et onze inspirations par minute ; la somnolence était profonde, il ne donnait aucun signe de connaissance, et de temps en temps il était pris de mouvemens convulsifs et d'une roideur tétannique qui durait trois ou quatre minutes. En mettant le malade dans son lit, on s'aperçut qu'il était dans un état d'érection ; les parties génitales étaient dans un état de chaleur qui contrastait avec le froid des extrémités. On appliqua trente sangsues aux jugulaires, et on fit une large saignée du pied, qui ne produisirent aucun effet : le malade mourut la dixième heure de son entrée à l'hôpital. La rigidité de la verge avait cessé quatre heures avant la mort.

La première idée qui s'était présentée à nous, à l'aspect de l'érection insolite dont le malade avait été atteint, fut de présumer qu'il avait fait usage de quelque préparation de cantharides, qui, comme chacun sait, produisent ordinairement une irritation considérable sur les parties génitales. Cette opinion nous pré-

occupait en faisant l'ouverture du cadavre, et elle nous paraissait d'autant plus probable que les parties génitales étaient encore extrêmement gonflées, rouges, et que le gland présentait des taches violettes comme gangréneuses. On fit, dans cette idée, quelques essais sur les liquides contenus dans l'estomac et les intestins, qui ne donnèrent aucun résultat satisfaisant. Nous procédâmes ensuite à l'ouverture du crâne, et l'encéphale étant mis à découvert, tous les élèves présens furent frappés, ainsi que moi, de l'irritation vive dont le cervelet avait spécialement été le siége. Les hémisphères du cerveau ne présentèrent aucune trace d'altération organique, les tubercules quadrijumeaux antérieurs étaient très légèrement phlogosés, les postérieurs l'étaient à un degré beaucoup plus considérable, la masse médullaire désignée sous le nom de *processus cerebelli ad testes* était d'un rouge vineux, les feuillets du cervelet qui la recouvrent, et qui par leur jonction forment le processus vermiculaire supérieur, avaient le même aspect, et présentaient trois ou quatre petits foyers semblables à ceux qui sont représentés figure trois, n^os^. 2, 3, 4; dans le noyau des *processus cerebelli ad testes* se trouvait un foyer plus considérable dont l'étendue aurait pu contenir une balle de fusil d'un calibre ordinaire; les hémisphères du cervelet étaient très injectés, mais à un degré moindre que le processus vermiculaire supérieur; le noyau des hémisphères du cervelet et les faisceaux désignés sous le nom de cuisses du même organe conservaient les traces d'une assez grande irritation.

On se doute bien que cette altération organique ne nous frappa pas seulement à cause de son siége; l'opinion de Gall sur les rapports qui lient les organes génitaux au cervelet était trop répandue pour qu'elle ne vînt pas se présenter naturellement à l'esprit, et il nous parut que, dans ce cas, la rigidité de la verge et l'inflammation dont les parties génitales avaient été affectées pendant la courte durée de la maladie, était liée avec l'irritation dont le cervelet avait été le siége.

Toutefois un rapport pathologique si extraordinaire ne pouvait être établi d'après un seul fait ; avant d'admettre cette opinion il était nécessaire de voir si elle se vérifierait dans des cas analogues. Je consultai dans ce dessein les observations nombreuses que j'avais recueillies sur les apoplexies, et qui m'ont servi à composer le mémoire que j'ai cité plus haut. Dans le nombre il s'en trouva deux d'individus qui avaient présenté des inflammations cérébelleuses, et qui, pendant la durée de l'apoplexie, avaient eu des érections assez prononcées et des éjaculations abondantes. L'une d'elles m'avait été communiquée par mon confrère le docteur *Lafore*, alors interne de l'Hôtel-Dieu. Je ne possédais que ces trois cas lorsque je publiai mon premier travail sur les maladies organiques de l'encéphale, et leur singularité même fut la cause principale de la réserve que je mis alors à les faire connaître. De noveaux faits sont venus confirmer les premières données, et non-seulement nous pouvons regarder comme positive l'existence des apoplexies cérébelleuses, mais encore nous pouvons espérer pouvoir les distinguer, dans la plupart des cas, de celles qui affectent les autres parties de l'encéphale.

Deuxième observation.

Thomas Marie-Anne, journalier, âgé de 55 ans, d'un tempérament sanguin, fort, très adonné aux plaisirs vénériens, passa au cabaret une partie de la journée du 19 avril 1818. Dans la nuit, somnolence, pesanteur, agitations momentanées, perte de connaissance, le malade ne répondait pas aux questions qui lui étaient faites, érection une partie de la nuit.

Il entra à l'hôpital le 20 avril au matin, et offrit les symptômes suivans : Face rouge et tuméfiée, stupeur légère dont il était retiré quand on l'excitait, respiration courte, suspirieuse par intervalles, treize, quatorze inspirations par minute ; pouls plein, fort, fréquent, quatre-vingts pulsations par minute ; hémiplegie du

côté gauche du corps, principalement à la jambe; agitation spasmodique du côté droit. (Saignée de la veine jugulaire droite, lavement purgatif, orge, arnica, pour boisson; potion antispasmodique).

Retour à la connaissance après la saignée, le malade paraît surpris de se trouver à l'hôpital. Le soir, paroxisme très fort, face tres injectée, gonflée, chaleur considérable au cou, respiration lente, onze, douze inspirations par minute; pouls dur, plus fréquent que le matin quatre-vingt-cinq, quatre-vingt-onze, quatre-vingt-quatorze pulsations par minute: somnolence profonde, insensibilité à tous les genres d'excitation, satyriasis très violent, tuméfaction et rougeur des bourses, immobilité du côté gauche, mouvement convulsif à droite; éjaculation abondante à la fin du paroxisme. Saignée, sinapisme aux jambes; même état après la saignée, râle pendant la nuit: le matin du 21, face violette, gonflée, lèvres et nez froids, respiration très rare, très courte, pouls petit, irregulier, très fréquent, distorsion de la bouche, tuméfaction et rougeur vive des parties génitales, éjaculation, abondante mort à neuf heures.

Ouverture de cadavre.

En enlevant la voûte du crâne, il s'écoula une certaine quantité d'un sang noir. Tous les sinus de la dure-mère, ainsi que le confluent du sinus, étaient remplis de caillots noirs; les vaisseaux de la pie-mère étaient gonflés dans toute son étendue; la substance du cerveau ne présentait rien de particulier, mais le cervelet était plus rouge que dans l'état naturel. Lorsqu'on eut incisé une partie de l'appendice vermiculaire supérieur, l'action de l'air lui donna promptement une couleur rouge vif, toute la substance blanche de cette partie avait changé de couleur, on eût dit qu'elle avait macéré dans le sang. Plongée dans l'eau, elle se décolora, mais ne revint jamais à sa coloration naturelle. Quelques parties du noyau des processus paraissaient corrodées, mais il n'y avait pas

de foyer distinct. Le processus était divisé d'avant en arrière; nous aperçûmes un sang noir, épais, renfermé dans le quatrième ventricule; ce liquide avait pénétré en avant dans la scissure de Sylvius; en arrière, dans le calamus scriptorius.

En plongeant le cervelet dans l'eau, nous observâmes que ce sang provenait d'un foyer situé dans la partie centrale de l'hemisphère droit du cervelet; sa largeur était transversalement de deux centimètres et un millimètre; et d'avant en arrière, d'un centimètre trois millimètres; de haut en bas, il pouvait avoir un centimètre trois ou quatre millimètres; ses bords étaient frangés inégaux, surtout au côté externe; il occupait le centre de la masse grise qui se rencontre au milieu de l'hémisphère du cervelet; toute la substance blanche était injectée d'autant qu'on se rapprochait davantage des parois du foyer; la coloration formait des espèces de zones concentriques au foyer: la protubérance annulaire vers la naissance de la cinquième paire était phlogosée, ainsi que l'éminence olivaire et le commencement de la moelle épinière; les poumons étaient gorgés de sang, ainsi que les cavités droites du cœur et les veines caves ascendante et descendante; ces organes ne présentaient d'ailleurs aucune altération organique: le canal intestinal n'offrit rien de particulier.

Observation troisième, rédigée par M. MANCE, *ex-élève interne de deuxième classe à la Pitié, et prosecteur a l'amphithéâtre des hôpitaux.*

Bourgoin (Nicolas), âgé de 46 ans, fut apporté à l'hôpital le 17 mai 1818. On ne put avoir aucun renseignement sur son état antécédent; à la vérité il nous présenta tous les symptômes des apoplexies cérébrales violentes. La respiration surtout était profondément altérée, et offrait en outre de particulier des mouvemens spasmodiques généraux, presque convulsifs, et

par intervalles. Un symptôme sur lequel M. Serres fixa notre attention, c'est que la somnolence persistait pendant la durée de ces mouvemens. (Saignée au bras, vingt sangsues aux jugulaires ; à midi, lavement purgatif, limonade végétale, potion antispasmodique.) Rémission considérable des symptômes après les sangsues.

Le soir à sept heures, paroxisme très violent, respiration très courte, inégale, rare ; pouls fort, dur, très fréquent ; érection, tension et gonflement des parties génitales, éjaculation de sperme abondante pendant la nuit, et, à ce qu'il paraît, à la chute du paroxisme.

Le lendemain 18, les symptômes apoplectiques étaient plus intenses que le veille. Nous fîmes part à M. Serres du satyriasis que nous avions observé, et, sur ce symptôme, ce practicien nous dit qu'il était probable que le cervelet était le foyer principal de la maladie ; les mouvemens spasmodiques avaient cessé, il ne restait qu'un trismus léger des mâchoires ; la respiration était toujours courte, inégale ; le pouls vif, fréquent, intermittent, chaque sept ou huit pulsations. La somnolence était profonde, la pupille resserrée et peu mobile par le passage alternatif de l'obscurité à la lumière ; les membres étaient tendus, roides ; on éprouvait à les fléchir une grande résistance : l'insensibilité devint générale. Le satyriasis n'existait plus, quoique les parties génitales, le pénis et les bourses fussent très rouges, gonflés et d'une température fort élevée. (Sinapismes aux pieds, vingt sangsues aux jugulaires, potion antispasmodique.) Le soir, les mouvemens convulsifs reparurent, le satyriasis fut très violent, le râle survint à six heures, et le malade succomba à onze.

Ouverture. — L'ouverture du cadavre fut faite à la leçon d'anatomie. La tête était violette, principalement les oreilles ; la chaleur était conservée vingt-sept heures après la mort ; les membres étaient rigides et dans l'extension ; les parties génitales gonflées, quelques taches brunes se remarquaient sur les bourses.

M. Serres rappela à cette occasion un cas semblable qui s'était présenté à l'amphithéâtre quelque temps auparavant. Un cadavre apporté de l'hospice de Bicêtre nous avait frappés à la distribution des sujets, à cause du gonflement énorme du pénis. M. Serres l'ayant fait apporter à son cours, nous dit que d'après le rapport qu'il avait observé entre l'irritation des parties génitales et celle du cervelet, il était vraisemblable qu'on en rencontrerait des traces sur ce dernier organe. L'examen de l'encéphale avait confirmé ce pronostic, et avait été l'occasion d'une longue discussion entre M. Serres et M. Lallement, actuellement professeur à la Faculté de médecin de Montpellier. En rappelant cette circonstance, M. Serres nous fit observer que le cas présent offrait une occasion très importante de vérifier ce fait, d'autant plus que la connaissance de l'histoire de la maladie ne permettait pas de mettre en doute la coïncidence d'une affection aiguë de l'encéphale et d'une vive irritation des parties génitales. Le crâne ouvert, l'attention se porta aussitôt sur le cervelet, dont le volume était plus considérable qu'il ne l'est ordinairement. La pie-mère et l'arachnoïde enlevées, cet organe nous parut d'une rougeur très vive; quelques gouttes de sang étaient épanchées entre les sillons de sa face supérieure. Incisé à quatre linges environ de sa profondeur, toute la substance médullaire était d'un rouge vif. On mit à découvert trois petits foyers creusés dans l'épaisseur même de l'organe. Le premier, situé en arrière, à quelques linges du processus vermiculaire supérieur, était inégal, avait son plus grand diamètre transversal, et renfermait de petits grumeaux de sang. Le second, plus antérieur, se rapprochait davantage de la linge médiane, et avait une étendue double du précédent; il était aussi inégal, plus étendu d'avant en arrière que transversalement, et était rempli par un caillot de sang. Le troisième était situé à la partie antérieure et supérieure du cervelet. En outre, toute la substance du processus vermiculaire supérieur offrait, par intervalles,

de petites déchirures, qu'on pouvait regarder comme le rudiment de plusieurs petits foyers; les tubercules quadrijumeaux, surtout les postérieurs, étaient phlogosés, ainsi que le gros faisceau désigné sous le nom de *processus cerebelli ad testes.*

Les poumons, ainsi que les cavités droites du cœur, étaient gorgés d'un sang noir et coagulé. M. le docteur Edwards et M. le docteur Lisfranc, furent présens à cette ouverture.

Observation recuellie par M. DUBOIS *élève interne de première classe à l'hôpital de la Pitié.*

Le nommé Gambar, âgé de 52 ans, profession d'écrivain public, fut apporté à l'hôpital de la Pitié le 5 mars 1819. Il y arriva avec une perte complète de connaissance et insensibilité de la peau. La face était très rouge et injectée. La mort ne se fit pas attendre.

La peau était froide aux extrémités, et couverte d'une sueur visqueuse; la déglutition était difficile, bruyante et laborieuse; le pouls fort, développé, plein; les yeux étaient rouges, injectés comme le reste de la face. Il y avait une résolution complète des membres soulevés, ils retombaient de leur propre poids; on prinçait la peau sans exciter de douleur: il y eut quelques déjections involontaires. Les membres du côté gauche opposés à la paralysie étaient contractés; l'avant-bras, fortement fléchi, ne s'étendait qu'avec peine; le côté gauche de la face était pris de contractions spasmodiques, semblables à celles que l'électricité détermine dans les membres d'un animal récemment mort. Le pénis était dans un état constant de turgescence, et, dans certains momens, dans une érection complète. On remarquait sur la surface du gland quelques taches violettes qui semblaient faire craindre la gangrène. Les infirmiers nous dirent que le malade était toujours resté couché sur le dos, la tête fortement renversée en arrière.

L'ouverture fut faite par M. Serres lui-même, à son cours d'anatomie. Il avait annoncé une lésion du cervelet à cause de l'affection des parties génitales. On a trouvé dans le cerveau un épanchement dans l'épaisseur du corps strié du côté gauche, ou hémisphère gauche. L'épanchement avait au moins trois pouces de longueur et un pouce de large. Le sang était nouvellement épanché et en caillot rougeâtre un peu foncé ; un sang plus liquide était à la surface ; la portion du cerveau qui formait les parois de la poche où le sang était contenu, était diffluente à cause de sa macération dans le sang : la portion au-dessous était injectée de sang. On vit au dessus et sur les côtés plusieurs taches jaunâtres, dures, véritables cicatrices du cerveau. Celui-ci du reste était très injecté. Le cervelet, et surtout le *processus vermicularis* supérieur, offraient de petits épanchemens nombreux de la grosseur d'un grain de chenevis ; mais en arrière de l'hémisphère droit du cervelet, on vit un caillot de sang de la grosseur d'une balle de fusil. Tout le reste présentait à-peu-près la même organisation que l'on rencontre dans les épanchemens du cerveau.

M. Serres déduisit cette conséquence : que le priapisme avait été produit par la lésion du cervelet, qui a un rapport connu avec les organes génitaux, comme l'établit en effet M. Gall ; et il pense que si ces lésions n'ont pas encore été observées, c'est faute d'attention de la part des médecins.

Suite des recherches sur les maladies organiques du cervelet, par M. SERRES, *médecin de l'hôpital de la Pitié, etc.*

Le précédent article nous a fait connaître le rapport pathologique qui existe entre le cervelet et les organes génitaux chez l'homme. La connaissance de ce rapport nous a été fournie par l'examen des malades pendant la vie, et des altérations organiques après la mort.

Remonter des symptômes au siege des maladies, établir leurs rapports avec les altérations organiques que nous présente le cadavre, telle est la marche que me paraissent devoir suivre les véritables observateurs en médecine, pour élever cette science au degré de certitude qu'elle peut atteindre.

Chacun sait que les maladies de l'encéphale sont celles qui offrent le moins de probabilité pour la certitude du diagnostique ; on a vu néan moins que non-seulement nous avons précisé pendant la vie le siége des apoplexies cérébelleuses, mais que l'ouverture des cadavres a répondu à notre attente, en justifiant notre prévision. Ne voulant exercer aucune influence sur l'esprit des praticiens, j'ai lassé eparler les élèves qui avaient recueilli les observations à ma clinique ; je n'ai rien ajouté à leurs réflexions, je n'en ai rien retranché ; je vais en agir de même à l'égard d'une observation nouvelle qui m'est communiquée par M. le docteur Falret, déjà connu dans la science par ses intéressantes recherches sur la mélancolie suicide.

Observation recueillie par le docteur Falret.

"Je viens de lire avec le plus grand intérêt votre premiér mémoire sur les apoplexies cérébelleuses, inséré dans le journal de M. Magendie. J'ai beaucoup regretté de ne pas y trouver l'observation d'un apoplectique que j'ai eu occasion d'observer dans votre division, à l'hôpital de la Pitié.

" En 1820, dans un article sur l'Annuaire médico-chirurgical des hôpitaux, qui par des circonstances indépendantes de ma volonté, n'a pas été imprimé, je rendais hommage à la précision de votre diagnostique dans les maladies organiques de l'encéphale. Je rapportais à cette occasion l'entretien que nous eûmes dans une des salles de votre division, au sujet d'un apoplectique âgé d'environ cinquante ans, entré de la veille dans l'hôpital.

"Pourriez-vous déterminer, me dîtes-vous, le siége positif que doit occuper l'épanchement chez ce malade? Non, répondis-je; et il y aurait, ce me semble, de la témérité à prononcer d'une manière affirmative. Eh bien! reprîtes-vous, je suis ce médecin téméraire. Je pense que l'épanchement est dans le cervelet, j'en ai pour garant l'érection du pénis, symptôme qui en effet avait beaucoup fixé votre attention et la mienne. Cette preuve ne me parut pas d'abord sans réplique; mais comme vous annonçâtes en même temps que le malade n'avait pas plus de trente-six heures à vivre, malgré tous les secours de la médecine, j'attendis l'examen du cadavre avec impatience, et à mon grand étonnement, je vis votre diagnostique parfaitement justifié.

"Je ne rapporterai pas ici tous les symptômes apoplectiques que présentait ce malade; ils étaient les mêmes que ceux des apoplexies cérébrales, mais de plus le pénis était gonflé, tendu, rougue, en un mot dans l'état d'érection. Voici en abrégé ce que nous trouvâmes à l'ouverture du cadavre:

"Developpement considérable des parties génitales, taches brunes sur le gland et sur les bourses, membres rigides et dans l'extension. Les tégumens du crâne n'offrient rien de remarquable. Les sinus étaient gorgés de sang; trois onces environ de ce liquide s'écoulèrent à l'ouverture de la tête. Les vaisseaux de la pie-mère étaient gonflés; la substance grise du cerveau était rougeâtre, injectée; mais on ne reconnut dans cet organe aucune trace d'épanchement ancien ou récent. Il n'en fut pas de même pour le cervelet; indépendamment de l'injection de cet organe, nous remarquâmes dans la partie centrale du processus vermiculaire supérieur un large foyer s'étendant à droite et à gauche vers les hémisphères du cervelet; un caillot sanguin le remplissait. Les *processus cerebelli ad testes* étaient très rouges; le quatrième ventricule contenait du sang. Les poumons étaient gorgés de sang; les organes de l'abdomen n'offrirent rien de remarquable."

Quoique ces observations soient en quelque sorte la répétition les unes des autres, qu'elles contiennent toute la confirmation du même rapport entre l'irritation aiguë du cervelet et celle des parties génitales, j'en rapporterai encore quelques autres que j'ai recueillies moi-même, persuadé qu'on ne saurait trop accumuler les faits particuliers, quand il s'agit de constater l'existence d'une maladie inaperçue et aussi grave.

Apoplexie cérébelleuse.

Jean-Baptiste-François Girardin, âgé de quarante-deux ans, potier de terre, d'une constitution très robuste, ayant le cou très court, très large, la face très développée, grand mangeur et grand buveur, très adonné aux femmes, était habituellement sujet à un flux hémorroïdal qui s'était supprimé depuis quelques mois. Le mois de janvier 1819, ce malade avait contracté une blennorrhagie pendant le cours de laquelle il avait eu des érections vives qui avaient nécessité l'emploi des sangsues au périnée, et l'usage des bains de siége. Il était à peine guéri, qu'il revint à ses anciennes habitudes. Il avait passé la nuit du 18 au 19 janvier dans un mauvais lieu ; et s'étant mis dans un accès de colère violent sur les représentations qui lui avaient été faites sur sa conduite, il avait disparu de chez lui dans la matinée dn 19. On l'apporta le soir sans connaissance, la face tuméfiée et rouge, ses habits couverts d'alimens et de vin qu'il avait régurgités. On essaya de faire vomir le malade par l'emploi de l'ipécacuanha, mais on n'y réussit point. On apporta le malade dans ma division, le 20 mars au matin. Après m'avoir fait le récit que je viens d'exposer, sa femme me prit en particulier, et me confia que pendant toute la nuit il avait été en érection, et qu'elle présumait qu'il avait contracté une nouvelle maladie vénérienne.

J'examinai aussitôt les parties génitales, et je trouvai en effet que le pénis était encore tuméfie, rouge. En

examinant la chemise qu'on venait de lui ôter, nous remarquâmes qu'il y avait eu dans la nuit une éjaculation abondante. Le malade était en outre dans la stupeur; la face était vineuse et gonflée; le cou était tuméfié; la main, appliquée sur la région occipitale, donnait la sensation d'une chaleure brûlante; la respiration était courte, lente; chaque deux ou trois minutes il y avait une inspiration très longue; le pouls était fort, plein, dur, et fréquent; l'œil était injecté, la pupille contractée, les membres supérieurs et inférieurs excités; le malade les retirait et paraissait avoir le sentiment de la douleur.

Je fis pratiquer une saignée copieuse à la veine jugulaire, j'employai les révulsifs sur les membres inférieurs, et je fis appliquer des compresses trempées dans de l'eau à la glace sur les parties génitales; je fis prendre intérieurement la limonade citronnée en grande quantité, et après la saignée, je fis appliquer vingt sangsues aux vaisseaux hémorroïdaux.

La respiration devint plus libre après la saignée et l'application des sangsues; le pouls se ralentit; il y avait neuf, dix et douze pulsations de moins par minute. Les parties génitales étaient néanmoins toujours gonflées, rouges, mais l'érection du pénis ne reparaissait pas. La stupeur était diminuée, le malade parut même avoir repris sa connaissance.

Le soir, un paroxisme violent s'étant manifesté, on fit demander le chirurgien de garde, qui observa l'érection du pénis, et crut remarquer que le malade y portait la main. Il appliqua sur le membre viril de la glace pilée; l'érection parut calmée pour quelque temps; mais dans la nuit elle survint avec une nouvelle intensité. La respiration devint très difficile; le bruit que son ronflement occasionnait fatigua beaucoup les malades qui l'avoisinaient; il passa la nuit dans cet état.

Le 21 au matin érection avait cessé, la respiration était courte, le poumon semblait ne se dilater que partiellement; le pouls était vif, précipité; la face était

livide et froide; les extrémités étaient au-dessous de leur température ordinaire; l'œil était terne, la pupille dilatée et immobile quand on frictionnait le globe de l'œil et qu'on ouvrait et fermait alternativement les paupières. Le malade paraissait paralysé du côté droit, tout annonçait une mort prochaine; le malade succomba en effet cinq heures après la visite.

Ouverture du cadavre.

Les tegumens du crâne étant enlevés, nous remarquâmes que la protubérance occipitale externe portait une saillie très considérable; nous fûmes également frappés de la brièveté du cou et du volume des couches musculaires de cette partie. Le crâne ouvert, les sinus étaient gorgés de sang, notamment le *torcular Herophili*. Les vaisseaux de la pie-mère étaient très injectés sur le cerveau et le cervelet; le plexus choroïde renfermait quelques petits kistes aqueux, qu'on désigne sous le nom d'*hydatides*. Après avoir mis à nu le cervelet, nous aperçûmes la substance corrodée dans la partie antérieure du cervelet; sur les bords de cette déchirure, il y avait quelques grumeaux sanguins qui indiquaient la présence d'un foyer creusé dans cette partie; en effet, en portant le doigt dans cette déchirure, nous pénétrâmes dans une caverne étendu à droite, de quatre lignes environ, vers la partie moyenne de l'hémisphère du même côté; à gauche, le foyer peu profond s'était étendu plus avant dans le centre de l'hemisphère; intérieurement, le foyer avait été borné par le lobule tonsillaire qui servait de plancher au foyer; de cette manière, il n'avait pas pénétré dans l'intérieur du quatrième ventricule.

La substance blanche du cervelet était irritée et rouge tout au pourtour du foyer; il y avait même quelques traînées de capillaires remplis de sang, qui lui donnaient un aspect marbré.

Les poumons étaient gorgés de sang ainsi que les cavités droites du cœur; la veine cave ascendante, les

veines jugulaires internes et externes, et tous les sinus cérébraux, comme nous l'avons déjà remarqué, etaient pleins de sang.

L'estomac et le commencement des intestins grêles étaient phlogosès; quelques ganglions mésentériques étaient engorgés çà et là. La vessie était remplie d'urine. Les organes génitaux tuméfiés offraient quelques taches livides vers la partie moyenne du scrotum; le tissu lamineux des corps caverneux du canal de l'urètre et du gland était gorgé de sang.

Le cervelet avait un volume plus considérable que dans l'état normal; les artères vertébrales étaient d'un calibre plus grand que dans l'état ordinaire. Cette augmentation de calibre était partagée par toutes les artères cérébelleuses. On peut même présumer que l'accroissement relatif du cervelet provenait de cette dilation de son système artériel.

Apoplexie cérébelleuse sans érection du pénis.

Après des observations si précises, j'étais presque en droit de conclure que le symptôme pathognomonique des apoplexies cérébelleuses était l'érection du pénis pendant la durée de la maladie. Je me suis en effet adressé cette question: toute apoplexie cérébelleuse est-elle accompagnée d'érection insolite? On devait le déduire des faits qui précèdent; l'observation suivante va nous montrer une exception, dépendante peut-être du lieu qu'occupait le foyer dans la profondeur du cervelet.

Jean-Charles Montagnon, blanchisseur, âgé de cinquante ans, mélancolique depuis sa première jeunesse, avait été sujet, dès l'age de quarante ans, à des tournoiemens de tête très incommodes, pour lesquels on lui appliqua un cautère au bras gauche. Il contracta également l'habitude de se faire pratiquer une saignée chaque deux mois, pour remplacer un flux hémorroïdaire qu'il avait eu de trente à quarante ans. Ces précautions et un régime assez régulier le firent jouir

d'une santé assez bonne jusqu'au 12 août 1821. Ce jour il s'échauffa beaucoup dans une marche forcée et se coucha au soleil, où il dormit environ deux heures. En s'éveillant, il se sentit engourdi; la jambe droite lui parut si lourde, qu'il lui semblait, dit-il en rentrant à ses fils, qu'elle était de plomb. Il fut triste toute la soirée, mangea et but très peu, et se mit au lit, assiégé par les idées les plus sinistres.

Pendant la nuit, le malade s'étant levé pour satisfaire quelques besoins, fut pris d'un étourdissement violent, suivi de chute dans laquelle la partie antérieure de la tête heurta l'angle d'une commode qui avoisinait son lit. On le releva sans connaissance. Il était dans une stupeur et une insensibilité profondes. On lui fit avaler de l'eau de mélisse mêlée à une infusion de tilleul, qui provoquèrent un vomissement abondant de matières verdâtres.

Après avoir vomi, il se trouva plus accablé, dit qu'il était perdu, et retomba dans la stupeur dont le vomissement l'avait retiré momentanément. Le médecin qui fut appelé dans la matinée du 13, fit pratiquer une saignée du bras qui ne produisit aucun changement à son état. On se décida alors à le conduire dans un hôpital. Il entra à la Pitié le 13, à deux heures de l'après-midi.

L'élève de garde qui fut demandé le trouva dans l'état suivant: face très rouge, abattue; respiration très lente; le malade avait été menacé de suffocation dans la voiture qui l'avait amené; pouls dur, fort et fréquent; intermittence chaque trois et quatre pulsations; paralysie du côté droit; mouvement léger dans le bras quand on l'excitait; immobilité et rigidité de la jambe; langue jaune; œil fixe, pupille resserrée et très sensible à l'action de la lumière. On appliqua des sinapismes aux cuisses, on administra l'eau de veau émétisée, qu'on fit avaler difficilement, à cause de la contraction des muscles des mâchoires. Potion antispasmodique.

Je vis le malade dans la soirée, il était agonisant,

pâle, les lèvres violettes, la face tout-à-fait décomposée, la respiration vive, entrecoupée; on n'avait pu lui faire avaler sa potion. Il mourut dans la nuit, après avoir eu quelques mouvemens convulsifs des muscles de la face.

Ouverture du cadavre.

Sur le rapport qui m'avait été fait par l'élève de garde qui avait vu le malade, je crus qu'il avait succombé à une apoplexie cérébrale, et que nous allions rencontrer le foyer apoplectique dans l'hémisphère gauche du cerveau, la paralysie ayant été du côté droit. Je portai en conséquence toute mon attention sur cette partie de l'encéphale; mais l'ayant trouvée intacte, je continuai mes recherches avec tout l'intérêt que pouvait inspirer une paralysie bien constatée coïncidant avec une intégrité parfaite des hémisphères cérébraux. Je fis enlever avec soin le cervelet, quoique je n'eusse aucun soupçon que cet organe pouvait avoir été le siége de la maladie; mais en le renversant et le retirant du crâne, le doigt de l'élève interne qui faisait l'ouverture pénétra dans une caverne située à la base de l'hémisphère gauche de cet organe. Ce foyer contenait environ demi-once de sang; les bords en étaient inégaux, mais le cervelet n'avait pas été déchiré en totalité, car il n'y avait pas de sang épanché dans les cavités occipitales du crâne. Il s'étendait un peu en dehors et en arrière, vers le lobule mince de *Malacarne*. Intérieurement il ne s'était pas étendu dans le quatrième ventricule, quoique son extrémité se dirigeât vers la partie externe du corps rhomboïdal (corps strié du cervelet.) La matière qui l'environnait était phlogosée à une ou deux lignes d'étendue seulement. Du reste, la substance cérébelleuse n'était pas enflammée, quoique les vaisseaux de la pie-mère fussent plus distendus que dans l'état ordinaire.

Les poumons et les cavités droites du cœur étaient gorgés de sang noir, épais et coagulé.

Quoique cette observation ne coïncide pas avec les précédentes, elle mérite la plus grande attention : je fis prendre des renseignemens auprès des parens, pour savoir si l'erection s'était manifestée lors de l'invasion. La réponse fut négative. On ajouta même que le malade avait toujours mené une vie régulière. Pendant son séjour à l'hôpital, on n'avait aperçu aucun signe de gonflement ou d'érection du pénis. Il est alors à présumer que ce symptôme ne s'était pas manifesté chez ce malade. Reste à savoir maintenant si l'absence de l'érection tient au siége différent qu'occupait le foyer dans le cervelet. Je le pense, mais ce n'est qu'après de nouvelles observations qu'on pourra le conclure avec certitude. Pour le moment, nous devons nous borner à appeler sur ce point l'attention des praticiens.

Apoplexie cérébelleuse ayant son siége dans le lobule tonsillaire.

Parmi le grand nombre de cerveaux de l'homme que j'ai anatomisés pour mon grand ouvrage sur l'anatomie comparative de l'encéphale, on a rencontré un très grand nombre de lésions organiques anciennes ou récentes : l'une d'elles était située dans le lobule tonsillaire du cervelet ; le cadavre avait été apporté de l'hospice Saint-Antoine à l'amphithéâtre des hôpitaux, et était fort vigoureux ; je n'ai pu avoir aucun renseignement sur sa maladie ; je le regrette d'autant plus que j'ai constaté que l'homme seul possède ce lobule ; que chez les singes, les phoques et les cétacés, dont l'encéphale se rapproche le plus de l'homme, on ne rencontre dans leur cervelet aucune partie qui lui ressemble. Sur ce cadavre, ce lobule avait été détruit presque en totalité par le foyer, et le sang s'était épanché dans le quatrième ventricule. Les parties génitales étaient très développées, mais sans gonflement pathologique.

Apoplexie cérébelleuse chez la femme.

Il est inutile de dire que le symptôme tiré de l'érection du pénis n'est applicable qu'à l'homme. La femme étant exposée comme lui à cette cruelle maladie, on doit donc chercher à la reconnaître sur d'autres indices; peut-être en trouvera-t-on dans le clitoricisme, dans la tendance à la nymphomanie. Une seule de mes observations peut mettre sur la voie à ce sujet.

Cérébellite chronique.

Marie-Jeanne-Joséphine Dubourg, âgée de trente-trois ans, couturière, fut livrée de bonne heure aux excès vénériens. Elle ne fut réglée qu'à vingt ans, quoiqu'elle se fût livrée dans une maison de débauche à tous les excès du coït, et peut-être même à cause de ces excès. Jusqu'à trente ans, de son propre aveu, elle avait été fatiguée, mais jamais rassasiée des plaisirs vénériens, et malgré les efforts de ses parens pour la retirer de la vie scandaleuse qu'elle menait, elle y était, disait-elle, irrésistiblement entraînée. Cet état dura jusqu'à l'âge de vingt-neuf ans; à cette époque, la cohabitation de l'homme ne pouvant assouvir ses desirs, elle se livra avec fureur aux excès de la masturbation, et tomba dans un assoupissement habituel à la suite de ces excès, assoupissement qu'on attribua aux boissons spiritueuses dont elle abusait également.

Honteuse de cet état, elle se soumit à un traitement assez violent; on brûla le clitoris dans l'espérance de faire cesser ses fureurs érotiques, qu'on regarda comme la cause d'une phtisie pulmonaire qui inquiétait la malade. Elle sortit de l'Hôtel-Dieu sans avoir éprouvé le soulagement qu'elle attendait, et reprit ses anciennes habitudes.

Elle éprouva en outre des maux de tête très intenses, et devint tout-à-fait imbécille à l'âge de trente-deux ans; elle mourut à la Pitié, où elle était entrée pour aller à l'hospice de la Salpétrière. Elle succomba à une phtisie pulmonaire.

A l'ouverture du cadavre nous rencontrâmes une induration de l'appendice vermiculaire supérieur et inférieur; en quelques endroits il existait de petites ulcérations qui auraient renfermé un pois à cautère ordinaire. Les bords étaient durs, jaunâtres, le fond était tapissé par une membrane épaisse; il y avait dans la petite cavité une sérosité jaunâtre; en outre, sur le devant de l'appendice vermiculaire supérieur, toute la partie du cervelet était ramollie, et d'un jaune blanc; la substance cérébelleuse était dégénérée au point où elle se trouve chez l'embryon humain du deuxième mois et du commencement du troisième. Tout au pourtour des appendices vermiculaires, le cervelet était phlogosé et plus dur que dans l'état ordinaire. Les artères cérébelleuses étaient plus développées qu'elles ne le sont ordinairement.

J'avais fait injecter le cadavre pour bien examiner ces dernières artères; je portai également mon attention sur celles du bassin, et nous trouvâmes toutes les divisions de l'artère hypogastrique accrues de volume; les utérines, les vaginales, les vésicales, les hémorroïdales, étaient prodigieusement dilatées. Existait-il un rapport entre ces développemens des artères du bassin et la nymphomanie? je le pense, et je fonde cette assertion sur l'inspection anatomique de ces mêmes artères chez les phtisiques. Chacun sait que les phtisiques sont enclins au coït et à la masturbation d'une manière désordonnée; sur environ soixante cadavres que j'ai examinés dans cette intention, j'ai constamment trouvé les divisions de l'artère hypogastrique très augmentées dans leur calibre. Que cette dilatation du système artériel soit effet ou cause, l'observation ne m'en paraît pas moins essentielle à constater. J'ai aussi remarqué le cervelet, mais je n'ai rientrouvé

de remarquable ni dans son volume ni dans son poids.

Cérébellite chronique, observée chez un singe.

Je dois à la bienveillance de MM. les professeurs du Jardin du Roi, l'advantage d'avoir pu examiner l'encéphale d'un grand nombre d'espèces de mammifères que je n'aurais pu me procurer par mes correspondances particulières. Sur un singe mort en novembre 1821, j'ai rencontré la partie médiane du processus vermiculaire supérieur, et la partie interne de l'hémisphère droit du même organe, ramollies, jaunes, dans une espèce de bouillie.

Ce singe (le papion) était mort d'une phtisie pulmonaire. Il n'avait point eu de paralysie, mais depuis plusieurs mois il était triste, taciturne et sans appétit.

Apoplexie cérébelleuse chez la femme ; observation communiquée par le D. FALRET.

Marie-Jeanne Renouville, âgée de cinquante-trois ans, d'un tempérament sanguin, d'une petite structure, née d'un père qui a succombé à une attaque d'apoplexie, avait toujours joui d'une bonne santé. Le 2 septembre 1817, Renouville fut trouvée morte dans son lit. Rien la veille n'avait pu faire pressentir sa fin prochaine. L'ouverture du cadavre fut faite vingt-quatre heures après la mort. On trouva dans le crâne un épanchement énorme de sang, qui paraissait avoir commencé dans le quatrième ventricule, et avait déchiré le cervelet, au point qu'il formait une cavité dont les parois n'avaient que trois lignes d'épaisseur, et qui était remplie par un caillot de sang du volume d'un œuf de poule. Le cœur était très volumineux, le ventricule gauche avait plus d'un pouce d'épaisseur ; il y avait quelques ossifications aux valvules artériques.

Les autres viscères paraissaient dans un état sain."

Cabanis a connu trois hommes qui, dans la force de l'âge, étaient devenus tout-à-coup impuissans. Quoiqu'ils se portassent bien d'ailleurs, leur humeur devint sombre et chagrine, et leur esprit parut bientôt s'affaiblir de jour en jour. Il est très probable que l'impuissance des parties de la génération a été précédée par la maladie du cerveau, particulièrement et primitivement du cervelet.

Conclusion.

Le grand nombre des faits physiologiques et pathologiques puisés dans l'homme et dans les animaux, ne prouvent pas seulement que le cervelet est l'organe de l'instinct vénérien, mais ils servent encore à expliquer les phénomènes suivans:

1. Comment des irritans appliqués dans la nuque, tels que des vésicatoires, des sétons, des frictions faites avec des substances volatiles et spiritueuses, produisent souvent une violente irritation dans les parties génitales, provoquent l'écoulement menstruel, lorsqu'il a été supprimé, remédient aux accidens causés par leur suppression, et guérissent l'impuissance provenant de causes débilitantes, bien mieux que tous les moyens que l'on a coutume de faire agir sur les parties sexuelles.

2. Pourquoi, au contraire, des ventouses, des sangsues, des lotions et des embrocations froides, faites dans la nuque, guérissent souvent la manie érotique, surtout lorsqu'elle est née brusquement, et deviennent d'excellens moyens contre le priapisme, le satyriasis, la nymphomanie et les pollutions nocturnes, supposé cependant que ces dernières ne soient pas une suite de l'épuisement.

3. Pourquoi les pendus ont de violentes érections, et d'abondantes émissions de liqueur seminale.* S'il

* Archenholz rapporte, dans ses Brittische Annalen (Annales Brit-

est vrai que les mêmes symptomes se manifestent dans la rage, de fréquentes saignées, etc., dans la nuque, produiraient, peut-être, d'heureux effets, dans cette maladie.

4. Pourquoi, dans quelques cas de lésions du cerveau, les blessés portent les mains, d'abord aux parties sexuelles et puis à la tête.

5. Pourquoi dans les cas d'inflammation des parties génitales, il y a toujours grand danger, lorsqu'il s'y joint délire et inflammation des parotides, ou lorsque dans le délire les malades portent souvent les mains sur les parties sexuelles.

6. Pourquoi la maladie se termine presque toujours par la mort, lorsque dans ces cas il y a délire, mouvemens désordonnés et convulsifs, et prostration des forces ; symptômes que l'on explique par une fièvre ataxique, tandis qu'ils proviennent d'une inflammation cérébrale.

7. Pourquoi chez les hommes morts d'une apoplexie occasionée par les efforts d'un coït trop voluptueux, on trouve presque tousjours du sang épanché dans le cervelet. Il y a très peu de temps que j'ai eu encore l'occasion de confirmer cette observation.

8. Pourquoi les désirs amoreux excessivement ardens sont souvent les précurseurs de l'apoplexie.

9. Pourquoi une cohabitation très ardente, répétée trop souvent peut produire l'aliénation mentale. Forestus, lib. X, observ. 25, en rapporte un exemple.

10. Pourquoi chez les soldats Turcs et Persans qui ont fait un usage excessif de l'opium les érections continuent encore long-temps après la mort.

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anniques), qu'en Angleterre des débauchés ont poussé le raffinement jusqu'à imaginer une machine à l'aide de laquelle leur maitresse les pend quelques instans avant de les recevoir dans ses bras.

Philosophical Observation.

Before closing these considerations, I wish to direct the attention of physicians to the different degrees of manifestation, of which the instinct of generation is susceptible. In infancy, and even in some persons who have acquired their full growth, we do not observe it at all; these individuals are absolutely indifferent to women. It commences its manifestation under the form of interest, taste, inclination; it soon assumes that of desire, passion, and it may terminate by degenerating into the most degraded lasciviousness, and into true erotic mania. All these different degrees then are only modifications of one and the same fundamental quality. This remark confirms what I have said in another place, on the gradations of the same propensity, and will be of the greatest use to us hereafter.

Some remarks on the Report, made to the Academy of Sciences on Experiments, relative to the Functions of the Nervous System, by Baron Cuvier, perpetual Secretary of the Academy.

M. Flourens has just made some mutilatory experiments on the nervous system, particularly on the brain and cerebellum. He believes, that he has proved by this means, that the cerebellum is the regulator of the movements of voluntary motion (*des mouvemens de translation*). As some may be tempted to conclude from this, that the cerebellum is not the organ of the instinct of generation, I have deemed it necessary to make a critical analysis of these experiments.

I have not seen the memoir of M. Flourens; I only am acquainted with the report of M. Cuvier; hence his report will serve as the basis of my reflections.

Baron Cuvier commences by correcting, in a proper

manner, the new language adopted by M. Flourens. I have observed with pleasure that he has endeavoured to avoid confusion in the terms *irritability* and *sensibility*, sensibility and the conductor of irritation, &c.

"To express then," says M. Cuvier, "in general language, the true questions that M. Flourens has proposed to himself, and which, perhaps, are not determined with sufficient clearness in the title of his memoir, we shall say that he has endeavoured to ascertain by experiment,

"1. From what points of the nervous system must artificial irritation set out in order to arrive at muscle.

"2. To what points of this system ought impression to be propagated, to produce sensation.

"3. From what points voluntary irritation descends; and, what parts of the system ought to remain untouched, in order to produce it regularly.

"We will add that, in this first part, he has only considered these questions so far as they relate to vertebrated animals and to their nervous system of animal life; that is to say, to the brain, the spinal marrow, and to the nerves which come out from them.

"In order to resolve these questions, the author commences with the nerves, and repeating, as it respects them, experiments already known, he establishes the two general effects of their irritation, to be such as we have just announced them; he shows in a very precise manner that, in order that contraction should take place, there must be a free and continuous connexion between the nerve and muscle; and that, for sensation, a free and continuous communication with the brain is necessary; and he concludes that neither contraction nor sensation belong to the nerve; that these two effects are distinct; that they can take place independently of each other, and that these propositions are true, at whatever place or whatever branch of the nerve, the communication is intercepted.

"Pursuing the same course for the spinal marrow, he arrives at similar results. When it is irritated in

any point, it causes contractions in all the muscles which derive their nerves from below this point, if the communications have remained free; if the communications are interrupted, no contractions take place. It is exactly the inverse of this as it regards the sensations; and as in the nerves the empire of the will requires the same freedom of communication as sensation, the muscles below the intercepted point no longer obey the will of the animal, and he no longer perceives them. Finally, if the spinal marrow is intercepted in two different points, and the space comprised between these two points is irritated, the muscles, which receive their nerves from this space only, experience contractions, but the animal no longer has any control over them, nor receives any sensation from them.

"We cannot report all the different combinations, with which M. Flourens has varied the experiments detailed in his memoir; it is sufficient to say, that they all tend to the results, which we have just mentioned.

"The author concludes from this, that sensation and contraction no more belong to the spinal marrow, than to the nerves; and this conclusion is true, as it regards all animals. It would be an important question to decide, if it is equally the case with animals who have been deprived of their brain, and which, in certain classes, appear very far from losing instantaneously all their animal functions; but it is a question to which we shall have occasion to revert, in the sequel of this report, even as it respects warm blooded animals.

"M. Flourens concludes further, from a part of his experiments, that it is in consequence of the communication established between all the nerves by means of the spinal marrow, that there is established what he calls the dispersion or generalization of irritations, or, in other terms, general sympathies; but he has not sufficiently developed this proposition, to enable us to appreciate the reasonings, on which he founds it."

These experiments and these results being known, I shall dispense with making any reflections.

Baron Cuvier continues:

"He comes finally to the brain, and it was in this central part of the system, that we were led to expect new information from experiments, better directed than those of former physiologists.

"In fact, although Haller and his school had made many attempts upon the brain, to learn its vital properties, and whatever there might be peculiar in the functions of the different parts of which this complicated organ is composed, it may be said that these attempts have not been attended with sufficiently careful results; because, on the one hand, neither the connexion of the parts of the brain, nor the directions and communications of their medullary fibres, were sufficiently known at this period; and, in the other, these different parts were not sufficiently isolated in the experiments. When, for instance, the brain was compressed, it was not well known, on what point of the interior the compression had most strongly acted; when an instrument was passed into the brain, the depth to which it extended, was not sufficiently examined, nor into what organ it had been introduced. M. Flourens objects, with some reason, to the experiments of Haller, Zinn, and Larrey; and he has endeavoured to avoid this difficulty by operating principally by means of ablation, that is to say, by removing, whenever it was possible, that particular part, the especial function of which he wished to know."

The reasons, that induce Baron Cuvier to object to the methods of Haller, Zinn, and Larrey, are very good. But, it is to be feared, that ablation is not by any means the best method of learning the special function of any particular part of the brain. Cuvier distinguishes very correctly, the vital properties of the brain from their particular functions. We shall see, hereafter, whether the function, that M. Flourens believes may be attributed to the cerebellum, is not rather a special

function, than a vital property common to the medulla spinalis and the medulla oblongata. We must first know the special functions; that is to say, those which constitute animal life, before we can obtain a knowledge of them by means of ablation. For, in this case, the animal can no longer manifest their psesence or absence. But up to the present time, these special functions have not been known. Let us suppose that M. Flourens wishes to determine, by the ablation of the cerebellum, whether this part is or is not the organ of the instinct of generation, how will he be enabled to make the animal live sufficiently long, to decide whether the animal retains or has lost this instinct? By the ablation of the hemispheres, vision and hearing are lost; will any one be correct in saying, that vision and hearing are special functions, or, all the special functions of the hemispheres? If we did not previously know that animals possessed memory, how shall we be enabled to determine that the same operation had destroyed it? How can we subject an animal, thus mutilated, to experiments on special functions of which we have no idea? And how can we remove from the brain a single organ? Does any one know the commencement, the termination, or the limits of an organ?

Finally, how can we remove a part without affecting those that are contiguous to it? How can we remove the cerebellum, especially in the mammalia, without injuring the *medulla oblongata* and all the parts with which it communicates, its commissure in the *pons Varolii*, intertwined with the nervous fasciculi of the *medulla oblongata*, the *tubercula quadrigemina*, &c. And as the effects of the lesion are transmitted, to what part shall we then attribute the symptoms, themselves? Neither should we ever forget, that one and the same part may have its general vital function, and its particular animal function beside. If it were true, that the lesion of the tubercles in birds, always causes convulsions, it is not the less true, that the tubercles

are destined for vision. So, also, the cerebellum may participate in the vital function of the *medulla spinalis* and *medulla oblongata*, and, at the same time, have a particular animal function. Cuvier admits, that the brain is not only necessary for vision, for hearing, and, to convert the irritations of other nerves into sensations, but also, that it is the seat of memory and judgment; which are here, general vital functions, and special, particular animal functions?

Thus, all these experiments, by mutilation or ablation, confirm what I have before said, that, at most, we can obtain but few results, almost always very doubtful, in relation to the phenomena of irritability and sensibility, the functions of certain viscera, and those of voluntary motion. But never shall we obtain the least knowledge of the special functions of the cerebellum or the integral parts of the brain.

But Cuvier continues:

"In order that the results that M. Flourens has obtained, may be better understood, we will call to mind, in a few words, the vitality and mutual relations of the parts in question.

"We now understand, and particularly by the late researches of MM. Gall and Spurzheim, that the *medulla spinalis* is a mass of medullary matter, white externally, grey internally, divided longitudinally above and below by furrows, two fasciculi of which communicate together by means of transverse medullary fibres; that it is bulbous at intervals, and that it gives out a pair of nerves from each bulb; that the *medulla oblongata* is the superior part of the spinal marrow contained in the cavity of the cranium, which also gives out many pairs of nerves; that the fibres of communication of its two fasciculi, there intertwine in such a manner, that those of the right ascend to the left, and reciprocally; that these fasciculi, after being dilated a first time in the mammalia, by a mixture of gray matter, and having formed the prominence known as the *pons Varolii*, separate and take the name of

crura cerebri, continuing to give out nerves; that they swell out again by a new mixture of gray matter, and form the masses commonly called *optic couches*, and a third time, to form those that we call *corpora striata*; that from the whole of the external border of these last protuberances, there arises a layer more or less thick, and folded externally according to the species of animal, entirely lined with gray matter which returns to cover them from above, forming what we call the hemispheres, and which, after being bent in their middle, unite with each other by one or more commissures or fasciculi of transverse fibres, of which the most considerable, which exists only in mammalia, takes the name of *corpus callosum*. We know, farther, that on the *crura* of the brain, behind the optic couches, there are one or two pairs of protuberances much smaller, known when there are two pairs, as in the mammalia, under the name of *tubercula quadrigemina*, and from the first of which the optic nerves appear to arise; that the olfactory nerve is the only one that does not evidently take its origin in the marrow or pillars of the brain; finally, that the cerebellum, a single mass, white within and cineritious without like the hemispheres, but oftener much more divided into external folds, is placed cross-wise behind the *tubercula quadrigemina* and upon the *medulla oblongata*, with which it is connected by transverse fasciculi, which are called the *crura* of the *cerebellum*, and which are inserted into the sides of the *pons Varolii*."

Those readers who wish to compare the report on our memoir, that was presented to the Institute in 1808, with these passages, will easily perceive the subjects in the anatomy of the brain, that were then called in question, or altogether denied, and which are now adopted. This change of opinion justifies our anatomical discoveries, and does honor to the reporter. I am fully persuaded, that when this celebrated naturalist shall have studied my physiological discoveries, his ideas will be in accordance with my own.

When Cuvier speaks of the *cerebellum* as a single mass, he can only mean the cerebellum of fishes, reptiles, and birds. In the mammalia, the part which in birds constitute all the cerebellum, only forms the middle or fundamental part, since on each side there exists a lobe more or less complicated, but always symmetrical with its other half. Consequently, the cerebellum of the mammiferous animals is, like the brain of the class of double organs.

"It was in these diversified and complicated masses that it was necessary to seek for the point of departure of irritation, and the place of arrival of sensation; it was of their respective coöperation in the acts of volition, that it was necessary to be assured, and it is this which M. Flourens has endeavoured to obtain.

"He has first examined, how far we can go back to produce efficacious irritations on the muscular system, and he has found a point where these irritations remain inert; taking then the brain at its opposite part, he has irritated it more and more deeply, so long as it did not act upon the muscles; and when action commenced, it was found to be in the same place where its action was arrested in ascending. This place is also the same where the sensation of excitations, transmitted to the nervous system, is arrested; above this, punctures and wounds excite no pain.

"Thus, M. Flourens has pricked the hemispheres without producing either contraction in the muscles, or an appearance of suffering in the animal. He has removed them by successive slices; he has done the same with the cerebellum. He has removed at the same time, the hemispheres and the cerebellum; the animal continued insensible to suffering; the *corpora striata* and the *opthalmic couches* were operated on and removed in a similar manner, without producing any different effects.

"There did not even ensue a contraction of the iris, and yet it was not paralyzed by the operation." Dr. Spurzheim and myself, seeing so much contradiction

and doubt, in the experiments cited by Duverney, Gautier, Kaw-Boerhaave, &c., came to the determination to make similar experiments, the results of which I have already announced, Vol. II., p. 83, and the Phrenology of Dr. Spurzheim, p. 8. If we remove the greater part of the two hemispheres of the brain, and the greater commissure, to the cavities, in hens or pigeons, these animals still manifest distinctly, that they see and hear; but they would not take the food that was put before them, yet if bread was forced into the throat, they swallowed it. Rabbits, mutilated in the same way, have run, seen, heard, and even voluntarily taken nourishment. A considerable lesion of the cerebellum itself, does not injure the functions of the senses and animal life any more than the destruction of the superior parts of the brain proper; but if these lesions penetrate to the two great apparatus of supply (*renforcement*), the corpora striata, or the optic couches, or still farther, to the great commissure of the cerebellum (*Pons-Varolii*), convulsions and death ensue.

We concluded, from these experiments, that the whole of the brain was not necessary for the functions of the senses; but they by no means determine whether a portion of the brain, and what part of this organ, is indispensable to enable the functions of the senses to take place, with the consciousness of the individual.

Here, then, are results entirely different from those obtained by M. Flourens. In truth, I cannot understand how the whole brain and cerebellum, with the optic couches and the corpora striata, can be removed without interfering with the medulla oblongata, &c., and thus exciting convulsions and death, without mentioning the consequences of an inevitable and profuse hemorrhage.

"But when he pricked the *tubercula quadrigemina* there was observed an incipient trembling and convulsions, and these increased in proportion as the injury extended further into the *medulla oblongata*. The

wound of these tubercules, as well as that of the optic nerve, produced strongly marked and prolonged contractions of the iris."

In reading this passage, I anticipated the conclusion that the lesion of these tubercles would not excite convulsions more constantly than the lesion of the hemispheres. For they are ganglions implanted in the superior extremity of the *medulla oblongata*, and not its continuation. MM. Fodera, Fossati, and myself, have injured and removed the anterior pair of tubercles, but with the precaution of leaving the subjacent *medulla oblongata* untouched; rabbits have not experienced the least convulsion. But, when the lesion is made farther forward, the animal is seized with strong and rapid convulsions.

These experiments agree in result with those of Larrey, printed in the third volume of the journal of foreign sciences. (*Savans étrangers.*)

"Neither the irritations of the brain, says this physician, nor those of the *corpus callosum* itself, produce convulsions; we can even injure it with impunity. The only one of all the parts of which the brain is composed, which has appeared uniformly and invariably to excite convulsions, is the *medulla oblongata*. It is this which produces them to the exclusion of all the other parts.

"They contradict those of Haller and Zinn, in all which concerns the cerebellum; but from what M. Flourens has seen and enabled us to see, it appears since that these physiologists have touched the medulla oblongata, without being aware of it.

"In his language, M. Flourens concludes that the medulla oblongata and the tubercles are irritable; which, in ours, means that they are conductors of irritation, like the spinal marrow and the nerves; but neither the brain nor the cerebellum have this property. The author also concludes, that these tubercles form the continuation and the superior termination of the spinal marrow and medulla oblongata; and this

conclusion is in conformity with their anatomical connexions and relations.

"Wounds of the brain and cerebellum are no more attended with pain than they are with convulsions; and, in common language, one would conclude from this, that they were insensible. But M. Flourens, on the contrary, concludes that they are the sensible parts of the nervous system; which simply means that the impressions, received from sensible objects, must affect these parts to enable the animal to experience a sensation.

"M. Flourens seems to have proved this proposition so far as the sensations of seeing and hearing are concerned; when the cerebral lobe of one side of an animal is removed, he no longer sees with the eye of the opposite side, although the iris of this eye preserves its mobility; when both lobes are removed, he becomes both blind and deaf."

M. Fodera has had the kindness to repeat these experiments with MM. Dannecy, Fossati, Londe, Georget, and myself. I will relate, what we have observed to take place in pigeons and rabbits.

The first two rabbits from which the central and superior parts of the cerebellum were removed, died in three or four minutes. The hemorrhage as well as the convulsive motions were considerable. The section was made from above downwards. On one the medulla oblongata was reached by the instrument, and tetanic convulsions ensued.

The same operation was performed on a third rabbit. He manifested an air of astonishment; rose on his hind legs, moving backward, drawing his head constantly in the same direction, jumping up on his hind legs twice to the height of more than a foot and a half. When his leg was pricked he quickly drew it back. By degrees all the centre and a portion of the hemispheres of the cerebellum were destroyed; the fatal symptoms multiplied as the destruction progressed.

The first pigeon, whose crebellum was destroyed,

like the preceding rabbit, drew his head backward strongly, sometimes advancing and sometimes receding.

The second pigeon, quite young, carried his head backward, and stepped forward and backward, even after the cerebral hemispheres were removed.

The third pigeon, after the same operation, appeared at first completely stupefied, with tetanic contraction and very strong convulsions.

The experiment was repeated on a fourth rabbit; the superior part of the ventricle was destroyed, with the exception of the optic couches and the *corpora striata;* complete stupor ensued for some time; the animal then moaned piteously, and ran forward with violence. The *corpus callosum* was then destroyed; the animal then became quiet; he ran forward when irritation was applied. The optic couches and the *corpora striata* were then destroyed; the animal supported himself on his feet, moving forward.

Here again are very different results from those of M. Flourens, and they will always vary, according to the irritability and age of the individual, and the kind of instrument with which the experiment is performed; that is, whether it is dull or sharp.

In general, it is hardly possible to perform precicely the same operation two or three times in succession, and always obtain the same results. Many other experimenters have slaughtered a vast number of pigeons, rabbits, dogs, &c., and there has always been the same inconsistency and the same uncertainty, in the appearance of the phenomena. Nothing is more common than convulsions, occurring as the immediate consequences of lesions of the cerebellum, in birds and mammalia. Here, in speaking of the tubercles, we can, with much more reason say, that their connexions and anatomical relations with the *medulla spinalis* and *oblongata*, explain these convulsions. These experiments, then, at least in many cases, in no way contradict the experiments of Haller, Zinn, &c.

But, we do not find, that he has proved this, as regards the other senses, equally well. First, he has not,

neither can he perform any experiment relating to the senses of smell and taste; then, as to touch, even his experiments do not appear to us conclusive. In truth, the animal thus mutilated, assumes a stupid air, and acts no longer from his own volition; but when he is struck or pricked, he assumes the appearance of an animal just awaking. In whatever position he is placed, he preserves his equilibrium; if he is put upon his back, he quickly turns himself; if he is pushed, he walks. If it is a frog, he hops when touched; if a bird, he flies when tossed in the air; when held, he struggles to escape; if water is poured into his mouth, he swallows it.

Without doubt it would be difficult to believe, that all these actions are brought about without being incited by any sensation; it is true, that they are not in consequence of an effort of reasoning. The animal escapes without an object; he frequently falls against the same obstacle; but that proves, at most, and these are the expressions of M. Flourens, that such an animal is in a state of sleep, or acts like a man asleep. But we are also very far from believing, that a man who sleeps, who moves himself in sleep, who knows how to take, in this state, a more comfortable position, is absolutely deprived of sensation; and that he has had no distinct perception of it, and that he has not preserved the memory of it, is not a proof that he has not had these. Thus, instead of saying, like the author, that the cerebral lobes are the sole organ of sensation, we ought to restrain ourselves to well-observed facts, and limit ourselves to saying that the lobes are the sole receptacles, where the sensations of sight and hearing can be realized and become perceptible to the animal. That, if we should wish to add still further to this power, we should say, that in these lobes, all the sensations assume a distinct form, and leave permanent traces and enduring recollections; that, in a word, they constitute the seat of memory, a faculty by means of which the animal is furnished with the materials of its judgments. This conclusion thus

reduced to its precise terms, will become the more reasonable; for, besides the probability which the structure of these lobes and their connexions with the rest of the system, give to it, comparative anatomy affords another confirmation, in the constant proportion of the volume of these lobes to the degree of intelligence of the animals."

As to the opinion of Cuvier, I request the reader to peruse again, what I have said in the second volume, where I have exposed the reasons which seem to prove that other nervous systems, entirely independent of the brain, can also produce spontaneous motions and sensations.

Baron Cuvier seems to admit, that the seat of memory is exclusively in the brain, and to explain the judgment by the materials furnished by the memory. Has he considered the different species of memory? Can he explain, by memory, the varied and opposite talents, instincts, propensities, so multiplied in the different species of animals? Is the power of judgment in proportion to the strength of memory? No: so long as physiologists shall continue to follow old systems of philosophy, all their researches relative to the functions of the cerebral parts, will continue without any definite object or practical result.

"After having studied the effects of ablation of the brain, properly so called, M. Flourens examines those which ensue from the extirpation of the tubercula quadrigemina; the removal of one of them, after a convulsive motion which soon ceases, produces, as a permanent result, blindness of the opposite eye and an involuntary rotatory motion of the head; that of both tubercles, brings on complete blindness, and the motion of the head is more violent and longer continued. Still the animal preserves all its faculties, and the iris continues to be contractile. The entire extirpation of the tubercle, or the section of the optic nerve alone, paralyzes the iris; hence M. Flourens concludes that the ablation of the tubercle is attended with the same

results as the section of the nerve would be; that this tubercle is only a conductor of vision, and that the cerebral lobe above, is the ultimate limit of sensation and the place where perception takes place.

"It only remains to be remarked, that, in extending too deeply this extirpation of the tubercles, the *medulla oblongata* becomes involved, and that violent and long continued convulsions then ensue."

M. Flourens was very near admitting, that the tubercles are not always irritable. When he says that the animal preserves all its faculties, of what faculties does he intend to speak?

"In the experiments of M. Flourens, what appears to us most curious and novel, relates to the functions of the cerebellum.

"During the ablation of the first slices, there only appeared a slight debility and want of harmony in the motions.

"As this slicing proceeded, an almost general agitation manifested itself; the animal, although he saw and heard, only performed certain rapid and irregular motions."

"The power of flying, walking, and standing upright was lost by degrees.

"When the cerebellum was cut off, this power of performing regular motions entirely disappeared.

"When the animal was placed upon his back, he made no attempts to turn himself; yet he saw the blow with which he was threatened, he heard cries, he sought to avoid danger, and made a thousand efforts to do it without succeeding; in a word he preserved his faculty of perception and his volition, but he had lost the power of rendering the muscles subservient to the will; hardly did he succeed in his attempts to stand upright by supporting himself on his wings and tail.

"By depriving him of his brain, he was put to sleep.

"On depriving him of his cerebellum, he appeared to be in a state of intoxication.

"It is surprising," says M. Flourens, "to see a pigeon,

in proportion as he loses his cerebellum, gradually lose the faculty of flying, then that of walking, then finally that of standing upright; this takes place by degrees. The animal at first loses the power of keeping his balance, then his feet are unable longer to sustain him. Finally, every fixed position becomes impossible for him; he makes incredible efforts to retain some fixed point, but does not succeed; and still, when exhausted with fatigue, he seemed to take some repose, his senses were so much on the alert, that the least gesture caused a recommencement of his contortions, without the appearance of the least convulsive motion, so long as the medulla oblongata and tubercles remained untouched.

"We do not recollect that any physiologist has published any thing, which resembled these singular phenomena. Experiments on the cerebellum of quadrupeds, and especially those that are full grown, are very difficult, on account of the extensive portions of bone that it is necessary to remove, as well as the great vessels that are opened. Besides, most experimenters operate from some previously conceived theory, and are a little too apt to see what they wish to see; and certainly no one had doubted that the cerebellum was, in some respect, the balance wheel, the regulator of voluntary motion in the animal. This discovery, if repeated experiments, with all proper precautions, establish its truth, will do the greatest honor to the young observer whose work we have just analyzed.

"In conclusion, the Academy is as well able to judge as ourselves, that, independently of the superfluous mutations of language and known facts, which the author was obliged to reproduce in order to give a finished appearance to his work, this memoir presents more precise details than any which we before possessed, of many old facts, and that it also contains others which are as new as precious for science."

The experiments of M. Flourens on the functions of

the cerebellum, are precisely those, which appear to me to present the greatest uncertainty, and are the least to be depended on; on this account I shall bestow more time on their examination than on the preceding subject.

It was said above, that M. Flourens removed the cerebellum by slices; that he removed it entirely, and that the animal remained incapable of suffering. Here it is said that, during the ablation of the first slices, some debility was apparent, and a want of harmony in the motions; when the middle slices were removed, an almost general agitation came on; the animal, though seeing and hearing, only performed rapid and irregular motions.

This want of harmony, this almost general agitation of rapid and irregular motions, why do they fear to call them convulsive motions? This is apparently feared, since then the results of M. Flourens would coincide with those obtained by so many other experimenters, and they would lose the merit of novelty.

Indeed, if the different cerebral parts existed in an insulated condition in the brain, without any connexion, if we could remove these without injuring their envelopes, without causing any hemorrhage, we might cherish some expectation of arriving to sure results by their entire ablation; but how can any one be so foolish as to attribute certain effects to the ablation alone of a part, which is so intimately connected, above, below, in its middle portion, with the *medulla spinalis* and *oblongata*, with the annular protuberance or pons Varolii, with the crura of the brain, with the tubercula quadrigemina; of a part, whose ablation or mutilation is impossible, without seriously affecting organs destined to the execution of spontaneous motions, and of the functions of many senses; of a part whose ablation is necessarily attended with a constantly increasing loss of blood? How can physiologists base their propositions on experiments so confounded, so complicated and varied in their nature and their effects; on experiments, which are either in

contradiction to those of other very expert experimenters, or which produce different phenomena every time they are performed, either on another animal, or by other physiologists?

Is it astonishing, that the animal successively loses the faculty of flying, standing upright, of performing regular motions, of raising himself up when he is gradually ceasing to live? But, you will tell me, the animal sees, hears, feels, he makes a thousand attempts to avoid danger; the power of volition still remains; consequently it is not to impending death that we ought to attribute this irregularity of motions. Go to the bed-side of the sick, and you will often see those who have not the strength to move their arms, to shut their eyes, to put out their tongue, and who see, hear, feel, and internally make a thousand vain efforts to manifest signs of life, without there existing sufficient reason to attribute these phenomena to the partial death of the cerebellum.

The pigeon, whose cerebellum we destroyed, still walked backwards and forwards. Does it not require regular exertions of the power of voluntary motion to walk backwards and forwards? And even in order that the pigeon should with difficulty support himself on his wings and tail, as happened in the experiments of M. Flourens, it requires regular motions.

Thus every thing serves to prove that the idea that the cerebellum is the balance wheel, the regulator of voluntary motion, is rather a singular idea than a true discovery.

"The integrity of the cerebral lobes," continues the report, "is necessary for the exercise of vision and hearing; when they are removed, volition is no longer manifested by spontaneous acts. Still, when the animal is directly excited, he performs regular motions by means of this faculty, as though he desired instantly to end his pain and uneasiness; but these motions do not enable him to effect his object; very probably because his memory, which has disappeared with the

lobes which were the seat of it, does not continue to furnish a base or elements for his judgment. These motions have no connexion with each other for the same reason, because the impression, which has caused them, neither leaves a recollection or a durable volition. The integrity of the cerebellum is necessary to the regularity of the motions of this faculty; whilst the brain remains, the animal will see, hear, and have very evident and energetic volitions; but if the cerebellum is removed, he will no longer be able to maintain the equilibrium necessary for his locomotion. As for the rest, the irritability continues a long time in the parts without either the brain or the cerebellum being necessary to it. Every irritation of a nerve calls it into action in the muscles to which it is rendered; every irritation of the spinal marrow excites it to action in the members situated below the irritated point. It is entirely at the top of the *medulla oblongata*, where the *tubercula quadrigemina* adhere to it, that this faculty of receiving and of propagating, on the one part an irritation, and on the other pain, ceases. It is at this place, at least, that sensations must arrive in order to be perceived; it is also from this point that the orders of the will must depart; thus, the continuity of the nervous organ from this place to its several parts, is necessary for the performance of spontaneous motions and for the perception of impressions, either internal or external.

"All these conclusions are not identical with those of the author, and, especially, they are not related in the same terms; but they are those which have appeared to result the most rigorously from the facts which have been so well established. They will, without doubt, be sufficient to enable you to judge of the importance of these facts, to induce you to declare that you are satisfied with the author, and to invite him to continue to communicate to you the remainder of a work so full of interest."

In our experiment on rabbits, M. Spurzheim removed a large part of the hemispheres, and these ani-

mals continued to see and hear, and already we had established as a fact, that the totality or integrity of the hemispheres was not necessary for the exercise of the functions of the senses.

Without tormenting the poor animals, we had already proved that a disease of one of the anterior tubercles produces either a disease or blindness of the opposite eye. See my large work, vol. i. p. 113.

Without these cruelties, Sœmmerring had already said: "We have seen an individual, in whom a wound penetrated to the *corpus callosum*, lose the use of the eye on the side opposite the wound, whenever the pus accumulated there, and this blindness disappeared the moment the pus was evacuated; hence the sensation of vision takes place in the brain." Passage quoted, vol. ii. p. 70.

Finally the pretended results of the experiments of M. Flourens, but very rarely agree with the pathological facts observed in lesions of the cerebellum. I have related the history of René Bigot, in whom, in consequence of a sabre wound, the right lobe of the cerebellum was exposed through an opening of the dura-mater. The *slightest touch of this organ occasioned vertigos faintings, and convulsive motions*, without his manifesting the least sign of pain. The same individual lost the vision and hearing of the right side. In the *post mortem* examination, the right lobe of the cerebellum was found shrunken, and of a yellow color; the *medulla oblongata* and *spinalis* was of a dull white, of a firmer consistence than natural, and reduced to a quarter of their volume; the nerves emanating from these parts, appeared also in a state of atrophy. This analogous condition of the *medulla oblongata* and *spinalis*, with that of the cerebellum, proves that this last is immediately connected with these parts, and that the lesion of the one influences the other. How then can we insulate the cerebellum and attribute to it, that which equally belongs to the diseased conditions of the parts connected with it?

Blindness or the changes of vision, which so often supervene upon diseases or lesions of the cerebellum, are explained by the connexion and the proximity of the cerebellum with the tubercles; the same connexion explains also the vivacity of the countenance, the fire or the languor and dejection of the eyes, in concupiscence, or after the satisfaction of venereal desires.

The wounded man, Augustus François, experienced sharp pains in the occiput, heaviness and numbness in the lower limbs, and so great a weakness of sight and hearing, that he could hardly distinguish the largest objects or hear the most acute sounds.

Boyer, in his *Treatise on Surgical Diseases*, vol. v. p. 78., cites an observation of Lapeyronie, and another fact reported by Petit, of Namur, which seem to prove that the lesion of the cerebellum, whatever may be the cause producing it, gives to the body an extraordinary vivacity of sensation. In the observation of Lapeyronie, the patient was a man whose intelligence was not in the least affected, and whose physical sensibility was very active. On opening the head the cerebellum was found to be a mass of tubercles filled with pus. The observation of Petit is still more precise. A soldier received a musket shot wound; the ball had traversed the left part of the cerebellum and penetrated to the posterior lobe of the left hemisphere of the brain. During the forty-three hours that this soldier lived, his judgment was sometimes good; he answered at this time whatever was asked him, but generally he was delirious; he was constantly in agitation, turning in bed from one side to the other, with his arms and legs in constant motion. Sensation was so acute in the whole of his body, that, at the least touch, he drew back the part on which the fingers were placed, as if he had been cut or burnt. This is a new proof of the immediate influence of the cerebellum on the medulla oblongata and medulla spinalis, and all the nerves which derive their origin from these parts. In consequence of the phenomena of

this wound, Petit made experiments on living dogs, and although in most of these animals, the lesion of the cerebellum was accompanied with an augmentation of the sensibility in all the parts of the body, Petit, notwithstanding, avowed that these experiments only excited doubts, which furnishes a further proof how variable and uncertain in their effects, are those lesions which are made designedly, and that they ought to be extended and multiplied, when the injury of the cerebellum is so great, or has continued sufficiently long, to transmit its irritation to all the neighbouring parts with which it is connected, to the *medulla spinalis* and *oblongata*, the *tubercula quadrigemina*, the auditory nerves, the first great ganglion of reunion (the *pons Varolii*), the great nervous fasciculi, (*crura cerebri*), the second and third great ganglions of reunion (optic couches and *corpora striata*), and thence to all the nervous mass of the hemispheres.

So also the irritations of any parts whatever of the hemispheres, or of the whole hemispheres may be successively transmitted to the inferior parts with which they are continuous. There is not a physician or physiologist, who cannot call to mind a great number of facts in support of this assertion.

How frequently do the lesions or diseases of the brain and its coverings, contusions, concussions, compressions, extravasations, excrescences, cancers, hydatids, inflammations, suppurating cavities, the seats of which are apparently solely limited to the hemispheres, produce the most general and alarming symptoms, the loss of the external senses, of sensation and the faculty of motion, of severe pains, partial and general convulsions, &c.

Let any one now determine what degree of confidence the prudent physiologist may give to the pretended results, obtained by mutilations and violent ablations of the cerebral parts, especially when it is required to determine the special functions of an organ, so much irritated and so intimately connected with other organs.

With the exception of the influence, that the lesions of the cerebellum exercise on the medulla oblongata and medulla spinalis, there exists, neither in the state of health, nor in that of disease, any relation or proportion, between the cerebellum and the regularity of the motions of the faculty of locomotion. Animals deprived of the cerebellum still regularly exert this power. The cerebellum of fishes, reptiles, and birds, is less complex than that of the mammalia. Have these last more regular or active motions of this faculty than the former? What relation is there between the successive development of the cerebellum from the moment of birth up to the twentieth or thirtieth year, and the regularity of these motions? Are the movements of the man at twenty or thirty years of age, more regular than those of the boy or girl, from five to sixteen years? Has it ever been proved by experiment, that individuals with a large cerebellum, have more regular motions than those, with a small one? Do women, who generally have a smaller cerebellum than men, walk and dance with less regularity, art, or grace than men? Does mutilation, which has such a powerful influence on the condition of the cerebellum, produce a derangement of the regularity of these motions? What connexion does the influence of the lesions, or the diseases of the cerebellum, or the genital parts, have with the regularity of motion? What have the painful tensions and heats of the back of the neck, apoplexies of the cerebellum, so often associated with the sexual functions, in common with the regularity of these motions? By the hypothesis of M. Flourens, neither of these questions is resolved. On the contrary, they are all answered, if we admit the cerebellum as the organ of the propensity for sexual union.

Why should we admit any other organ for the *regularity* of voluntary motion, than the organs for this motion itself? Would it not be absurd to admit some organs for the vision and hearing, and others

for the regularity and irregularity of these two functions? For the same reason it is sufficient to explain the irregularity of the motions of this faculty, to say that the organs of voluntary motion, the medulla spinalis and oblongata, may be irritated, injured, troubled, &c.

In order to admit, that the cerebellum regulates the motions of this faculty, it is necessary that a certain proportion should exist between the cerebellum, and the power, the quickness, and the regularily of these motions. Comparative anatomy does not support this idea. But this proportion between the medulla oblongata and medulla spinalis, and the nerves that are derived from them, exists throughout. The power, the agility, and the regularity of the motions of the tiger, the hare, the alligator, the boa, &c., are in proportion to the size of their organs, and not to that of their cerebellum, which in them is much smaller than in man.

We will further add, that the phenomena excited by these lesions, vary at different ages in different individuals; and they never justify any application from the fish to the reptile, the reptile to the bird, the bird to the mammiferous animal, or this last to man; that consequently these lesions can never supply sure and useful facts, either for physiology or human pathology; and that, finally, all these cruel mutilations have no other merit than that of vain curiosity.

II. *Love of Offspring.*

Nature, by another organ, secures the existence and prosperity of beings, procreated in consequence of the instinct of propagation. In all animated nature, there is manifested an imperious propensity to preserve and cherish offspring; we admire it in the insect, and it commands our veneration even in the tigress.

How happens it, that, to this day, neither philosophers nor physiologists have made any serious re-

searches in relation to this propensity? No one has endeavoured to discover the origin of this preserving instinct; no one has examined why this propensity differs in its manifestation, in different species, in the two sexes, and in different individuals. Does it result from the organization taken collectively, or does it depend on an isolated part? These are questions, which no one, before myself has examined. Ought it then to be a matter of astonishment, if, when I teach that this instinct is innate in man and other animals, that it is a fundamental and peculiar quality, and that it has its seat in a particular cerebral part, the idea should be deemed ridiculous, and at variance with common sense?

But, I will lead my readers by the same route, that nature has conducted me; in this way they will themselves discover this truth, which heretofore has seemed to them devoid of probability.

History of the Discovery of the Love of Offspring, as a Fundamental Quality, and of its Organ.

On comparing with indefatigable perseverance various forms of heads, I have observed that, in most of the heads of females, the superior part of the occipital bone recedes more, than in the heads or crania of men. Let any one compare the crania of men (Pl. XXX. XXXIX.) with the cranium of a woman (Pl. LVI.). As this prominence of the superior part of the occipital bone is evidently produced by the brain, it follows that the subjacent cerebral part is, in most instances, more developed in woman than in man. What was then more natural than the idea, that this cerebral part might be the material cause of a faculty or quality, manifesting itself in a greater degree in woman than in man?

But what is this quality, or this faculty?

There is not the least shadow of evidence, that the

love of offspring has ever been considered as a primitive power, a fundamental propensity; still less, as being produced in the organization, by a particular organ; and least of all, that any one should have believed, he could find this organ in the brain. For many years I have had different opinions, which I have successively discarded, on the difference in the form of the head in man and woman. In the conferences that I have held with my auditors, I have often spoken of my embarrassment on this subject. I observed finally, that the crania of monkeys, as far as this prominence is concerned, have a singular analogy with the crania of women. I concluded from this, that the cerebral part, situated immediately under this prominence, was very probably the organ of a quality or faculty, that women and monkeys equally possess in a high degree. I pursued with the more ardor this idea, because, from the organs I had already discovered, I was sure, that this region was not the seat of any superior intellectual faculty whatever. I more than once reflected, in my own mind, on the qualities and faculties that I knew were possessed by monkeys; finally, in a favorable disposition of mind, during the delivery of my lecture, I was struck with the extreme love that these animals have for their offspring. Impatient of comparing instantaneously the crania of male animals, in my collection, with all those of females, I requested my class to leave me, and I found, in truth, that the same difference exists between the male and female of all animals, as existed between man and woman. This new idea appeared to me as much the more plausible, as the organ of this instinct is found placed very near that of the instinct of propagation. What could be more in conformity with the order of nature?

Before presenting the proofs in favor of the existence of the organ of the love of offspring, I shall give an abstract of the history of this instinct, both in animals and in man. This sketch will be sufficient to

convince my readers, that it should be considered as a true fundamental instinct, as a particular primitive quality.

Natural History of the Love of Offspring.

Most insects, fishes, and amphibious animals, seeking to preserve their eggs from accidents from without, lay them in a place which facilitates the egress of the young, and where they are enabled to find food. Their solicitude for their young extends no farther.

In some of the species of these animals, the care that they take of their offspring even goes beyond this. Certain species of spiders carry their eggs in a little sack on their back, which they never part with except in the most pressing emergency, and which they immediately resume when the danger is passed. All those, who have once in their lives destroyed an ant hillock, must have seen, with what earnestness the ants collect their eggs and larvæ, to replace them in a place of safety. Wasps and bees, that at all other times permit us to observe them without manifesting anger, become dangerous to those who approach them in the season of their young. Who does not know with what indefatigable activity they nourish them, and with what courage they defend their young bees, with what anxiety they lick and caress them from the moment when they come out of the cells? We find also in birds, this tender affection for their young. The more they are taught, by sad experience, the dangers that threaten their young, the greater pains do they take in building secure nests, and in concealing and protecting them. After having with perseverance covered the eggs and hatched out the progeny, the parents nourish them with extreme tenderness; their watchful love foresees all the accidents which may happen to them, instantaneously gives them notice, and induces them to remain still and conceal them-

selves, or conducts them to a safe place. When the parents perceive that their brood is threatened, what anxiety, what alarms do they manifest! what stratagems do they put in operation to deceive the bird of prey, the serpent, the weasel, or man! and when we succeed in robbing them of their offspring, what painful cries, what stubborn resistance! Sometimes uttering plaintive accents, they follow the robber for considerable distances, to the very place where he deposits them, which they do not quit until they have lost all hope of recovering them; even hunger cannot oblige them to quit them in the moment of peril; often, even after long continued cold and humid seasons, we find the males and females dead, covering their young, victims also of the cold.

In the mammalia, also, the love of offspring is the most active and imperious of all the instincts. The mother observes with solicitude and anxiety every thing, which may become dangerous to her offspring. When the fox, the cat, the squirrel have the least indication that their habitation is discovered, they instantly abandon it, and conceal their young in another retreat. Animals of prey, however wild they previously had been, and with whatever caution they have concealed themselves in the vicinity, become rash when they have young to provide for; no danger stops them; they enter the gardens without caution, the poultry yard, the dove cot, &c. When all the outlets of a borough are furnished with snares, the foxes, when they have no young, keep shut up for fifteen days, until there only remains the alternative of dying of hunger or falling into the trap. But when they have offspring, the cruel hunter knows too well that the mother will not long resist their groans, and the father also, after having exhausted all the means of safety, will soon become the victim of his tender love for his progeny. Cats nurse the young of which the mother is sick or dead. With what earnestness does the bitch implore the pity of her master, who takes

from her one of her young? The hind and the female roebuck forget that they are unarmed, and rashly precipitate themselves on the enemy, when they are compelled to save or defend their fawns. With what fury does the wild sow defend her young! How formidable do animals of prey become, when they seek food to appease the hunger of their offspring!

Finally, who is there that forgets this admirable propensity in the human species? From the most tender age, nature begins to teach the woman the part of the mother, and makes her pass through the different degrees of instruction to prepare her for her future destiny. Observe this little girl, so seriously occupied in playing with her doll. She dresses it, undresses it, decks it in fine clothes, feeds it, gives it drink, prepares its night linen, puts it to bed, takes it up often, caresses it, gives it its lesson, scolds it, threatens it, and tells it stories. In this way she spends the whole day, weeks, and even months with her dear doll. It is with hearty good will also, that she assumes the care of her younger brothers and sisters. She feels, more acutely than they, their pleasures and their sorrows. Hardly does a new desire arise in her heart; nothing in the world has greater value or more charms in her eyes, than babies. Where is the father, or the mother, who does not call to mind with rapture the time, when, being single, they hoped soon to be married? And when the early indications attest that the union has not been sterile, what joy! what mutual felicitations! what plans for the future! Some young women experience especially an inexpressible delight, when they first perceive the movements of the living infant within them. The young wife becomes the object of the busy cares of the whole family; all await the decisive moment with impatience, mingled with anxiety! Is there any happiness purer than that which is depicted in the looks of a mother, watching with tenderness the wants of the infant, that she presses to her bosom? What duty is there more respectable and more sacred than

the cares, which parents take of the precious pledge of their love? If I had a city, there should arise in its centre an emblem of domestic happiness; a mother nursing her infant. Every time that a grandmother sees her grandchildren, or, her great-grandchildren, the sentiment of maternity comes again to her heart, and this benevolent instinct acts still, when all the other propensities are almost entirely extinguished within her.

Every sacrifice, the least action performed for the safety of a child, or, to administer to its happiness, deeply affects us; all, which discloses the heart of a barbarous mother, fills us with indignation and horror; every injury, inflicted on feeble infancy, or on a pregnant woman, or, a nursing mother, revolts us.

The interest, which infancy commands, influences even the judges in favor of criminals. Galba Sergius, though accused of the assassination of thirty thousand Lusitanians, and on the point of being banished, was absolved by the people, who were moved to pity, because, shedding tears, he pressed to his bosom two children of tender age.

Reflecting on all the circumstances that characterize the love of offspring, it is impossible to deny that it is an innate instinct, and intimately inherent in the organization.

In order to be convinced by the surest evidence, that the love of offspring is an innate and particular instinct, let us follow it in its different manifestations in the different species of animals, in the two sexes, and in different individuals.

In many species, the male, have little or no love for the young; such as the bull, horse, stag, wild boar, dog, cock, &c. In these species the love of offspring appears to belong exclusively to the females. It is very rare to see a dog bring food for his female companion with young.

In other species, on the contrary, the male and female equally love their young, and take care of them

in common. This particularly takes place in those where nature has established a marriage as durable as life; for example, in the fox, wolf, marten, pole-cat; in almost all birds, such as the stork, swan, swallow, blackbird, nightingale, (green finch,) sparrow, pigeon, &c. In these species, when the female dies, the male continues to cover the eggs and nourish the young. When both are alive, they generally cover the eggs alternately, and take care of the young in common.

Still, even in these species, it is observed that the female is more powerfully influenced by this instinct than the male. In cases of imminent danger the father escapes rather than the mother.

In each of these two classes again there exist differences between one individual and another. There are cows, mares, bitches, which submit with indifference to the loss of their young; some females even abandon them entirely as soon as they are born. Generally, pigeons, the male as well as the female, cover their eggs carelessly. They often let them get cold; frequently they crush them; sometimes they abandon their nest for the slightest cause; and when their young are taken from them, they do not manifest much sorrow. *Le Râle des Genets*, called the *king of quails*, sets with so much assiduity, that oftentimes the bird is beheaded by the sickle of the reaper. When the building in which there is a stork's nest takes fire, the parents precipitate themselves into the flames, rather than abandon their young.

The female of the silver rabbit and hamster neglect their young, and sometimes devour them, even when they do not want food. Nothing is more original than the idea of M. Virey, when he maintains that the females kill their young from maternal affection, when they have no milk. Let him but take the pains to compare the heads of such cruel mothers, among rabbits, sows, and women, with the heads of good mothers of the same species, and he will find the true cause. Other females are inconsolable for such a loss, grow

lean with sorrow, and utter lamentable cries. I have seen bitches seek their young for many months, with the most unwearied anxiety; they attack with fury all those whom they suspect of having taken them away, and overwhelm with plaintive caresses, those who they believe are able to restore them; when they find all their hopes disappointed, they fill the air with their continued howls. Some mares have such a passion for colts, that they lead away those of other mares, and take care of them with jealous tenderness.

In the different species, maternal love manifests itself still under different modifications. The female of the silver pheasant singularly loves her young; and on this account the nest and care of the young speckled hens are confided to her, in preference to the old hens. Some females have only an affection for their own young, and hate those of other females of the same species. The female partridge manifests the greatest tenderness for her own young, but destroys those of others. The hen pheasant (common) on the contrary, shows much less affection for her own young, and abandons, with apparent indifference, those that have wandered away; but she receives with joy and takes under her protection young pheasants, that are strangers to her.

Some animals live a long time with their young, and constitute a family; others quit them, as soon as they can do without assistance.

There are numerous families of insects, of amphibious animals, and of fishes, the males and females of which, do not trouble themselves about their young. Among birds, the cuckoo is entirely a stranger to the love of offspring. All her care for her posterity is confined to the preservation of her eggs, which she deposits in the nests of other birds, whose eggs she either eats or carries away. The masters of these nests, always smaller than the usurper, not only hatch out the eggs of the cuckoo, but still nourish,

with indefatigable complacency, the voracious young cuckoo. When any one takes him from the nest and places him in an aviary with other birds, or exposes him in a garden, all the birds around seem anxious to adopt him. I have frequently caused them to be raised by a wren; it was a pretty sight to see the adopted father mounting on the shoulders of the young cuckoo to introduce food into his mouth.

Man constitutes a part of that class, in which the male and the female love their young and take care of them with common accord. Notwithstanding this, the woman very much exceeds the man in this respect. This instinct is manifested in infancy; the little girl reaches out her hand for the doll, as the boy, for a drum or sword. When we wish to have a child taken care of, we call a servant girl and not a valet. Females who do not wish to marry, or those whose marriage is sterile, often adopt the children of others, in order to bestow upon them those cares which nature imposes on the mother. The whole physical constitution of woman combines with her moral and intellectual character, to prove to us that she is destined, more particularly than man, to take care of children.

These striking differences, in the manifestation of the love of offspring, strongly prove, that it is not a voluntary or factitious propensity, but an instinct resulting from organization, varying like it, but always natural and innate. Before entering into details relative to the cerebral part on which it depends, I shall advert to the opinions of some authors on the subject.

Opinions of Philosophers on the Causes of the Love of Offspring.

The manifestation of the love of offspring is a phenomenon of such daily observation, that, on this very account, no one takes notice of it. Whenever, in my youth, I inquired the cause of similar manifestations,

I was taken for a very singular man. It is natural, replied they to me, and my inquiry was terminated. But why is it natural? How has nature imprinted this instinct in animals? Has she not been obliged to appropriate a part in the organization, by means of which this instinct not only becomes natural in man and animals, but becomes also in them a want and a passion, which, at the same time that it procures for them great pleasures, provides for the preservation and the education of their feeble offspring?

Others would endeavour to satisfy me by speaking of *instinct*. In general, it is by *instinct*, as we have so often seen, that every thing in animals is pretended to be explained, as, in man, every thing has been accounted for, by will and intellect. But again, instincts also ought to derive their source from the organization. They are very different among themselves, sometimes even opposite to each other; they are developed at very different periods of life; such an instinct exists without another, &c.* All the instincts cannot, then, be collectively considered under the same denomination, nor be derived from the same source. Naturalists only follow natural deduction, when they endeavour to seek a particular cause for a particular effect.

"A mother," say they, "does not love her infant because she has a protuberance; she loves her child because it makes, or has made, her happiness; she loves it because it is a part of herself, because it is a part of the man who is or has been dear to her; she loves it because it resembles her, or at least she thinks so; she loves it because it is her work; she loves it from the pride she has in being a mother; she loves it from the dangers she has been exposed to on its account, from the pains it has caused her; she loves it because it is feeble and requires her aid; she loves

* See what I shall say in another volume in treating of instinct *ex professo*.

it because she has felt it within her, and because she has heard proceed from its lips the sweet sound of mother; she loves it, finally, from duty, from virtue, from habit, if you will, when there have not been other reasons sufficiently powerful." *

It certainly is not to such causes as these, that the Creator has confided the life and the well-being of children and the young of animals. He has provided better for their safety. Let any one examine the hearts of tender parents, and let him read there, whether their love for their children is determined by such artificial motives; if they can possibly do otherwise than love them? Do we not find examples of this tender love in the most degraded individuals, in the most savage nations, in a word, under circumstances where most of the motives above mentioned do not exist? Finally, in all these assertions, we entirely forget insects, amphibious animals, birds, the mammalia, terrestrial as well as aquatic, the natural history of which affords thousands of examples of this strong love of offspring. Let any one read the natural history of the ape, lion, sea-horse, or any domestic or wild animal whatever; every where he will find the most convincing proofs, that in the animal species, the love of offspring is an invariable propensity, essentially inherent in their nature.

It is true, that we may be sometimes tempted to doubt, whether, in the human race, the love of children is an inherent propensity. With what repugnance do not certain women observe the first development of the fruit of their womb! with what indifference do they not place in mercenary hands their new-born infant!

I have said, in another place, † that sometimes, both in animals and the human species, there are instances, where, from the want of development in its organ, this

* Journal of the Empire. The same objections have been made in the 21st volume of the Dictionary of Medical Sciences, page 210.

† Vol. I. § 5.

propensity is hardly manifested, and where this kind of insensibility is a natural condition.

Too often, I am aware, powerful reasons exist, which compel a woman to renounce the nursing of her child, and in such cases, I sincerely pity the mother. But much oftener the husband and the wife consent, from the slightest motives, to have their child nourished by a stranger's milk, at the risk of absorbing fatal miasmata, of which innumerable children become the victims, as well in the country as in cities. It is imagined, that the woman who fulfils her duty to her child loses certain charms; the cares of nursing, say they, are incompatible with the business of a wife who has a family to manage; but a much more powerful motive, as also more culpable, is, that the cares of nursing are incompatible with the pleasures of dissipation. It is difficult to conceive, why the writings of philanthropists have not made governments more scrutinizing in the matter of so great an abuse, in order that they might hold up to public contempt these unnatural mothers.

But if it is true that we can repress the instinct of propagation and the love of offspring, the most universal and imperious of all the propensities, it is a new proof against those, who pretend to infer the irresistibility of actions from the innateness of the propensities and the existence of their material organs. The love of offspring, say some, neither merits recompense nor admiration. Immediately after accouchement, the breasts and the nipples are distended with milk, so much so as to give the mother pain; nursing becomes a matter of necessity; the child or the young animals, by sucking, give ease to the mother; this is sufficient to cause the mother to love them. After the objection that M. Delfit has made to the instinct of propagation in the *Dictionary of Medical Sciences*, Vol. xxxviii., page 267, he continues; "It is the same also, without doubt, with respect to the love of mothers for their offspring, considered as an instinct, or what is truly animal, and

making abstraction of all ideas or moral habits which may be connected with it. It is proved by constant observations, that this immediate affection belongs essentially to the dispositions of the womb, or the interior of the organ secreting the nourishing fluid; hence arises the necessity for nursing and the pleasure that attends it. How can we transport to another place, and to a particular cerebral division, the seat of a similar affection?"

How can any one be so ignorant in natural history, and especially in comparative physiology, so fruitful a means of enlightening the philosophical physician on the functions of our race? Where are those constant observations which prove that the love of offspring belongs essentially to a disposition of the womb, or the interior of the secreting organ of the nourishing fluid, &c.? As soon as the infant or the young animals have quitted their parent's womb, and a long while before the breasts are distended with milk, the mother warms, dries, and licks them with tenderness. If among them she finds one dead, she turns him every way with the expression of the most melancholy feeling, and often preserves him many days. What need of nursing have bees, ants, birds, and the males of those mammalia, where the two sexes divide the care of the young, as man, the fox, the marten? So much for the most constant observations!

"Maternal love," says Richerand, "surely is not the result of any intellectual combination, or cerebral action; it is in the *bowels* that it derives its source; it comes from them, and the greatest efforts of the imagination cannot produce it in those, who have not enjoyed the happiness of being mothers."*

No; it certainly is not the *result* of *any intellectual combination*. But Richerand also would deny that the *sentiments* are an operation of the brain. The whole natural history of woman, from infancy to decrepitude, refutes his gratuitous assertion. How

* New Elements of Physiology.

often, I repeat it, do we not see women, who have never desired or never been able to become mothers, adopt the children of others, and bestow upon them the most tender cares?

The love of offspring is active in animals, even before they have brought forth young. Birds, the mouse, the squirrel, and a hundred others, prepare beforehand a nest or lodging place.

If the love of offspring, say my adversaries, were the effect of an organ, it ought to be evident at all times; but we observe nothing of this in animals when they have no young.

But I have shown in many parts of this work, while speaking of other instincts or propensities, that the reason why they do not always manifest themselves, proves absolutely nothing against their innateness. The instinct of propagation, of travelling, of making provision for future want, of singing, are in a state of inactivity at certain periods of the year; and it is precisely the reason, that all these qualities can individually be active or at rest, that proves that they are independent powers, and that they each have a particular organ.

How happens it, notwithstanding this, that some women do not have an equal love for all their children, that it sometimes is the case, that they hate some of them? How is this possible, if the love of offspring results from the activity of an organ?

However serious this difficulty may appear to certain superficial minds, it is in fact of very little importance. First, I have often remarked that female dogs and cats love one of their young in preference to the rest. But, if similar preferences exist in the females of animals, they ought, by a much stronger reason, to take place in women, whom so many secondary motives can influence, such as the hatred or love they have for the father, the beauty or homeliness of the infant, &c. So, the stomach does not digest equally well all kinds of food, and all meats are not equally

agreeable to even the most voracious gourmand; all music does not please equally well every musical ear; every woman does not inspire every man with desires and love.

"These touching qualities of woman," says Cabanis, "necessarily depend on the kind of sensibility that we have said was peculiar to her. It is also to this cause, in a great measure, that we must refer the spontaneous development, or rather the burst of maternal love, the strongest of all the sentiments of nature, the most admirable of all the inspirations of instinct."

And in another place he says: "Of all the propensities that can be referred to the lessons of judgment and habit, is not maternal instinct the strongest and most predominant? To what power must we attribute these movements of a nature, sublime in its end and means, movements which are not less irresistible, but which are perhaps more so in animals than man? It evidently is not to the impression already received in the womb, or to the condition of the breasts, or to the sympathetic disposition in which the whole nervous system is found, in relation to these eminently sensible organs. Do we not constantly see maternal love as much more energetic and profound, as this sympathy is more internally active; provided, at the same time, that the abuse of or misplaced abstinence from amorous pleasures has not rendered its character unnatural? It is a fact, that, in general, cold women are rarely passionate mothers. The tenderness of fathers, in all species of animals, appears to be founded, at first, almost solely in the love they have for their companions. The influence of this sentiment, which is always imperious, often profound and delicate, causes them to partake with her a mother's interests and cares."*

After this, one would be authorized to regard the love of offspring as a result, or rather an extension of

* Relation of the Physical and Moral in Man, Vol. I, page 363.

the instinct of propagation. But I have already shown that the love of offspring is in full activity, without the least change having taken place, in the sexual parts. The instinct of propagation is extremely ardent in certain males, for instance, in the cock, dog, wild-boar, and stag, without these males taking the least interest in their young. In man, the instinct of propagation is generally more active than in woman; and notwithstanding this the females feel a stronger love for children. Many animals, for example, certain insects, amphibia, the cuckoo, among birds, take no care of their young, although they couple with great ardor. Others, such as bees and working ants, do not exercise at all the act of propagation, and notwithstanding this they take very assiduous care of the eggs and larvæ of the females. Who does not know women that are extremely voluptuous, who are very bad mothers?

The same woman of whom I have before spoken, who has never experienced any pleasure in the arms of her husband, and who is no more affected at the sight of a man than a woman, has given birth to twelve children, all of whom she tenderly loves. Do we not every day see women that despise the commerce of men, and bestow the most tender love on the children of strangers?

We are then compelled to admit, that the love of offspring is absolutely different from the instinct of propagation.

If a naturalist had only made a few of the observations that I have related, in speaking of the love of offspring, he could not have failed to suspect, that this instinct ought to depend on a particular organ. But it is very rare for a man to come to the discovery of any truth by reflection alone; it is requisite, in order to discover it, that reason should be guided by facts. For myself, I have not made all these observations, until after my researches on animals had convinced me of the existence of the organ of the love of

offspring, and that I had discovered its seat. I shall now complete the proof, that the instinct of the love of offspring is a fundamental quality.

The Love of Offspring and the Effects of its greater or less Development; continued.

In Man.

I have said, that, on comparing the different forms of craina, I had found that the superior part of the occiptal bone recedes much more in the heads of women than men, and I have referred the reader to Plates LVI. XXX. XXXIX.

I have shown in the first section of this volume (on the influence of the brain on the form of the cranium), that those only of the prominences of the osseous box, which are formed by the encephalic mass, have a signification in craniology.

Let the reader then compare the brains of the two sexes that I have caused to be engraved in my large work, and he will be convinced, that the difference of the form of the cranium in man and woman really depends on the difference in the form of their brain. These brains have not been designedly chosen; all have been absolutely taken by chance.

The plates V. VI. VIII. IX. XII. represent the brains of men; the plates; IV. X. XIII. those of women. We see distinctly that, in these last, the cerebral parts II. definite development, (*épanouissement,*) or that part of the organ of the love of offspring which is externally apparent, are much more developed, and encroach much more upon the cerebellum than in the first; now, it is from this greater development, that the prominence of the cranium results. This difference of form of cranium in the two sexes, is apparent from infancy. The cranium represented in plate XXXVI. is that of a boy twelve years of age; that represented plate XXXVIII., a girl six years old.

Sometimes these two parts of the posterior lobes separate considerably from each other; in such cases they produce a double prominence of the occipital bone, that is to say, there is then a double prominence on each side, and, between the two, there is a depression in the form of a groove. Most frequently these two lobes are contiguous, and the prominence of the cranium appears as a single protuberance.

I have already refuted, in the second volume, the opinion of those, who believe that these posterior lobes are the organs of the most eminent faculties in man, for the reason that these two lobes, according to some naturalists, are wanting in brutes. The fact is, that, in most animals, these lobes do not cover the cerebellum, which circumstance has induced superficial observers to maintain, that they are entirely wanting. But the reason, why these lobes cover the cerebellum or leave it exposed behind them, depends solely on the horizontal or vertical position of the animal, as I have already said. This place, that is assigned to the most eminent faculties, does not accord in any way with the gradual perfectibility of the brain and its functions. Let any one examine with attention the heads of individuals of both sexes of every age, and he will almost always find in them the same difference; most frequently it will be found that the diameter from the frontal to the occipital bone, in girls and women, is greater than in men, because, in the former, the occiput recedes more. The cerebral part, placed in the occipital bone, is greater in women than in men, although the whole brain of the woman is smaller than the entire brain of man.*

There are, however, exceptions to this rule. Sometimes the cerebral part situated in the occiput, is feebly developed in a woman, and has acquired a very great development in a man. In these cases we may with

* This form of head, peculiar to woman, should not escape artists; they ought to regard it in representing women.

much probability presume, that the woman resembles her father, and the man his mother, unless it is the case, that this particular conformation is hereditary in the family.

Men, with such a conformation, have a particular love for children; and when in them the organ of propagation is slightly developed, they console themselves with an apparently very philosophical resignation for the loss of a beloved wife, whilst the death of a child plunges them in profound and lasting grief. The sterility of their wife occasions despair in them, and often this circumstance is sufficient to induce them to treat with disregard a companion, who is very estimable in all other relations.

In those cases, on the contrary, where this organ is feebly developed in the woman, the consequence is, that she has hardly the character of her sex. Her principal destination is wanting. When, against her wish, she becomes a mother, her own children, if not odious, are at least indifferent to her. I knew, at Vienna, a lady who loved her husband tenderly, who managed the affairs of her household with intelligent activity, but who sent from home, immediately after their birth, all the nine children of which she was successively delivered, and for years she never desired to see them. She was herself astonished at this indifference, and could not account for it. In order to acquit her conscience, she required that her husband should daily see her children, and attend to their education.

The unfavorable development of the organ of love for offspring, is the principal cause of the slight affection, or even negligence, which certain women manifest in their conduct towards their own children, or those of strangers confided to their care. Hence these cruel mothers, like Isabella of Bavaria, of whom history relates, *that she had stifled all the sentiments that she owed her children.* Let us imagine a woman, in whom the organ of love of offspring is slightly

developed, without education, and having none of those motives which religion and morality afford, living a life of celibacy, a prey to an unfortunate love, having yielded to the desires of a lover who abandons her, and fearing contempt and misery. If a woman, thus situated, feels within her the fruit of her love, she will either destroy it before it comes into the world, or she will forsake it the moment it is born; if, unfortunately, the organ of murder is developed in her, can we be astonished if she destroys it with her own hand?

In twenty-nine women who had committed infanticide, that we have had occasion to examine, the organ of the love of offspring was very feebly developed in twenty-five. I refer the reader to what I have said on this afflicting subject in the fifth section of the first volume. There I observed that it is not solely the want of development in the organ in question, which determines mothers to infanticide, but that mothers thus defectively organized yield, sooner than others, to any unfortunate circumstances which incite them to crime, because they are not endowed with that profound sentiment which, in the heart of a good mother, would victoriously revolt at a similar attempt.

From the moment in which the young female, in whom this organ has acquired a very great development, knows her destination, all her ideas have the desire of being a mother for their basis. Every child that she meets gives a new impulse to the wishes that, perhaps without being aware of it, she forms in the bottom of her heart. However well and pleasantly she may be united in marriage, she cannot find happiness in her union if she is not a mother. An estimable husband is without doubt a precious treasure for such a woman, but nothing in her eyes approaches the happiness of having children. Let the nurse neglect, but for a few instants, to return with the beloved infant, and the alarmed imagination of the

tender mother depicts to her a thousand perils, which threaten it. In the moment of eminent danger, where is the hero whose courage equals that of a mother? How many women who lead a very wretched life with their husbands, still bless their marriage ties, for the sole reason that they have children!

We generally find the organ of the love of offspring more developed in certain nations than others. We observe that it is usually so in negresses; hence infanticide is a crime almost unheard of among these people. M. Peale, as well as other persons, from whom I have derived information on this subject, assure me that they have never heard of a similar crime committed by a black.

This organ is also generally very much developed in male negroes; thus we often see in Europe these people anxious to have the charge of children.

Travellers relate that the Tunguses and the inhabitants of North America, have an extraordinary love for children. I have seen at Gœttingen, at the house of M. Blumenbach, two crania of Tunguses, and one cranium of an inhabitant of North America; in all three this organ was very much developed. Thus not only individuals, but entire nations, furnish proofs that the cerebral parts, placed in the occipital region, are the organ of the love of offspring. Let us now see what takes place when the organ is excessively excited.

Alienation of the Love of Offspring.

We have seen that the over-excitation of the organ of the instinct of propagation produces a partial mania, — erotic mania; in a similar manner arise all the monomanias, diseases, the explanation of which becomes impossible, if we do not admit particular organs.

In the great hospital of Vienna, there was a pregnant woman who was attacked with a serious disease. I was told that she had a very peculiar kind of delirium, that is to say, that she believed herself pregnant with six children. In consequence of my principles, I attributed this phenomenon partly to a more than ordinary development, and partly to an over-excitement of the organ of the love of offspring, and I entreated the physicians to send me the head of this woman in case she died. She died. What was my joy in seeing an extraordinary development of this organ! the posterior lobes not only encroached upon the cerebellum much more than they usually do in women, but they were farther rounded and very voluminous. PLATE LX. represents this cranium.

M. Rudolphi would explain the posterior elongation of this head, by pressure, which it may have suffered from above downwards. But how could he prove that a similar pressure had in fact taken place? Why have not the bones equally yielded in the direction of their breadth? For the rest, when a cranium is deformed by pressure, the cerebral parts may really be a little displaced, but can never acquire by this a greater than ordinary development. Similar objections would be admissible, at most, in the case where a physiologist should undertake to determine the seat of an organ, from a single fact and without having any other proof in support of his assertions. But when every thing in nature concurs to establish the same assertion, a single fact, which comes by chance to its support, becomes a new proof.

At Paris, I professionally attended a very modest lady, that was attacked with a mental disease. She lived in very genteel society, and went to Vienna in company with respectable people. She had hardly arrived there, when she visited all her acquaintance, and told them with the most lively joy, that she was pregnant. The circumstance of this disclosure, and

the known character of the lady were sufficient to induce some of her friends to believe that she had become insane. Soon this immoderate joy gave place to violent anguish and an invincible and melancholy taciturnity. A short time after this, she was attacked with consumption to which she soon became a victim. Here, again, the organ of the love of offspring was extremely developed, and, during life, this lady had singularly loved children.

We saw also in the hospital for the insane, at Amsterdam, a lady who incessantly talked of her pretended pregnancy. Her head was small. The organ of the love of offspring was the only one, that was very much developed.

We have even seen, in another insane hospital, a man who maintained that he was pregnant with two infants. We declared that he must have the organ in question very strongly developed, and the examination of his head proved that we were not deceived. Thus, then, the state of disease proves further that the instinct of the love of offspring ought to be considered as a fundamental quality, independent of all others, and founded in a particular organ.

The following case reported by M. Pinel, proves with what energy this instinct continues to act in mania.

"It is so common for affectionate mothers," says this author, "to preserve still the profound sentiments of nature, in all the periods of their insanity, that we ought, with the greatest care, to spare them the sight of children that are strangers to them, and which some have occasionally the imprudence to bring with them in visiting some convalescent; this has sometimes excited the most stormy scenes. An insane woman while laboring under a violent paroxysm, saw a child which some stranger was leading by the hand; she believed it to be her own, and immediately sprung to seize it; she made the most violent efforts, and uttered frantic screams, while the real mother

was so affrighted, that she swooned, and continued in this state more than an hour. Another insane female who was convalescent, and who had the liberty of jumping, playing, prattling, and of practising a thousand innocent tricks, and of walking freely in the courts, escaping one day through the entrance gate, accidentally found a child at the porter's lodge, which she seized upon, and it was necessary to make use of strong efforts to get it from her. She immediately relapsed into furious mania, wounded many of the servant girls, and it was with great difficulty that they were enabled to confine her in her cell. The furious delirium, which was the consequence of this, was of many months' duration.*

"A mother, esteemed for her extreme attachment for her family, and whom domestic troubles had thrown into profound melancholy, regarded the food that was offered her as the portion that was destined for her children, and rejected it with indignation; it was necessary to submit her frequently to the shower-bath, to prevent her dying of consumption." †

Hildenbrand, in his work on contagious typhus, relates the case of a young Jewess of Galicia, who impatiently desired, while she was in the delirium of typhus fever, to have her son, who was distant ten miles, present with her. She caused him to be brought, received him with affection, and tenderly blessed him; after this, she took nothing but from his hands; and, when the delirium had subsided, she was astonished at his presence, asked him why he had come to her, and felt then, for the first time, with real knowledge, the true joy of a mother agreeably surprised.

* On Mental Alienation, 2d edit. p. 278. † Idem, 296.

Of the Seat and the External Appearance of the Organ of the Love of Offspring in Animals.

I have examined, as much as it has been possible for me, the crania of birds, from the smallest to the largest, and of mammalia, from the mouse to the elephant, and I have found throughout that, in females, the cerebral part, which corresponds to the organ of the love of offspring in the human race, is more developed than in males. Let any one present me, in water,* the fresh brains of any two adult animals whatever, the one male and the other female, and I will distinguish the two sexes without ever being deceived. In the male the cerebellum is larger, and the posterior lobes, smaller; in the female, on the contrary, the cerebellum is smaller and the posterior lobes, or the convolution belonging to this function, are larger, and especially longer. When these two organs are distinctly developed on the cranium, I am able also to distinguish the two sexes by the simple inspection of the osseous box. In those species, where the difference of the love of offspring is very great between the sexes, the crania differ, sometimes, so much in their form, that we find them in certain collections arranged as different species, or at least as varieties of the same species, although they are taken from individuals of the same variety, but of a different sex.

As the whole of this subject requires exact, and even minute, observations, I ought to make here, for the use of those of my readers, who attach more importance to facts than subtile reasoning, some remarks on the differences which take place in different species, as regards the situation of the brain as well as the form of the cranium. But still I repeat, that we ought always to bear in mind, that only those prominences of

* It is necessary to put the brains in water, because, without this precaution, they would become deformed by their own weight.

the cranium occasioned by the cerebral parts, have any relation with organology.

In most birds, the cerebellum is situated behind the hemispheres of the brain, and is entirely separated from it. (Pl. I. fig. II. 5, 7, 8.) In females, the hemispheres of the brain are more developed, larger, longer, and higher than in the males; and it is on this account, that the cranium of females is wider, longer, and more prominent in the corresponding region.

But this difference is not very striking, except in those species, in which the male takes very little care of the young. Plate LVII. the regions marked II. are, without exception, more prominent in the cranium of the female than in that of the male. The cranium of the female manifests, in its superior part, by the side of the median line, two oblong elevations, which extend to that part which encloses the organ of hearing. Compare the cranium of the hen, fig. 2, and that of the hen turkey, fig. 4, with that of the cock, fig. 1. and that of the turkey cock, fig. 5. It is very easy, in these species, to distinguish the sexes, either by the eye or touch.

It requires a much more practised eye to distinguish the sexes by the form of the cranium, in those species in which the male and the female equally take care of their young. But even in these, the posterior part of the head is more convex in females than in males; because the former have always more attachment for their young, than the latter.

The difference is particularly well marked in those females who love their young extremely, either on account of the nature of the species, as the female of the silver pheasant, or by virtue of a particular organization. There is not a single farmer's wife that does not know, that individual differences exist in this particular, and who cannot very well distinguish in her poultry yard, those of the female hens, turkeys, ducks, and geese, that cover their eggs and manage their young with assiduous care, from those which destroy

their nests, or neglect and abandon their young. Let any one compare the heads of those possessing these opposite qualities, and he will be struck with the great differences.

The amateur, who wishes to form a collection with this point in view, ought not only to know the natural history of each species, but he should know besides, the peculiarities of each individual.

In general, the naturalist, who wishes to devote himself to organological researches, ought not only to be instructed in the habits of each species of animals, but he ought to know the particular conformation of their brain and of their cranium. It is impossible for me to give this subject all the developments of which it is susceptible; I should fill a volume on each organ and each fundamental quality or faculty, and yet the most detailed descriptions could never be so instructive, as a collection formed by an attentive observer. I will add a few words more on the mammalia.

We should also commence our observations on the mammalia, in the largest species, and especially in those, where the male takes no care of the young.

Let any one compare the cranium of the stallion with that of the mare; when the horses are young, the superior posterior part of the head of the mare is considerably more prominent and larger than that of the stallion. In the mare, the two parietal bones are more prolonged backwards, because the cerebral parts placed under these bones are more prominent, larger, and longer than in the male. As the horse becomes old, a transverse bony crest is formed on the occipital bone, which makes a projection between the ears. This crest is not in fact hollow, but as the subjacent cerebral part, which touches it within, is more developed in the mare than in the stallion, and elevates itself or recedes more, (as the head has a vertical or horizontal position,) this crest is more elevated in the mare, so that we can distinguish the two sexes by the simple inspection of the cranium.

The same thing happens in the bull and cow. See Pl. LIX. II. II. fig. 2, the male calf; fig. 1, the female calf. In the bull, the superior part of the head forms nearly an arc of a circle conjointly with the horns; in the cow, on the contrary, the summit of the head is elevated much more above the horns.

In the stag and hind, the roe-buck, fig, 1, and its female, fig. 2, Pl. LXV. II. II. the male and female goat, the male and female chamois, the ram and the sheep, the male and female wild goat, and in all the varieties of this family, the same difference exists in the conformation of the head, in the two sexes, as well in youth as in advanced age.

In all other animals, whether the male interests himself or not, in the care of the young, the region of the cranium, II. II. always recedes more in the female, and is less salient and more obtuse in the male; for instance, in the entire races of cats and dogs. Pl. LVIII. fig. 3, is the female cat; fig. 4, the male cat; fig. 7, the female dog; fig. 6, the male dog. In the badger, marten, beaver, marmot, and all gnawers; in rats, Pl. LVIII., fig. 1, female rat; fig. 2, male rat; the difference is often more strongly marked than between the bull and cow; the same thing takes place in the mole, shrew-mouse, and bat. The difference is still more striking in the ape, (*singe.*) Pl. LXV. fig. 4, is the cranium of the female ape; fig. 3, that of the male.

When one has a collection of brains, moulded in wax from nature, or even in plaster, he can not only determine, with the most scrupulous exactness the convolution, which constitutes the organ of maternity, but still further ascertain precisely the modifications of its external mark on the cranium. The different positions of the brain in the cranium produce modifications, which may sometimes cause the inexperienced observer to hesitate. The following examples will enable the reader to understand my idea; in the ape, a species of monkey, the posterior lobes of the hemispheres extend beyond the cerebellum, as in man

and woman; so that this last is covered and compressed under the posterior lobes, the most posterior convolutions of which, being large and prominent, constitute the organ of maternity. Hence it happens, that the heads of female monkeys in this region are much more rounded and prominent backwards than the heads of male monkeys. (Pl. LXV. fig. 3, 4.) In the dog, the posterior lobes of the hemispheres only cover half of the cerebellum. The head of the female dog, on this account, is less prominent behind than that of the female monkey, but always more protuberant and larger towards the region of the cerebellum, than the head of the male dog of the same variety. In the cat, the posterior lobes of the hemispheres only cover a very small lateral part of the cerebellum. On this account the organ of maternity appears to have a seat much more in front, especially on the cranium. This organ is the second convolution commencing from the median line. It is also larger and more prominent in the female than the male cat, which I can demonstrate in more than a hundred specimens of heads of cats, that I have in my collection. The convolutions form an oblong elevation on each side, the whole length of the parietal bones to the cerebellum. These two elevations are very apparent and palpable, on the superior posterior surface of the cranium of the female cat. Although these crania are still much less prominent behind than those of female dogs, they are yet much larger and more prominent towards the cerebellum than those of male cats. Plate LXXVI. represents, for this purpose, the brain of a monkey, fig. 1; the brain of a male cat, fig. 2; the cranium of the female cat with the mark II. of the organ of maternity, fig. 3; and the cranium of a panther also, with the organ of maternity, marked No. II.

Whoever wishes to give himself the trouble of making a collection of animals, males as well as females, will find, in all species, a confirmation of the remarks I have just made on the difference of the organs

of propagation and the love of offspring in the two sexes. I could wish that all young naturalists might commence their researches by these two organs. Both are easily recognised, and it is very rare to find, as an exception to this rule, a male animal assume, as far as these two organs are concerned, the character of a female. It is well to select for one's collection, males and females of the same variety, and nearly of the same age; for, a great disproportion of age is a circumstance, which may occasion difficulties capable of embarrassing the beginner.

The more numerous the collection is, and the oftener the young naturalist shall have repeated each observation, with more assurance will he await all the objections; there are none that can disconcert him; every step, that he makes in advance, will encourage him to pursue his career, and in a few years he will be convinced, that organology rests upon an unshaken foundation.

The Influence of Castration on the Organ of the Love of Offspring.

Cabanis tells of the method, that every one knows, of making capons hatch and bring up chickens.* "They take a capon, pluck the feathers from his abdomen, rub it with nettles and vinegar, and in this condition of local irritation in which the operation has put him, he is placed upon the eggs. He continues there mechanically at first, to relieve the pain that he feels; he soon begins to feel a succession of unaccustomed impressions within his abdomen, which are rather agreeable to him, which induce him to continue on the eggs during the time necessary for incubation, and the effect of this is to excite in him a kind of factitious maternal love, which continues, like that of

* Relations of the physical with the moral in man.

the hen, as long as the pullets require assistance and protection. The cocks do not interest themselves in this case; they have an instinct that influences them differently....."

As the same method does not succeed with cocks, it follows that the operation of plucking the feathers from the abdomen, and rubbing it with nettles and vinegar, is not the only cause which excites the love of offspring in the capon. I can well conceive, that similar procedures may suffice to awaken the activity of certain dormant organs; but what can produce these irritations where the organs do not exist? If, in the hen, as they would have us believe is the case in the mammalia, it is the ovaries, &c., which constitute the viscera, on which the instinct of taking care of the offspring depends, it would be impossible to excite this instinct in the capon by any procedure whatever. If, as no one will maintain, other viscera are the seat of this instinct, why are these viscera in the cock constantly incapable of exciting it? *The instinct which leads the cock in a different direction*, cannot prevent him from being susceptible of the love of offspring; since there are many males of other species of birds, which cover the eggs and take care of the young; and have not the females also this same *instinct, which leads them in a different direction?*

This observation should excite in naturalists a suspicion, that the love of offspring depends on a part which the capon equally possesses. It is a fact, that the organ of this love exists in male animals of species, where the male takes no care of the young; only it is slightly developed in them. We know, however, cases of dogs and stallions, who have sought with solicitude the young they have engendered, and who have protected them with tenderness and defended them with courage. But it appears to me, that in these animals the organ of the love of offspring acquires a greater development, in consequence of the

ablation of the genital parts, and the diminution of the cerebellum which is the consequence. Let any one compare the cock and the capon, the bull and the ox, the stallion and the gelding, &c. Since I have mentioned this in my large work, I have made a numerous collection of castrated animals of many species. In all those that were castrated in the early period of their life, the organ of maternal love is almost always found evidently more developed than in the perfect animals of the same kind. It can then be easily conceived how this organ is susceptible of a greater excitation in the capon by the irritation of the abdomen, as it is in the hen by the simple influence of the season and more nourishing food.

General Remarks on the Instinct of Propagation and the Love of Offspring.

It is disputed whether we should give to the instinct of propagation the name, physical love, amativeness, generative energy, instinct of reproduction, of propagation, or venereal instinct. To propagate, say they, is neither to engender nor reproduce, it is only a remote consequence of it. I answer, that to engender and reproduce are only a consequence of an act. If an appellation drawn directly from it, had nothing revolting to delicate ears, it would better express what is understood by the propensity for propagation. Physical love and amativeness do not take place, either in animals or in the insane, nor often in the most ardent men. Generative energy does not suit better, since the venereal instinct exists, and often acts without any generative energy. Hence it is much better to preserve an appellation, which is understood by all, and is equally applicable to animals and man. For this reason I have not thought proper to change my first name, — propensity or instinct of propagation.

It has also been wished to change the term love of

offspring, for philoprogenitiveness or philogenesis. As for myself, I prefer, wherever it is possible, words derived from our living languages. The mania for seeking Greek and Arabic words, gives an air of erudition, but renders the reading more difficult and often unintelligible.

The question would be more important, to know if the nomenclature adopted for these two instincts agrees only with one of their modifications, or with these two primitive radical powers. Although I have fixed upon the venereal instinct as a fundamental quality, after having observed it in its extraordinary exercise, I have not denominated it in conformity with its excesses. It was not difficult to abstract it from all its modifications, and reduce this function to its peculiar and essential term. As to the love of offspring, it would hardly be possible to find a more appropriate appellation.

No one will deny, that the instinct of propagation, and that of maternal love, are the two most imperious, essential, and important propensities or instincts. But, from all the facts cited in the exposition of these two instincts, one must needs be beset with an imperturbable attachment for ancient prejudices, should he still wish to seek for the seat of the venereal instinct in the genital parts, or that of the love of offspring in the womb or the breast distended with milk. Then it is proved, not by reasoning, but by irrevocable facts, that the *propensities* also have their legislative organs in the brain. Error was inevitable, so long as we were entirely ignorant of the organization and destination of the brain, and so long as the human race was degraded, by comparing many of its qualities, not only with those of other mammalia, but even with those of birds and insects.

The essential difference, and the gradation of activity of these two instincts, enable us to understand that the expressions, *instinct*, *propensity*, *passion*, are abstractions, and cannot belong to a single general or-

gan. The instinct of propagation is essentially different from that of the love of offspring; this last is more active in the female sex; the other is most so in the male sex; one exists in animals in which the other does not; one may be excessively energetic in one individual, whilst the other is hardly perceived, &c. &c. Both of them have regular gradations, both as it respects different individuals, different ages, different circumstances, from the simple disposition, the nascent propensity, to the most imperious passion. Thus there is disposition, propensity, and passion, in the love of offspring; and there is disposition, propensity, and passion, in the instinct for propagation. Consequently, the disposition, propensity, and passion of the venereal instinct have their seat in the organ of this fundamental quality; and the disposition, propensity, and passion of the love of offspring have their seat in the organ of its appropriate fundamental quality also. So all the affections of these two instincts are nothing more than modifications, affections of their respective organs.

It is thus that I hope to prepare my readers for that philosophy, which alone is in conformity with the nature of man and animals.

Let any one call to mind the history of the discovery of these two fundamental qualities and the seat of their organs, and he will be convinced, that I have neither discovered them by reflection, nor by any induction whatever. I had not the least presentiment, that I should discover the seat of these two instincts in the brain; and yet is there any thing more natural, than to find that instinct of propagation connected with the most essential cerebral part, and placed immediately after the *medulla spinalis*, at the commencement of that series of organs, of the moral qualities and intellectual faculties? What can be more consistent than to see ranged, immediately after the organ of propagation, the organ of that instinct, which is devoted to the preservation of that which it engenders? Unfortunately, arguments of this kind are not felt by the amateurs of mutilation and speculation.

I now return, and I shall frequently do so hereafter, to the opinion of Cuvier, announced in his "Regne Animal," vol 1. p. 54: *that instinct has no visible mark in the structure of the animal.* This is great authority, one certainly well merited; but, in the eyes of naturalists, there is no other irrefragable authority but that of nature. The experience of all ages has proved, that the greatest men have paid tribute to their age by consecrating errors, the ridiculousness and absurdity of which have been generally admitted a few years afterwards. Where would many objects of natural science be, if we had always respected the authorities of Hippocrates, Galen, Celsus, Boerhave, Sydenham, Haller, Lavoisier, &c? And to confine myself within the sphere of my own researches, how often have I not been obliged to combat the declarations, often very insignificant, of Hufeland, Walter, Ackermann, Richerand, Rudolphi, &c. &c. Have not men of the greatest reputation, in their report to the Institute of France, contested the most essential points of our anatomical discoveries, adopted at the present day by those authors themselves, and by all those who have given themselves the trouble to examine them? Should I recoil before the great merit of the Pinels, Esquirols, Fodérés, &c., to prove that the immediate seat of mental alienations is in the brain? Great authorities ought not to have any other influence, than that of engaging us to rectify their errors by a more imposing mass of facts. Very well; the demonstration of the organs of the instinct of propagation, and that of the love of offspring, is the easiest and most evident. Every family, every society, all domestic and wild animals, furnish us with undeniable proofs. I challenge individuals, learned societies, and academies, to make a collection of the brains and heads of men and animals of the two sexes, of perfect and of castrated animals, to observe the energy of their propensities, to repeat my experiments, &c.; and if, after doing this, their conscience will still permit them to declare my

discoveries false, or only doubtful, I will be the first to renounce the whole physiology of the brain.

How will the advocates of the opinion of Cuvier, reply to the following dilemma? Either the brains of all species of animals have the same structure, and impress the same conformation on heads and crania; or the brains of different species of animals are differently organized, and impress a different conformation on their crania. Unquestionably, if the first proposition were true, the different instincts of animals would have no visible mark on their heads. But what naturalist can deny the immense variations of structure of the brain of different species of animals, and the conformation of their crania? That being established, it must either be maintained, that these different organizations of the brains of different species of animals are without an object, without any accordance with the difference of their instincts, and, in a word, that the brain in animals has no function; or, it must be admitted, that these different organizations have different instincts for their result; and, as these different forms of the brain impress different forms on the crania, it necessarily follows, that these different forms, whether of the brain or cranium have different significations. All that is to be done at present is to learn these significations. If they have escaped you, admit it, and confess to the public that you are ignorant of them; but do not commit yourself by maintaining, that a thing does not exist, merely because you are ignorant of it; and that another, who has applied himself for many years to a study, is as ignorant of it, as yourself.

III. *Attachment. Friendship.*

History of its Discovery.

I was requested to take, for my collection, a cast of the head of a lady who was, as they told me, the model of friendship. I took her cast, more out of

kindness than in the expectation of making any discovery, and I endeavoured to get a correct one. On examining this head, I found two great prominences, constituting the segment of a sphere, by the side of the organ of the love of offspring. As, up to that time I had never seen these prominences, which, however were evidently formed by the brain, and exceedingly symmetrical, I considered them as a cerebral organ: but what were the functions of this organ?

In order to get some general view on this point, I inquired of all the friends of the lady, respecting her qualities and faculties. I attempted to learn of the lady herself, what propensities and faculties she believed she possessed. All united in confirming what had been told me, that she had an invincible attachment to her friends. Although her fortune, at different periods, had experienced great changes, and by degrees she had passed from poverty to honors, her feelings for her old friends had never changed. This characteristic trait struck me. The idea occurred to me, that the disposition to friendship might also be founded in a particular cerebral organ. This opinion acquired with me a still greater degree of probability, as the prominences, that I had observed on the head of the lady, were placed immediately above the organ of physical love, and by the side of that of the love of offspring, and these three sentiments have some analogy with each other. Whatever may be the difficulty of making exact observations in man, on the organ in question, and on its functions, the idea, that attachment and friendship depend upon a particular cerebral organ, acquires a degree of probability almost equal to certainty.

Natural History of Attachment and Friendship in Man and Animals.

I shall with reason be accused of calumniating human nature, if I call in question the received opin-

ion, that friendship is a quality essential to man. There is no one who, strong in the testimony of his own heart, does not reject with scorn the abject idea, that it is solely from the want of mutual aid that men are attached to each other; that the state of society is the result of interest and the instinct of propagation. Does not history present us with the most noble examples of the devotion of friends, who gave themselves up as hostages for their friends? The inviolable fidelity of friendship in criminals, sometimes commands our admiration, even when they are most depraved. They have been seen to support tortures and brave death, rather than betray the faith that they have sworn to their accomplices.

He, who feels friendship, lives for others. He alone feels happy in a circle of friends; his friend is his greatest good; he is ready, at every moment, to do every thing, to sacrifice every thing for him; but he expects the same sacrifices. The happiness of his friend is his own happiness; and his sorrows become those of his friend; his heart is inaccessible to envy and malignity.

Where can any one pass more happy days than in the bosom of a people, in whom friendship is a daily virtue? At a banquet, in the social circle, every where we find friends, every where the heart is expanded, and these feelings are reciprocated. The master, the subordinates, the domestics, form but one family; the happiness of the one is the most important business of the other; to be the occasion of happiness to one's equals, is a delight as fervent, as that of receiving a kindness from the hands of friendship.

But further, every one knows the great difference in this respect, that exists between individuals and even those of the same countries. There are men who have never felt the sentiment of friendship, and who find a thousand pretexts for excusing their cold indifference. I know a man, who has often assured me, that he was an enigma to himself. He is of a

very mild character, filled with benevolence for all his acquaintances, and loving his children to excess. To take care of a sick person, he spends day and night. Nothing deters him; but he has never been able to have an idea of what is called friendship, or attachment. Although constantly residing in the bosom of a numerous family, a separation, either by a journey or death, never occasions him the least painful sensation. I know others, whom the unexpected news, either of a misfortune, or the disease of some of their most intimate connexions, has never affected. Who does not know, that there are egotists, for whom self is the whole universe, who will not marry from the fear of imposing upon themselves some slavish obligation, prejudicial to their exclusive interest? Who does not know the difference, that exists between a city, where friendly relations make the delight of society, and a city, where selfishness takes the place of the reciprocal relations of friendship; where the hurry of business, the anxiety for making a fortune, dissipations of every kind, stifle the least symptoms of friendship; where the forms of politeness, and exaggerated and senseless language, are substituted for true sentiments; where vain protestations take the place of kindness; where each individual is but an instrument of pleasure for his neighbour; a mere counter, necessary for the calculation of interest; where all the good services that are rendered you, are the services of speculation; and where for sake of the most frivolous benefit, a connexion of many years' duration is broken with indifference; where the father, mother, husband, wife, brother, sister, &c., that death has just removed, are forgotten from the instant they are buried; where, to recall their memory, is to shock the rules of society and commit an imprudent act; because this recollection would awaken perhaps some disagreeable sensation!

Most animals are susceptible of attachment, if not for man, at least for other animals. We have often observed, that horses and oxen grow lean, when they are deprived of their accustomed companion. In

herds we often see certain animals keep constantly together. In Denmark, among a stud of horses, we observed that those of the same colored hair invariably associated together. The attachment of apes, as well for animals of their own species as for man, exceeds all idea. Every one knows the small species of parrots, called *inseparable*, because they often die, when separated. All of us have admired the friendship which sometimes exists between the tiger and the dog, a lion and a dog, a horse and a dog, or between two dogs. A seal, that I had for a few days, had become so much attached to me, that, when I went out, he made strong efforts to leap from the trough and follow me. The dog defends his master to his last breath, who often has the ingratitude to maltreat him. He dies with grief and hunger on the tomb of his beloved master, and attacks his master's assassins with great fury, even after a lapse of years.* There are examples, and these cases are not very rare, of dogs dying of the joy, occasioned by the return of their master, and others, who, having unexpectedly found their master dead, have instantaneously expired from emotion and grief. In a dog, that had died in this way, we found the heart ruptured. We have seen tame wolves, that felt so much sorrow at the absence of their master, that they obstinately refused all food, and died of hunger.

Great varieties exist in this propensity, in animals as well as in man. There are dogs who can never forget their first master; in vain are they sent to another city at a very considerable distance; they return, and their attachment is stronger than ever. Others, on the contrary, run from house to house, from one person of their acquaintance to another, without ever being faithful to any. It is the same with all animals. I have always had a great number of birds, squirrels,

* The dog of a soldier, who had been killed in a duel, passed days and nights on the tomb of his master; all attempts to remove him were ineffectual; and they were obliged to make a niche in the tomb for this faithful animal.

&c.; some manifested the greatest indifference for me, and others exhibited the strongest attachment.

All these observations concur to prove, that friendship is not at all, as some people pretend, a sentiment founded on the calculations of interest, or, on a sympathy taking its source in a relation between the manner of thinking and feeling; facts oblige us to admit, that this sentiment belongs to a fundamental quality.

On Marriage, in Man and Animals.

It is extremely difficult to discover completely the sphere of activity of an organ or a fundamental quality or faculty. I have, for a long time, compared the crania of all the animals that I had, and of all the individuals that I had ever an oportunity of observing, in order to discover the organ which leads men and animals to contract marriages for life. Marriage has been instituted by the Author of all that exists; but it is hardly possible, but that this should be by means of a particular organization. Still I am constantly in doubt, whether my ideas in this particular are in conformity with nature. Here I am obliged to satisfy myself with probabilities, and whenever I cannot establish myself on facts at every step, I advance with the greater caution.

Most of my readers have no idea that marriage exists in animals, and in our own species it is only regarded as the result of social institutions. Man is not always willing to persuade himself, that, in whatever manner he acts, it is the finger of God, that impresses upon him the first movement.

Certain animals, such as the bull, stallion, dog, never approach the female of their species, except when they feel the want of copulation, and do not exclusively satisfy their desires with one only; and these desires being satisfied, there is no longer any attachment between the male and female; each one takes care of himself.

Other animals, on the contrary, when they feel amorous desires arising within them, select among many females, one towards which they appear attracted by a kind of sympathy; and until they have acquired peaceable possession of her, they combat with ardor other males, that pretend to dispute with them the conquest of the object of their choice. From this moment the union is concluded for life. Conjointly with their companion, they take care of the young born from this union, until they are in a condition to provide their subsistence for themselves. Though the time of propagation is passed, the couple continue in the most affectionate union; they make journeys together; when they are animals that live in herds, they always keep close to each other. In the spring they renew their loves, and continue in this state as long as they both live. It is not until one of the couple perishes, that the other makes a new choice. It is in a similar union, that the fox, marten, wild-cat, mole, eagle, hawk, pigeon, stork, swan,* nightingale, sparrow, &c. live. Marriage for life is then ordained by nature for all these animals; it would be the same with man, if our race, on account of such a multiplicity of propensities, were not subject to so many modifications.

After this exposition the reader will not be astonished, if I apply myself to discover the organic cause of the difference, which exists in this respect in the kind of life, as well in animals as in man. Does marriage result from the action of a single organ? Does it result from the simultaneous action of many organs? What is the organ, or what are the organs the action of which determines it?

Spurzheim believes, that he is able to decide these questions; he thinks, that it is the attachment and friendship of the male and female for each other, which influences them not to forsake each other, after

* They even say, that, in the wild swan, the reciprocal attachment of the pair is such, that, when one dies, the survivor lives in voluntary celibacy for the rest of life.

the instinct of propagation is satisfied, but to remain united, even when the season of their loves is passed.*

I should be also tempted to profess the same opinion, but I confess the facts appear to me to be of a nature to excite some distrust. The dog, the model of attachment among animals, and very ardent in his loves, never lives in a state of marriage. It is true, that sometimes a female dog bestows her favors exclusively on one dog, but these cases are very rare; and, as to male dogs, I doubt if any one has ever occasion to praise their fidelity in love. I have before said, that oxen and horses are susceptible of much attachment, as well for other animals as for man, and still it does not appear that among these animals, even in a state of nature, one male and one female particularly attach themselves to each other.

Spurzheim replies to this, that the modifications in the habits arise from a simple modification of the organ of attachment; the sense of odor and taste are also, says he, differently modified in frugivorous and in carnivorous animals.

It is certain, that modifications of the organ of attachment exist in the different species of animals. Certain animals have a preference, an attachment for individuals of their species; others conceive an affection rather for animals of another species, or, for man; the dog, for instance, attaches himself to his master, and to those persons that he is in the habit of seeing; but I shall not dare to affirm, that marriage can be explained solely by modifications of this nature. It is a fact, that the organ of attachment is placed near those of the instinct of propagation and of the love of offspring; and, if an organ of marriage exists, it should be placed near these three. The instinct of propagation and the love of offspring are common to us with animals; the organ of these propensities ought then to be among the number of cerebral parts, with which animals are endowed, as well as man.

It is further certain, that, where marriage exists,

* The physiognomical system of Drs. Gall and Spurzheim.

there is also attachment and friendship; but it is not true to say, that marriage takes place in all animals susceptible of attachment and friendship. Facts prove even the contrary.

If I could have full confidence in my acquirements in natural history, I would on my part propose an opinion.

It seems to me, that, in all the species where the male and female both concur in taking care of their young, their exists marriage for life; that in those species, on the contrary, where the male contents himself with procreating the young, without attending to their bringing up in the least, the female that first comes, serves him for the satisfying of his desires, and that the essential end of nature is fulfilled without the marriage tie.

The males of certain species, that live in a state of marriage, are not capable of nourishing their young; the roe-buck and the warren rabbit are examples of this; but they defend the female and the young from their enemies, and play with and caress the young, like the mother.

Partridges live together in a family until the moment when the young are capable of propagating; the male is the conductor of it; when he is killed, the family, deprived of its head, becomes entirely the prey of the hunter. When the male partridge escapes the danger, the sportsman does not succeed in destroying his family; for, he instantly leads it beyond the frontier. The male takes care of the young with the female; and, like her, he protects them from the rain with his wings.

While I am passing in review the habits of animals in relation to this point, the cuckoo excites in me some doubts.

Most naturalists appear to admit, that the cuckoo lives in the state of marriage. I have not been able to assure myself of this. As he neither hatches nor nourishes his young, and as he abandons his posterity

entirely to the care of other birds, it would seem, that nature had acted without an object, in instituting marriage with him. Some one pretends to have seen in England the female cuckoo hatch her own eggs and feed her young; but no one has ever seen the male join himself with the female, to divide with her the care of the young. I have very often observed this bird in the time of his loves; he is extremely ardent; we most frequently see many who reciprocally pursue each other; still I have never been able to assure myself, whether the male satisfied his desires with a single female or with many.

There are both men and women who, without any external accidental cause, have an aversion to marriage. If we could read the bottom of their hearts, we should perhaps find there the solution of the enigma. Are such people incapable of attachment and friendship? Do they fear the expenses of a family? Are they egotists to whom we can apply the proverb, *Impius, ut cuculus pater, generat atque relinquit?**

We shall be able to speak more boldly on this point, as well as upon many others, when we obtain more extensive knowledge of the manners and habits of animals. There are many, of which we are still ignorant even up to this very hour, whether they live in a state of marriage or not; there are others which, we observe, lead a life of celibacy, solely, perhaps, because they are not left to nature; and because more males of their species than females are killed. There are animals, such as the dog and cat, who perhaps would live in a durable union with one female, if their young did not find abundant food in our houses. The wild-cat, for aught I know to the contrary, lives with a single female; certainly the wolf, in certain cases, lives in a state of marriage. I possess the cra-

* There are people who refuse to marry, because they have not been able to obtain the hand of the object of their love. This case is not perhaps very frequent, but it exists. These people appear incapable of an attachment, merely because they are already irrevocably attached for life.

nia of a male and female wolf, that were seen together for many successive years. What I have just said on the state of marriage, will be sufficient to enable the reader to comprehend, why I speak on this subject with so much reserve.

Alienation arising from Attachment.

An excessive development of the organ of attachment may predispose to mania. A peasant woman became insane three times; the first, at the death of her brother; the second, at the death of her father, and the third, at that of her mother. After she had recovered the third time, she came to consult me. As she was very religious, she complained to me of her unfortunate disposition to be afflicted, at the loss of persons who were dear to her, more than religion permits; an evident proof that she had yielded to grief, although she had combated it by motives which were within her reach. Pinel relates some similar cases: "A young man," says he, "after other unfortunate events, lost his father, and some months after a mother that he tenderly loved; hence arose deep and all absorbing melancholy, with loss of sleep, and appetite; and by degrees ensued a most violent mania." *

Two young conscripts joined the army; and in a bloody engagement one of them was killed by a ball at the side of his brother; the other remained motionless and like a statue at this sight. Some days after, he was brought in this condition to his paternal house; his arrival caused the same impression on a third son of the same family; the news of the death of one of his brothers, and the insanity of the other, threw him into such a consternation and stupor, that nothing could better realize a state of icy immobility from fright, that so many ancient and modern poets have painted.

* Pinel on Mental Alienation.

Of Sociability in Animals and Man.

Sociability is another propensity, of which, in spite of all my researches, it has been impossible for me, up to the present time, to discover the material condition. As this propensity is common to man and animals, it requires, that its organ should be among the number of those cerebral parts with which animals are endowed, as well as man; it should also be placed in the neighbourhood of those of which we have already treated; or rather sociability is included in their sphere of action.

I have in another place, vol. I. sec. 2, shown that the causes which are assigned for sociability, are not admissible. Society is neither founded on our wants, nor in general upon calculations of interest. Strong and powerful animals live in herds, as well as weak animals. The black bear of America (frugivorous) lives in herds at Kamschatka, whilst the great brown bear lives always by himself. Some species live in herds the whole year; others only collect together at certain seasons. There are some that only live in society with their own family during summer and winter, and who separate in the spring, the season of their loves. There are many that live in herds formed of couples; in other species still, one male lives surrounded by many females. All these societies, differently modified, are so many institutions of nature.

In all probability, sociability enters into the sphere of action of the organ of attachment, and the different modifications of society belong to as many modifications of this organ. But, it has always appeared to me very difficult, to deduce marriage and sociability from the same source. If, for instance, the love of offspring were the cause of sociability, why do not the stork, roe-buck, and fox live in society like the sheep and man? Many animals live in society without uniting in couples for life; such are the bull, the dog, the stag, and the cock; others live at the same

time in couples and in flocks, as the crow and sparrow; others are united in pairs for life without living in society, as the magpie, fox, marten, and nightingale. The heath-cock and the sea-merle live isolated without a female. The red male pratridge separates from the female immediately after coupling, although this variety is gregarious. The tufted lark lives a solitary life, the common lark lives in flocks, at least during autumn and winter. The wren, (troglodyte of Europe,) the marsh, tomtit, *penduline*, *remis*, live solitary lives. The great tomtit, the blue, the long tailed, and the bearded tomtit, prattler, wren, (motacilla regulus,) live in flocks. The badger lives alone even in her family. Can any one still have recourse to a simple modification of the organ of attachment? It is, no doubt, humiliating to be compelled so frequently to confess our ignorance; but it is the part of prudence, to wait until time shall enlighten us.

I have compared the crania of most of the animals above mentioned, as well as those of many others, whose habits are very different as to sociability or solitary life. I have compared, for instance, the great black raven (*solitaire*) with the crows and the little raven; the tame jackdaw, living in flocks, with the magpie, who lives in society with his family only. I cannot affirm, that this examination has enabled me to distinguish by the inspection of the cranium, the animals that live in society, from those that lead a solitary life: notwithstanding this, it appears very probable that the propensity to live in society, is comprehended in the activity of the organ of attachment.

Certain people feel a particular inclination to live in society. Every thing which surrounds them, acquires by degrees a greater value in their eyes. They become attached to the place of their residence; to their clothes. They are troubled when they are obliged to leave those, whom they have been in the habit of seeing. Who is not acquainted with the disease of home-sickness, so painful, and at the same time so fatal? Can any one conceive, without the

propensity of attachment, that men, transplanted from the most severe climates, under a fine sky and in the midst of every enjoyment, feel themselves pining away, with the desire of seeing again their mountains of ice, and of again living on fish oil? Others seclude themselves even in the midst of a crowd and withdraw from the most various objects; nothing attaches them; they change with indifference their society, dwelling, and residence. From this it follows, that the organ of attachment can only have its minimum of development, in these misanthropes, who, like Timon and Apomantes, have a hatred for all commerce with men.

Of the Seat and External Appearance of the Organ of Attachment.

The convolutions of the brain marked III. (Pl. VIII. IX. X.) constitute this organ. They are generally placed between the organ of the love of offspring, and that of the preservation of self and property; or rather, to the right and left, and outside of the organ of the love of offspring. When the organ of the instinct of propagation, is strongly developed in its superior part, the organ of attachment is placed a little higher than that of the love of offspring.

In the cranium, it is situated in the middle of the edge of the parietal bone, and when it is advantageously developed, forms two distinct annular prominences, or, at least, the cranium is large and prominent in this region. When, on the contrary, the organ of attachment is very slightly developed, the cranium in the same region is narrow and depressed.

See Pl. LXII. the cranium of a man, remarkable for the affection he had for his friends, and who, even in dying, left them proofs of his attachment.

Women are generally more devoted to their friends than men, and manifest an indefatigable activity to render them services. Whoever has gained the

friendship of a woman is sure of the success of the affair, in which she serves him; men are much more easily discouraged in similar circumstances. I have had occasion, a hundred times in my life, to admire in women, the most generous activity in favor of their friends. Who is not astonished at the courage, which a woman displays, when she sees threatened with imminent dangers a husband, whom indiscretion has perhaps a thousand times betrayed? Who does not know instances of the most heroic devotion in such cases? No sacrifice is too great for a woman in serving her friend. When the life of her brother, husband, or father is at stake, she penetrates prisons, she throws herself at the feet of her sovereign. Such are the women of our days, and such history depicts those of antiquity. Happy, I repeat it, is he who has a woman for a friend!

The organization of the head of woman corresponds perfectly with these sublime qualities. Most of the crania of women, in the region indicated, are larger than the crania of men.

In animals susceptible of a great attachment, also, this region is larger and more prominent than in others. The cranium of the dog is particularly remarkable in this respect. We may be convinced of this by examining a collection of the crania of dogs, some of which were very much attached to their master, and others vagabonds by inclination. This organ is singularly developed in the seal, who is not only very susceptible of attachment, but lives in society. The cranium of the sheep, so social, is remarkably distinguished in this respect from that of the roe-buck, who lives, it is true, with his family, but never is gregarious.

The cranium of the sparrow, pigeon, starling, crow, jack-daw, (*corvus monedula, Linn.*) is also larger in the region above indicated, than that of the yellow-hammer, blackbird, magpie, falcon, eagle. The parrot has this region very large and prominent.

Although it may be extremely difficult, on this subject, to collect, in man, a sufficient number of observations which leave nothing more to be wished, it is not the less true, that the natural history of man and animals, concurs with the form of the head, as well in man as in brutes, to prove that attachment or friendship ought to be considered as a fundamental quality, and that the organ of this quality has its seat in the region of the brain and cranium, which has been indicated.

M. Démangeon, who has made a very exact analysis of my large work,* adds his own critical reflections on different subjects. I shall neglect none of his remarks in the sequel of this edition. This is what he says respecting the organ of attachment: "We see, that the reciprocal attachment of animals among themselves, is based on the generative instinct, and on the resemblance and accordance of their other tastes and interests: that is to say, in an analogy of sentiments, that may be called sympathy. The organ of attachment or friendship of our author is, perhaps, only sympathy strengthened by interest, hope, gratitude, &c. On this supposition, would there be a special organ of sympathy, or would this organ be the result of many similar faculties, or, at least, faculties fit to enable us to appreciate in others, those qualities which flatter our tastes, our propensities, and our habits? What would render this probable, is, that, in order to be on good terms with others, we must not oppose their fancies nor their self-love; from this we may see the reason why flattery has so much success, especially when it is founded on an identity of tastes and opinions, or, when it adroitly simulates this identity. It is also certain, that the dog, who has a great number of the tastes of man, attaches himself to him more strongly as he is better understood; it is a matter of observation, that good nature and good will in men do

* Analytical and Critical Exposition of the work of Dr. Gall on the nerves, brain, and their sensitive and intellectual functions; by J. B. Démangeon.

not belong to inferior minds. From these considerations it would not be unreasonable to derive sympathy, love for offspring, friendship, and benevolence from one and the same source. This would sufficiently well explain why the same religion, same language, government, manners, country, profession, the same opinions, and the same danger, give to benevolence, to sympathy, and to patriotism, an energy which favors, privileges, differences of conditions, and every thing which tends to prevent the equal relations of men with each other, either diminish or destroy. Never will a crew, composed of masters and slaves, afford an example of exalted and universal patriotism, such as was exhibited on board the ship *Vengeur*. Sociability, which is strengthened by sympathy, as well as the necessity of self-preservation, seems to have a mixed origin, and to be extended or restrained, according as the principle of individual preservation, of which property is one means, coincides more or less with sympathy, whence flow vanity and all the frivolities that are called social enjoyments. We see then why the man, whose wants are limited and little varied, like him to whom society is disgusting, voluntarily confines himself to his own family, or admits only one companion to his society."

The tendency to abstract and generalize, is so natural to man, that I can very well conceive the difficulty that I every where meet with, in urging the acknowledgment of the most obvious distinctions. Such objections will always weigh with those, who, fixing their attention on man alone, neglect the economy of animals. The reciprocal attachment of animals is certainly not based on the generative instinct; for, it by no means follows, that all the animals, that have the generative instinct, have also that of attachment, either for the females of their own species, or for their own offspring. Without repeating the examples, that I have already cited in the preceding treatises, are there not even men, who, devoting themselves pas-

sionately to the generative instinct, are not susceptible of any attachment either for a woman or for children? And what relation has the generative instinct between a dog and his master, between two oxen, two mares, between a lion and a dog; finally, between two men and two women, between brothers and sisters, &c.? I admit that interest, gratitude, the analogy of tastes and sensations, and sympathy, strengthen attachment. But, if this sentiment did not previously exist, how could these circumstances create it? The generative instinct is certainly excited and strengthened by the charms of the other sex; but, all the charms imaginable could not create it, where it did not exist. Let us not raise the singular pretension of M. Démangeon, that the dog is attached to his master in proportion as he is understood, and that good nature and benevolence are not the inheritance of limited minds. Why confound good will and benevolence with attachment? If we wish well to those, to whom we are attached, we are neither attached to all men nor all animals, for whom we have a benevolent regard. And how then will the ideas of sympathy, equality of tastes and sentiments, of interest and gratitude, find their application to the attachment for our native soil? It would then be unreasonable, to ascribe to the same source the generative instinct, sympathy, attachment, love of offspring, and benevolence or good-will.

If M. Démangeon had had before his eyes the social life of sheep, horses, cows, fishes, insects, sparrows, chamois goats, starlings, &c., he would have reasoned quite differently on the instinct of sociability. And therefore, if man alone often appears problematical, seek the solution of your difficulties in other parts of the animal kingdom.

END OF THE THIRD VOLUME.

ORGANOLOGY;

OR,

AN EXPOSITION

OF THE

INSTINCTS, PROPENSITIES, SENTIMENTS, AND TALENTS,

OR OF THE

MORAL QUALITIES, AND THE FUNDAMENTAL INTELLECTUAL FACULTIES

IN MAN AND ANIMALS,

AND THE SEAT OF THEIR ORGANS.

By FRANÇOIS JOSEPH GALL, M. D.

TRANSLATED FROM THE FRENCH

By WINSLOW LEWIS, Jr., M. D., M. M. S. S.

IN SIX VOLUMES.

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CONTENTS.

OF THE FUNCTIONS OF THE BRAIN,

AND THOSE OF EACH OF ITS PARTS.

IV. Instinct of Self-defence and of Property; Disposition to quarrel; Courage.

In certain cases, it is much easier to discover the organ which determines a certain mode of action, than the fundamental quality or faculty itself. Actions that are the result of the extraordinary activity of an organ, are much more obvious than the primitive destination of that organ, and its ordinary mode of action. For this reason, I at first observed almost all the organs, and all the faculties, in their excessive activity. When faculties are once recognized as peculiar and independent, it is possible thence to infer by degrees, the primitive destination of an organ. The history of the discovery of the instinct of self-defence, and of property, and of its organ, will be better understood by the reader from the following observations.

History of the discovery.

Uncertain whether I should find, in the language, suitable expressions to designate all the fundamental qualities and faculties, I was curious to ascertain what faculties and qualities had attracted popular notice by their outward manifestations. I therefore collected in my house, quite a number of individuals of the lower classes of society, following different occupations, such as coachmen, servants, &c. I obtained their confidence, and disposed them to sincerity, by giving them beer, wine, and money, and when favorably inclined, I got them to tell me of each other's good and bad qualities, and in short, of all their most striking characteristics.

In their different communications, they seemed to particularly notice those who were always provoking disputes and quarrels. Individuals of peaceable habits they knew very well, speaking of them with contempt, and calling them poltroons. As the most quarrelsome found great pleasure in giving me circumstantial narratives of their exploits, I was anxious to see whether any thing was to be found in the heads of these *bravos*, which distinguished them from those of the poltroons. I ranged the quarrelsome on one side, and the peaceable on the other, and examined carefully the heads of both. I found that in all the former, the head, immediately behind and on a level with the top of the ears, was much broader than in the latter. On another occasion, I assembled separately those who were most distinguished for their bravery, and those most distinguished for their cowardice. I repeated my researches, and found my first observations confirmed. It was impossible for me to be deceived by the false ideas of philosophers, on the origin of our qualities and faculties. In the individuals I had to deal with, education was entirely out of the question, and the manner in which their character was manifested, could not be attributed to the influence of external circumstances. Such men are the

children of nature, yielding themselves unreservedly to their dispositions, and all their actions bearing the imprint of their organization.

I therefore began to conjecture, that the disposition to quarrel might really be the result of a particular organ. I endeavored to find out, on the one hand, men of acknowledged superior bravery, and on the other, men known to be great cowards. At the combats of wild beasts, at that time still exhibited in Vienna, there often appeared a first-rate fighter of extreme intrepidity, who presented himself in the arena, to sustain alone a fight with a wild boar, or a bull, or any ferocious animal whatever. I found in him the region of the head just pointed out, very broad and rounded. I took a cast of this head, and likewise those of some other *bravos*, that I might run no risk of forgetting their particular conformations. I examined also the heads of some of my comrades, who had been expelled from several universities for duel-fighting. One of them knew no greater pleasure than that of sitting down in an ale-house, and mocking the workmen who came thither to drink; and when he saw them disposed to come to blows, putting out the lights; and giving them battle in the dark, chair in hand. He was, in appearance, a small and feeble man. He reminded me of another of my comrades, a Swiss, who used to amuse himself at Strasburg, by provoking quarrels with men much larger and stronger than himself. I visited several schools, and had pointed out to me the scholars, who were the most quarrelsome, and those who were the most cowardly, and I prosecuted the same observations in the families of my acquaintance. In the course of my researches, my attention was arrested by a very handsome young woman, who, from her childhood, had been fond of dressing herself in male attire, and going secretly out of doors to fight with the blackguards in the streets. After her marriage she constantly sought occasion to fight with men. When she had guests at dinner, she challenged the strongest of them after the repast to wrestle. I likewise knew a lady, who, although of small stature, and delicate constitu-

tion, was often summoned before a justice, because of her custom of striking her domestics of both sexes. When she was on a journey, two drunken waggoners, having lost their way in the inn during the night, entered the chamber, where she was sleeping alone; she received them so vigorously with the candlestick, which she hurled at their heads, and the chairs with which she struck, that they were forced to betake themselves to flight. In all these persons, I found the region in question, formed in the manner above described, although the heads in other respects were formed quite differently. These observations emboldened me, and I began thenceforward to speak in my lectures of an organ of courage, as I then called it.

There soon after died a general, whose whole reputation was founded on his courage and love of fighting. I found in his head (Pl. lxiii, the organ v,) shaped as it is in the first-rate fighter at Vienna, spoken of above. My entire conviction was finally achieved by the cranium of the poet Alxinger, who was so destitute of courage, that his cowardice exposed him to considerable raillery. Comparing his cranium with the preceding, (lxii.) what a difference in the development of the region V. The general's cranium, besides being very broad immediately behind the ears, also presents a round protuberance an inch in breadth. Alxinger's cranium, on the contrary, is not only very narrow in this place, but entirely flattened.

Natural History of Courage, or the Instinct of Self-defence and of Property.

In relating the natural history of this instinct, I shall combat some prejudices, that are generally received on the subject of the courage of animals.

Certain animals are charged with wanting courage, for manifesting fear when attacked by superior force, as if temerity instead of true courage, were the desired quality. Among the carnivorous animals, the dog is,

without contradiction, one of the most courageous. Before having experienced the superiority of the lion, tiger, and bison, he attacks them without hesitation, but let him once escape from the unequal combat, which exposes him to almost certain death, and he ever after flies at the approach of these terrific creatures. The wild-boar alone never learns to calculate his strength. The hare, pigeon, &c. are said to be timid; but hares, when they fight together, will frequently tear off whole strips of skin, and sometimes dismember one another. Observe two pigeons fighting, male against male, or female against female, and you will see them striking their wings together, struggling, and picking most furiously at each other with their bills. What creature is more valiant than the cock, yet he flies before the martin.

It is generally admitted that the carnivorous have much more courage than the frugivorous animals, but I shall try hard to prove the contrary. Hunters are perfectly aware that the wolf, unless excited by hunger, takes flight at the approach of the slightest danger. That powerful animal, the tiger, with the serpent's flexibility, and with incredible strength, armed too with teeth and claws, whose unexpected attack nothing can resist, cannot sustain his courage. The moment a herd of buffaloes observes him coming stealthily along, the old bull, the father of the family, comes forward, engages him in combat, and generally is the victor. In the arena of the combats of wild beasts at Vienna, a deer was once destined to be torn in pieces by a lioness; but the moment he saw the latter leave its lodge, to advance upon him, he put himself on his guard. The lioness walked around him slowly, when the deer, the moment he saw her intention, leaped upon her back, and beat her ribs vigorously with his feet, insomuch that they had considerable difficulty in getting the lioness back to her lodge, where she died three weeks afterwards. Shortly after a roe-buck was pitted against a lion. The former sprang with a sort of desperate courage on his adversary, but the disparity of strength and arms was such, that the

poor creature succumbed without the power of offering any further resistance. I have often seen a he-goat crush many a dog with his horns, and she-goats even defend themselves heroically against the dogs. Every body knows the courage of the chamois and the wild-goat, to which the hunter is often a victim; and who does not know the boldness of the squirrel, as well as the courage and mischievous daring of the rat? If beasts of prey, armed as they are, with claws and teeth, were also endowed with courage even to rashness, nothing could resist them. But, ordinarily, nothing less than hunger will induce them to risk a bold stroke.

These observations prove, that the instinct of self-defence is common to all animals; but it is not equally active in all species. Certain species live in peace and in society; while others, on the contrary, not content with repelling attacks, maintain constant war with their own and other species. Hence the difference between the manners of the sheep, horse, pigeon, tomtit, &c. and those of the morse, cock, cape-petrel, most of the fly-catchers, such as the red-throat, wren, &c. Many species of birds are even furnished with special weapons, such as spurs, &c.

The individuals of all species differ in regard to courage, according as the organ of self-defence and of property, is more or less developed. There are large and small dogs that avoid all fighting; while others think of nothing else, and will boldly attack the furious bull, and the wild boar foaming with rage. There are rams, he-goats, bulls, cows, pigeons, thistle-finches, who are continually fighting, either with animals of their own, or other species, and who attack and bite every thing they meet with.

Certain carnivorous birds, such as the *Falco pygargus*, *F. veruginosus*, *F. tinnunculus*, the *Lanius collurio*, as well as all the species of that genus, the *Tringa pugnax*, and *Larus cataractes*, are courageous and very quarrelsome. The *Falco Milvus*, on the contrary, is so timid, as to take flight, when attacked by a few crows, or even rooks. Among the little gnawers, none equals the

hamster for courage, even to rashness, while the guinea-pig of the same size, is very peaceful and timid.

Such a difference of manners cannot be attributed to education; and it can only be explained upon the ground of an innate disposition, and consequently an innate organization. No one will maintain that it is ambition, cupidity, or fear of punishment, which inspires these creatures with courage, and impel them to fight. The first-rate fighter of Vienna, already mentioned, as well as those of Paris, have often assured me, that it is impossible to train for fighting, a dog that is cowardly by nature, such as the greyhound. It may happen, indeed, that a young inexperienced dog, like a conscript, at first manifests fear; but the moment he is a little familiarized with danger, he is a ready-made fighter. I once owned a Danish dog, which, except myself and a little bitch, that was always with her, received with a growl every thing that approached him, and rushed upon it with fury. He had this habit from his youth, and neither caresses nor threats could break him of it. This dog never manifested the least instinct for the chase, and birds and mice might run round him without exciting his attention. A shaggy water-dog, a favorite of his master, who fed him well, was constantly seeking opportunities to fight in the streets, and every day he returned with new wounds. They tried shutting him up for weeks together, but the moment he was set loose, he sprang upon the first dog he met, and fought till he conquered him, or was obliged to quit himself. A wren in my aviary, masters all the other birds, who fear him, even the greenfinch, the gnat-snapper, and the turtle-doves. He attacks them with astonishing rapidity, and fights with the most obstinate courage. A white rabbit assumed the sole duty for two years of defending the tribe against the cats. He was constantly in a turmoil, and the moment a cat approached, he leaped upon him furiously, beating the ground with his feet. In barn-yards we always find some cock more valorous and quarrelsome than the rest. When a flock of wild beasts is menaced with danger, the most

intrepid are always found at their head; and the herds of bisons and wild horses are always led by the boldest males.

The same differences are observed in the human species, as the facts already related sufficiently prove. Daily experience concurs with the results of history, in showing, that the disposition to quarrel and fight is often manifested at the most tender age, without the stimulus of example, and in spite of the education whose object is to repress it. Every one, who has been educated in a large family, or in public seminaries, must have encountered young people of this character.

Bertrand du Guesclin, constable of France, thought of nothing but fighting, from early childhood. He formed a regiment of children of his own age, and was styled general, and dividing them into companies, taught them how to form the line of battle. "There is not a worse little wretch in the world," said his mother; "he always has some bruise, or a bloody nose; always beating, or being beat; he appropriates every thing he observes of a military nature."

I need not be told, that every soldier in an army displays the same courage; that it can be excited at pleasure in the raw recruit. I am well aware, that the actions of man are much less the result of a single quality or faculty—the effect of a single organ—than those of the lower animals. I know also that an organ, which, in its ordinary state, acts but feebly, may be excited to much higher activity by strong drinks, warlike music, the hope of distinction, the love of glory, and by the very necessity of escaping from imminent danger; but it is no less true, that in the bravest regiments, we meet with some soldiers more intrepid and rash than the rest. Wherever men are assembled together, there will always be found some disturbers of the peace, some quarrellers, who strive to gratify their passion, even at the expense of honor and duty. Savans, who are forever engaged in some little controversy, and impassioned pleaders, probably have this organ largely developed.

Derangement of the disposition to quarrel.

The phenomena of this instinct in disease, particularly mental derangement, also prove that it should be considered as a fundamental quality. There are individuals, who, when they have drank too much, or are suffering under some kind of irritation, such for example as that of cerebral inflammation, or that produced by certain poisons, become quarrelsome, while others in the same circumstances, are rather disposed to enjoy the pleasures of love, or perpetrate some kind of trickery. Recollect the case of the man who, all his life, was of a mild and peaceful disposition, till cured of a wound he had received on his head from a stone, when he became quarrelsome and inclined to fight.*

We have seen that the instinct of propagation and that of offspring, may degenerate into monomania. The same thing may happen to all the fundamental qualities and faculties, and very frequently does to the instinct of self-defence. I will cite a few cases from Pinel.

"A maniac of a mild and peaceable disposition, seemed, during his paroxysms, to be inspired by a demon of malice. He was then incessantly in mischief; shutting up his companions in their cells, teasing, striking and throwing among them some bone of contention to set them by the ears. Another example of this kind is worth relating; that of a person affected with a periodical insanity of the most inveterate description. The paroxysms ordinarily occurred once a month, and continued from eight to ten days, presenting the most striking contrast to his natural condition. During the lucid intervals, his countenance was calm, his aspect mild and reserved, his answers to questions, modest and highly judicious, and his manners urbane; his conduct

* Vol. ii. p. 202.

evinced strict probity, and even a desire to oblige others, and he expressed the most ardent wishes for his recovery. On the recurrence of the paroxysm, however, which was accompanied by a certain flush of the face, excessive heat in the head, and a parching thirst, his motions were rapid, the tone of his voice loud and arrogant, his looks full of audacity, and he felt the most powerful inclination to teaze every one who came near him, and provoke them to fight, as long as breath remained in their body."*

"Ought we not to refer to mania without delirium, (the hallucination of the English writers corresponds to the delirium of the French,) those turbulent, cross-grained characters, who manifest no alienation in other respects, and whom, they have preferred to seclude in lunatic asylums, rather than mix them up with criminals in jails and prisons. An old religieuse at the Salpêtrière was a striking example of this kind. Whenever a servant-girl approaches her to offer any service, she showered upon her the most outrageous and opprobrious epithets. The other insane were treated with no more respect, and menacing cries, transports of rage, and efforts to strike every thing around her, followed one another without cessation. When her food was brought to her at meal-times, she either indignantly threw it away, or concealed it, and then complained that they were trying to starve her to death. She delighted in throwing her clothes into the fire, and then crying out that she had nothing to wear, and was suffered to go naked. She never ventured to brave the authority of the overseer when he was present, but when absent, he was continually the object of her sarcasm. Such a firebrand of tumult and discord being dangerous to the welfare of the other inmates, it was necessary to confine her in a solitary cell, to which the outbreakings of her wild and savage spirit were afterwards limited." †

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* Sur l'aliénation mentale, p. 101. † Pinel, l. c. 280.

"An only son of a weak and indulgent mother was encouraged in the gratification of every caprice and passion, of which an untutored and violent temper was susceptible. The impetuosity of his disposition increased with his years. The money, with which he was lavishly supplied, removed every obstacle to the indulgence of his wild desires. Every instance of opposition or resistance roused him to acts of fury. He assaulted his adversaries with the audacity of a savage; sought to reign by force, and was perpetually embroiled in disputes and quarrels. If a dog, a horse, a sheep, or any other animal offended him, he instantly put it to death. If he ever went to a fête or any other public meeting, he was sure to excite such tumults and quarrels as terminated in actual pugilistic rencontres, and he generally left the scene with a bloody nose. This wayward youth when unmoved by passions, possessed a perfectly sound judgment. When he became of age, he succeeded to the possession of an extensive estate. He proved himself fully competent to the management of it, as well as to the discharge of his relative duties, and was even distinguished for acts of beneficence and compassion. Wounds, law-suits, and pecuniary compensations were generally the consequence of his unhappy disposition to quarrel. But an act of notoriety put an end to his career of violence. Enraged with a woman, who had used offensive language to him, he pushed her into a well. Prosecutions commenced against him, and on the deposition of a great many witnesses who testified to his furious deportment, he was condemned to perpetual confinement in the Bicêtre."*

On the subject of such cases, which are but too frequent, Pinel observes, that "daily experience shows the necessity of having seven or eight cells in a remote part of the hospital, where those inmates, who are not furious, but extremely turbulent and intractable, may be kept for

* Pinel, l. c. 156.

a certain time in a state of seclusion. Among these, may be ranked those who are not subjected to the general rules of labor, and are but little affected by the ordinary means of reform, but who are constantly in mischief, teazing the other inmates, and exciting among them some subject of contention."*

These cases show, conclusively, that the instinct of self-defence may be irritated to excess, independently of all other qualities and faculties, so as to be converted into monomania—a phenomenon that would be impossible, if this instinct had not a particular and independent organ.

Fundamental quality of the disposition to quarrel and fight.

The reader is already aware, that it was impossible for me to discover any fundamental power in its primitive destination; and that at first, my attention has been always fixed on the extraordinary manifestation of a quality or faculty, and consequently on the result of an extreme development of an organ. The highest degree of action, of which an organ is susceptible, is nothing but a gradation of the fundamental power, but not this fundamental power itself. The fundamental quality or faculty is common to all the individuals of the species; but the degrees of manifestation vary from one individual to another, according as the organ is more or less developed. Setting aside all accidental modification, and attending only to that condition of this quality, which is common to all individuals, we shall arrive at the fundamental quality or faculty. As much must here be left to the sagacity of each individual, who makes it a subject of attention, there will always remain a great diversity of opinion, even among organologists,

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* Pinel, l. c. p. 291.

as to the denomination of the fundamental qualities or faculties.

The instinct which disposes to quarreling and fighting, may be referred, in all its modifications and degrees, it seems to me, to the instinct of the defence of self and property. As soon as the necessity exists, in man or brute, of providing for self-preservation, for having a habitation, a male or female, children, or young, or property of any description, they must be also provided with a quality, which will prompt them to defend it against external violence. The preservation of the individual alone, even renders the existence of this instinct indispensable. Thus far, however, we have seen nothing of the disposition to quarrel and fight. This supposes a higher degree of activity of the fundamental quality—of the instinct of the defence of self and of property, whose organ is capable of different degrees of development. The individual who, with a moderate development of this organ, merely defends himself and property, will commence an attack, the very moment the organ becomes more developed, or more strongly excited. As this development or excitation increases, the disposition to quarrel becomes stronger, till it degenerates into a fixed desire, a necessity, a passion. Quarrels and battles are sought for, dangers are loved, perils confronted, and even created. Here then is a desire, a passion, which has nothing in common with that of the amative instinct, or the love of offspring, or of attachment, and which has its seat in the brain. If we call the fundamental quality, in consequence of this excitation, or excessive development, the disposition or passion for quarreling and fighting, we should be guilty of no less an error, than if we derived the name of the instinct of propagation, from the most depraved tastes into which it may degenerate.

As every different degree of development of this organ will always exist, so will there always be men and brutes, whose supreme enjoyment consists in dissension, quarreling, and fighting. So long as man exists, so long will there be disputes, quarrels, and wars.

Of the seat of the organ of the Defence of Self and Property.

I have already remarked, that in all courageous, rash, fight-loving people, there is a round protuberance behind and above the ears. Its situation on the cranium is at the posterior-inferior angle of the parietal bones. When no such protuberance is found in people of this disposition, we shall, instead thereof, find the distance between the corresponding organs much greater than in timid people. In man, the organ is situated nearly an inch behind the ear, and on a level with its superior margin. We must take care not to mistake for it, the mastoid process, which is a little lower down, and directly behind the ear.

My observation is confirmed by the heads of all who have been distinguished for courage; of robbers, who have committed theft, accompanied by violence and danger, in preference to simple larceny; and of all those who, for accomplishing perilous enterprises, snatch the reward from others who conceived the project, but wanted the requisite spirit and daring to execute it themselves. All soldiers distinguished for valor, so far as I have had opportunity to examine, have this organ very large. I have also found it very prominent in highway robbers, &c., notorious for their intrepidity. I am indebted to the politeness of Baron Larrey for the cranium of a soldier of the guard, who was singularly fond of fighting; he had killed several in duels, and finally died of a stab in his abdomen. The diameter of this skull, from the posterior-inferior angle of one parietal bone to that of the other, is very great. It is still more so in the head of Bouhours, who was guillotined several years ago, for murdering a number of people with a hammer. In Prof. Blumenbach's collection, we saw two crania, one of a young man, the other of a woman, in both of which the organ in question, was very little developed.

Otto Fabricius relates, that the race to which these crania belong, is a very cowardly one, and their character, as given by David Kranz, is in perfect conformity with their organization.

Certain savage races seem to have a confused notion of some advantage in great breadth of this region of the head, and are in the habit of endeavoring, by means of pressure, to increase the breadth of their children's heads between the ears, in the belief that they will thereby become better fitted for war.

In the lower animals, the situation of this organ requires particular investigation, because it varies with the structure of the head and the relative position of the brain. Horses, whose ears are set very near each other, are skittish and timid, while those whose ears are far apart, at their base, are bold and steady. Dogs, also, that are incapable of being trained to fight, have the head narrow above and a little behind the ears; while the heads of those that are rashly bold, are broad in this region. Amateurs of pigeons have, long since, made the same observation upon these birds. In the first interview I ever had, in my travels, with a devoted amateur of cock-fighting, he thought he was confiding to me a great secret, by telling me that, by the sight alone, he could distinguish good fighters from poor ones, and pointing out, as the distinguishing mark, a great breadth of the head, a little in front of the ears. This man had no knowledge of my discoveries. At this period I had already made this observation on barn-yard cocks, and afterwards confirmed it by comparing them and their hens, with game-cocks and their hens. Dr. Spurzheim has had frequent opportunities, in England, of repeating this observation on the game-cock. The hen of this variety have such an animosity towards all other hens, that it is impossible for them to remain in the same yard with the former. The rook and crow have the head much broader in this region, than many species of eagles and falcons; and what creature is more courageous than the large black crow (corvus corax)? The

moment I put my eye on the head of a wren, his indefatigable temerity was explained to me. Organology can alone explain, how the wild rabbit dares to pursue, and succeeds in vanquishing the hare. It is the same conformation of the head, that makes the instinct of self-defence so active in the hamster, and so many other frugivorous animals, and impels them to engage in the most obstinate combats.

Opinions of some other Physiologists on the origin of Courage.

It cannot be supposed, that, before the discovery of organology, the different qualities and faculties should have been laid down and described, and the common errors on this subject abandoned. But we cannot conceive, how physiologists of the present day can still have recourse to assertions entirely gratuitous, to explain the origin of the faculties. Richerand thus expresses himself on the subject of courage.

"The heart is likewise larger, stronger and more powerful in courageous, than in weak and timid animals. This is the first instance of a moral quality depending on a physical disposition of parts, and is one of the most striking proofs of the influence of the moral on his physical nature. Courage arises from the consciousness of strength, and the latter is in proportion to the activity with which the heart propels the blood towards all the organs. The inward sensation produced by the afflux of the blood, is the more lively and the better felt, when the heart is powerful. It is on this account, that some passions, anger, for example, by increasing the action of the heart, increase a hundred fold both the strength and courage, while fear produces an opposite effect. Every feeble being is timorous and shuns danger, from an inward consciousness that he does not possess sufficient strength to resist it. It may perhaps be objected, that some animals, as the turkey-cock and ostrich, have less courage than the smallest

bird of prey, and that the ox has less than the lion and many other carnivorous animals. What has been said, however, does not apply to the absolute, but to the relative size of the heart. Now, though the heart of a hawk be absolutely smaller than that of a turkey-cock, it is nevertheless larger in proportion to the other parts of the animal. Besides, the bird of prey, like the other carnivorous animals, owes his courage, in part, to the strength of his weapons of offence.

Another, more specious but not better founded objection, is drawn from the courage, manifested on certain occasions by the most timid animals—by the hen, for example, in protecting her young; from the courage with which other animals, pressed by hunger or lust, surmount all obstacles; and particularly from the heroic valor of men of the feeblest bodies. All these facts, however, are only proofs of the influence of the mind on the body. In civilized man, the prejudices of honor, considerations of interest, and a thousand other circumstances, change the natural inclination, so as to make a coward of one, whose strength would induce him to brave all kinds of danger; while, on the other hand, men, whose organization should render them most timid, are inspired to perform the most daring actions. But all these passions, all these moral affections, operate only by increasing the action of the heart, by redoubling the force and frequency of its pulsations, so that it excites the brain or muscular system, by a more abundant supply of blood." *

This whole passage is false. Courage never arises from the consciousness of strength. There is no one who is not acquainted with very strong men, who are not only peaceable, but even timid. Even in cases, where every thing appears to depend on the bodily strength, the strongest are not the most courageous, intrepid, and rash. The largest dogs, the greyhound, for example, are

* Elements of Physiology, sect. li.

the greatest poltroons; they never can be trained to fight, because they fly at the first attack. Even among mastiffs and common dogs, the smallest are often the most courageous and the most bent upon fighting. I have, at this moment, a dog of one of the smallest breed, reared by girls, who, the first time he met another dog, attacked him most vigorously. He is absolute master of every dog at all near, or even somewhat above his own size, and when he is sometimes thrown down by a much stronger dog, he is never intimidated, but gathers himself up instantly, and renews the attack with increased spirit. The wild rabbit, let me repeat, though smaller and weaker than the hare, will, when they are inclosed in the same park, drive him away and put him to flight. The game-cock, as has been already mentioned, is smaller than the barn-yard cock, though he attacks and vanquishes him. Every day I see, in my yard, the smallest English cocks fighting with large ones of the ordinary kind, and very often they are successful. If, therefore, to possess courage, something more is requisite than bodily strength, Richerand's objection is without the slightest foundation, and must, consequently, fall to the ground. I have elsewhere cited some examples of men known in history for their courage; such as Attila, Alexander, Pepin-le-Bref, who were of small size, and the reader will recollect many other similar cases.

When Richerand says, that the heart is larger, stronger, and more powerful in the courageous than in feeble and timid creatures, he advances an assertion entirely gratuitous, which he has not taken the trouble to support by a single example, drawn from comparative anatomy. It is true, the size of the heart bears a certain proportion to the stature, or to the venous and arterial system; but this proportion has no relation with any quality or faculty whatsoever. The heart of the hare is much larger than the biggest cat's. As for the rapidity of the heart's pulsation, I defy Richerand to find them more rapid at the sight of peril, in the hero than in the coward. "We see," says M. Nacquart,

"that in brutes, the disposition that impels them to kill, is nearly related to that of fighting, and that they are even confounded together. The dog has not learned to distinguish the disposition to kill from the disposition to fight; and with the wolf, to attack and kill are one and the same thing. Thus, the two dispositions have not an independent existence, so long as the individual enjoys moral liberty to any extent. It is as if we should consider physical love a different propensity from that of moral love, because, in man, there is a well-marked line of separation between them, and one which seems apparent even in brutes at all capable of choice; whence we conclude, that the disposition to fight, is a modification of that of murder."

I have elsewhere said, that a living being is capable of being determined by motives, the number of which depends on the size and quality of the brain, and on the number of organs to whose influence he is submitted. Man is not sensible to the pleasures of sensual love exclusively, but may also be captivated by the charms of beauty, by the attractions of virtue, &c. Here is the ground of difference between physical and moral love, though these two species of love are much more nearly related to each other than many people imagine. Why is not the Corypheus of Platonic love inflamed by the ravishing charms of moral love, when seen in a man or an old woman? Is not what we call moral love chiefly an illusion, that ordinarily finishes where physical love begins?

If M. Nacquart had been acquainted with the natural history of the instinct of the defence of self and property, and with all its different manifestations, as I have pointed them out, he surely would not have admitted the disposition to murder and the instinct of self-defence to be only modifications of the same fundamental quality. I will not stop to cite the thousand of examples furnished by the animal kingdom, but will content myself with recalling to the reader what history teaches us respect-

ing the manner in which heroes, equally well known, were accustomed to act.

"Charles XII., who was inflexible even to obstinacy, and rashly courageous, was a scourge to the human race; thousands of men destroyed by fire and sword, was the result of his warlike ardor. Pepin-le-Bref was no less courageous, but was not cruel. Du Guesclin, who thought of nothing but fighting, even from early childhood, was, like Turenne, humane and generous. He always protected women and children, too often the victims of sanguinary fury." Does not experience show, that the cowardly, when in power, shed blood in torrents, without necessity or object; while, ordinarily, the most gallant prevent every unnecessary effusion of blood? Besides, the organs of fighting and of murder are by the side of each other; they render mutual aid, and many acts are the result of their simultaneous activity. It is not astonishing, then, that the mingled functions of these organs should appear to be only a modification of one or the other of these two propensities. Thus we see men, with the propensity to kill very energetic, without having courage; and some with indomitable courage, without the slightest inclination to kill. Thus, too, there are dogs, some frugivera, and other animals, who are very courageous, without evincing any admixture of the murderous instinct. We have seen, that, notwithstanding the instinct of propagation, a man does not love all women indiscriminately, nor one woman, all men; and that, notwithstanding the instinct of love of offspring, a mother does not love all children equally alike. So, a courageous man does not brave all kinds of danger with equal intrepidity; and frequently one who fears a sword, will use a pistol with equal boldness and valor.

The notion is, that courage is produced by the fear of dishonor and disgrace, by ambition, jealousy, example, &c.; in short, by a variety of motives. All these different motives may indeed stimulate courage, where the organ exists; but, where the fundamental quality

does not exist, for want of a suitable organization, no motive, nor any other untoward irritation, can give rise to it.

Cowardice.

Is cowardice, or timidity, the consequence of a small development of the organ of self-defence, or does it proceed from the action of some other organ? There can be no doubt, that caution may sometimes moderate the desire to fight; but I believe that this same quality may, just as often, excite us to defend ourselves, and overthrow an enemy. Experience shows, that men and brutes eminent for caution, are no less courageous than those who want it; whence we may conclude, that cowardice proceeds rather from a too feeble development of the organ of self-defence, than from the influence of caution. At any rate, caution will never produce fear, except so far as it makes known the superiority of an adversary, or when the organ of self-defence is but little developed. Spurzheim, however, not coinciding in the belief, that fear originates from little development of the organ of courage, has opposed this view, and endeavored to prove, that fear depends rather upon the organ of caution. This induced me to append to the third volume of my large work, some remarks on negative qualities, and on fear, as follows.

I call *negative qualities*, those that are not the result of activity, or of a fundamental quality, but which take place when a fundamental quality is inactive, or entirely deficient. A giddy and heedless disposition must be the necessary result of a want of cautiousness: it is therefore a negative quality, and is derived from no active fundamental quality. So, also, humility and modesty are the negations of pride and assurance. Chastity, while a man suffers no temptations, and feels no thorn in the flesh, is but a passive quality, without merit; it becomes a virtue only, when, by the force of elevated motives, the individual subdues his de-

sires, and restrains his inclinations. Modesty and humility become meritorious, when they result from reflection on our own weakness and the narrow limits of our knowledge. Cowardice is always a passive or negative quality. Fear is sometimes negative, and sometimes positive; the most courageous will fear when they find themselves in the presence of an enemy, or of a danger superior to other powers. The dog most eager in the chase, will recoil before the formidable weapons of the tiger. Here, fear is a matter of calculation, a consequence of caution. A very high degree of courage, joined to a great deficiency of cautiousness, makes the rash man rush into invincible danger. But he who fears a danger, or an enemy, which the least effort would overcome, is a timid, cowardly, pitiful creature; and these qualities certainly have not their source in cautiousness.

Spurzheim considers fear to be an affection of the sentiment of cautiousness, and does not believe that the want of courage can be the cause of fear. He cannot comprehend any such thing as negative qualities. The absence of a faculty, he says, may modify the action of the other powers, but can never produce a positive sensation. A want of courage, he thinks, renders a person peaceable, but does not inspire fear; for, if this were the result of the absence of courage, he cannot comprehend how one may, at the same time, be courageous and in fear. Besides, there are some species of animals and some men, that experience these two sentiments. The stag is both timid and courageous.

If the absence of a faculty never produces a positive sensation, Spurzheim is wrong in considering fear, under all circumstances, to be a positive sensation. When we say that a man or brute is timid, we do not necessarily mean, that, at this very moment, he is agitated with fear, as people are affected with anger or fright. We mean by this expression, that he is a timid, cowardly man, or brute, as the case may be; and that such are more easily made to fear, than the courageous. If a deficiency of courage merely, makes a man peaceable, without giving

rise to fear in the presence of danger, I wish to know what are the qualities, that sometimes produce an aversion to women, even to abomination, if it be not the want of physical love? What are the qualities, too, that create an aversion to music, if it is not a want of the musical talent? or, give rise to erroneous judgments, if it be not a want of intellect? or excite disgust at the sight of food, if it be not a want of appetite, or some defect of the digestive powers? How can Spurzheim, upon his hypothesis, conceive of hatred, calumny, cruelty, imbecility, since none of these qualities arise from any fundamental power?

To me, these phenomena are perfectly intelligible. Outward objects are a source of pleasure, only so far as there exist certain relations between them and us, established by means of the cerebral organs. For this reason, when in the glow of youthful strength and health, we are pleased and charmed with a thousand things, which, when our powers have begun to decay, are matters of indifference to us, and excite even an aversion, which, when the mind is peculiarly depressed, proceeds to a distaste for life, and a disposition to suicide. When certain objects have lost their former relations to us, they are no longer in harmony with our spirits, and henceforth there succeed estrangement and aversion. Who has not learned from experience, that a surfeit of certain enjoyments is followed, not only by indifference, but by a real disgust for the same things that, a little before, were the objects of our most ardent wishes. In the same manner, when our limbs are fatigued, we feel an aversion to travel. We may say, with Bonald, that those who have no taste for metaphysics, mathematics, &c., are musical instruments, that have not their complement of strings.

Finally; if cautiousness be the source of fear, the heedless must always be exempt from this emotion, and fear will be in direct proportion to cautiousness — a position which is constantly belied by experience. Spurzheim cannot understand how one can be courage-

ous and timid at the same time, if fear be the result of the absence of courage. But why does Spurzheim here neglect the principles on which, in other places, he insists so strongly and so justly too, that actions are rarely the result of a single organ? Admitting this principle, and this part of the objection is already answered by our remark, that the most courageous men and brutes do not, on that account, lose the power of measuring their own strength with that of their enemies. Armies composed of men renowned for courage, have been seized with a panic: has not the intrepid Roman also sacrificed to Fear?

M. Demangeon, with inexhaustible perseverance, drives away at the question, whether fear proceeds from a want of courage, or of some other faculty, and whether there is a special, unique organ of courage. With the whole force of his military talents, he directs against me a war of extermination. "Courage, therefore," he concludes, "does not belong to a particular organ, and this conclusion is derived from Gall's own acknowledgment." As I have engaged to answer all objections, the reader must pardon me, if I detain him too long, perhaps, with this formidable dispute. "We have already seen," says Demangeon, "that Gall founds negative qualities upon the absence or weakness of organs, and in the following words, we have his views of fear. [He here quotes my own words a little altered, from, "If a deficiency of courage makes a man peaceable, to "we feel an aversion to travel."] Gall adds, that "cowardice is always negative; that fear is sometimes negative, sometimes positive; and that the most courageous are afraid, in presence of an enemy or danger superior to their strength."

Demangeon begins his attack, by quoting from Spurzheim, who says, "Let us suppose, that the two expressions, to be a coward, and to feel fear, are synonymous; still I neither see that we can therefore infer, that fear is negative, nor, that the knowledge of danger and the sensation of fear take place in the same faculty. I,

however, conceive that the knowledge of any danger may affect the sense of circumspection, in a manner to which the name fear is applied, just as it may excite courage, and make a person fight with fury. Neither courage nor circumspection know the danger nor reflect on it. Sometimes the most innocent and harmless things inspire fear. Any one endowed with courage, self-esteem, acquisitiveness and firmness, if his circumspection be considerable, will feel less fear than another with smaller circumspection, and deficient courage, self-love and firmness. The reader must also bear in mind the meaning, which I attach to the term affection, and remember, that affections do not depend only on the different degrees of activity of the faculties; that the sense of touch, for instance, though obtuse, produces the sensation of itching; that, in the same way, fear is an affection or quality of circumspection; and he will perceive that Gall's reasoning, when he objects that the careless, upon my views, must be entirely exempt from fear, does not refute my opinion." *

Because I said, what all the world knows, that the most courageous being may sometimes feel fear, why does Spurzheim suppose, that, to feel fear, and to be a coward, are synonymous expressions? I do not believe, any more than he, that the knowledge of danger and the sensation of fear, take place in the same faculty; but I conceive, as a thing of necessity, that fear is an affection of the organ of courage, and not at all of the organ of circumspection; for, it would naturally follow, that the more circumspect a man is, the more fear he will feel,—and the more careless he is, the less fear he will feel,—circumstances not at all confirmed by experience. One of my nephews is as destitute as possible of circumspection, yet he is exceedingly timid, and the greatest coward imaginable. He is ashamed of it himself, and though he may be well enough convinced that, in certain

* Phrenology vol. i. pp. 204, 205.

circumstances, there is nothing to fear, he is none the less frightened, and cannot help growing pale and trembling. Nothing, he says, excites his compassion so much as a timid creature, for he knows how painful the sensation is. How, too, will Spurzheim apply his reasoning to those animals, which are sometimes cowardly, sometimes fearful, and sometimes courageous?

Demangeon still has recourse to Spurzheim, who adds, says, he, that if fear resulted from the absence of courage, we could not conceive how one could be timid and courageous at the same time; and also, that this double state of fear and courage, sometimes experienced at the same moment, may be easily conceived, if we make it result from the simultaneous action of circumspection and courage. He then continues as follows. "Let us still examine whether the analogies, quoted by Gall, refute my opinion on the origin of fear. He compares fear with fatigue, disgust, and other sensations, which result from a satiety, or an exhaustion of certain faculties. Will he then maintain, that fear is ever the result of courage when exhausted? He compares it also with the inactivity of faculties, with imbecility, and with the imperfect functions of the intellectual faculties, or false judgments. None of these comparisons, except that with imbecility, is conformable to the definition given by Gall of negative qualities, among which he includes fear, hatred, calumny and cruelty. Several persons are fond of reasoning, but their conclusions are false; others are fond of singing, and making melodies, but cannot produce harmony. False judgments, therefore, are not the effect of an inactive state of the faculties." *

I reply, that we never are timid and courageous at the same moment, but that we may feel courage and fear at the same moment. I was, one day, walking in a by-path, from which there was no opportunity to escape, either to the right or the left; and while least expecting

* Phrenology, vol. i. p. 203.

it, an ox rushed furiously towards me. I certainly was frightened and felt fear, but my courage did not forsake me. Luckily, I instantly found a pretty large stone, which I threw at him, and struck him in the forehead. Surprised and stunned, he turned up the road and went away. My fear and the ox's too was a positive fear, since neither of us wanted courage, but each had a powerful enemy to contend with. Now it is true, that if fear resulted from an exhaustion of courage, as these gentlemen make me say, this double state of the organ of courage would be impossible; but not so, if, in these cases, fear is nothing but an affection of this same organ. This affection may indeed be produced like courage itself, by circumspection and a thousand other motives; but no one can confound such fear, in a courageous man or brute, with the absence of courage, with cowardice, or faint-heartedness, which are purely negative qualities, and which certainly have not their origin in circumspection.

Every thing that Spurzheim has made me say in this passage, is pure fiction. He applies to our discussion on fear, what I have said to render my ideas on negative qualities more intelligible. Nowhere have I compared fear with fatigue or disgust, nor with any sensation whatsoever resulting from satiety, or from the exhaustion of certain faculties. I have expressly copied my own words, without addition or diminution, and I seek in vain for any thing that will bear the construction, that fear is the effect of exhausted courage. Neither can I find that I have compared fear with false judgment. I said, indeed, that the inability of judging correctly results from a want of intellect. As to hatred, cruelty, calumny, &c., I would ask how Spurzheim explains them upon his theory, without examining whether these modes of manifestation are purely negative, or the result of the influence of several organs, or simple affections of certain organs. I merely recollect, that Spurzheim himself derives malice from the small development of benevolence. I believe it was cautiously remarked,

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in my large work, that, "sooner or later, and sometimes in the least important circumstances, we shall discover in persons, in whom these cerebral parts are but feebly developed, a malicious, hateful, vindictive, ungrateful and slanderous character. Whether the reason is, that, in such cases, there exists no organ whose activity can maintain the balance of the other organs, and that thus selfishness predominates; or, that the small development of this cerebral part, gives rise to a hateful disposition, it is always certain, that persons thus organized, unless motives of an elevated kind come to their aid, are never capable of enduring benevolence." *

Demangeon now appears alone on the field. "It is necessary," says he, "to know and appreciate a danger or a misfortune, in order to fear it, and therefore infants, idiots, fools, and the new-born young of animals, feel no fear, or not the same fears as other men and old animals, although in them there is an absence of courage. So far from being the effect of exhaustion or inactivity of an organ, as Gall pretends, fear results from the excessive activity of certain faculties, which presage evils from real or imaginary causes; for, it cannot exist without an object; that is, we cannot be in fear of nothing. This is why women, young persons, the subjects of hysteria, hypochondria, or any other nervous affection which increases the nervous sensibility, as well as those who possess a highly excitable imagination, easily sacrifice to fear. It may therefore be the result of the activity of all the different faculties and sentiments, that put us in relation to objects that appear to menace our existence, or happiness. Spurzheim, therefore, is undoubtedly more consistent, and nearer the truth, than Gall. Still he attributes too much of this sentiment to the organ of circumspection, which, by enabling us to foresee a possible danger, and prepare the means of escaping it, is as likely to confirm as to depress our courage, as

* Tome iv. p. 218.

when we traverse a forest by night, with or without arms."

It seems that Spurzheim and Demangeon think they have found a powerful argument against me, in the expression, *exhaustion of the organ of courage;* since they are incessantly attributing to me an idea which no where exists in my works. It is by no means true, that it is necessary to know and appreciate a danger, in order to fear it. A coward may be well convinced, by reasoning, that he has nothing to fear, without being any the less liable to fear and tremble. Do we not every day see people quaking with nervous agitation at the sight of a spider, or a mouse; at the sound of thunder, or of the rustling of the wind? How often do we see children crying at the sight of a stranger? Certainly, new-born children and brutes feel no fear; for, fear being an affection of the organ of courage, it is at least requisite that this organ should be developed to a certain degree, before it can be affected in a certain way.

"If our authors," continues Demangeon, "had admitted an organ or instinct of self-preservation, (which they might have admitted with as much as, and more reason than many others, since this instinct is general, and graduated upon a particular disposition in all species and individuals; since its manifestation disappears, like that of others, in certain diseases and under certain circumstances, and is as essential to the end of nature as any other,) we might derive fear and courage from it chiefly, admitting other faculties to choose the means of preservation. We could thus better explain, what these authors have not at all done, why the same individual is timid or courageous, according to the different positions in which he may be placed; and why, when we perceive the folly and danger of the suggestions of fear, for personal safety, despair awakens our courage by thinking of acts of heroism, as is the case with the modern Greeks, and other oppressed people." There, then, follows a long enumeration of cases, where men, nations, and armies have been courageous or in fear, according

to the difference of circumstances; and M. Demangeon concludes, that courage depends on all the faculties which enable us to judge of our position, and of the means of extrication.

Undoubtedly, the other organs may furnish motives both for courage and fear; otherwise the poltroon would never manifest a spark of courage, when opposed to a still greater poltroon than himself; and the courageous man would never be intimidated by an enemy, however superior he might be. Fear and courage are therefore, in certain cases, a matter of calculation; but, without the organ of courage, no imaginable circumstances could create courage in any of its forms, any more than a man or woman could create the sexual passion, without a particular organ therefor.

Demangeon would adopt other notions on the origin of courage and fear, if he would reflect, for a moment, upon the different conduct of the courageous and the cowardly, in perilous circumstances. The poltroon takes flight, abandons his enterprise, resigns himself to despair, submits, and dies like a poltroon, as he is. The courageous man resists, his spirit is roused, and the more imminent the danger, the more boldly and perseveringly does he contend with it; and if he must succumb at last, he avenges his defeat by the death of his enemies. Behold those young conspirators, whom they are leading to the scaffold;—some are fainting and bathed in tears, while others brave death, and throw themselves under the murderous axe, as if they were going to fight the enemies of their country. To go no further for examples, take some specimens from the adventures of my youth.

My fellow-pupil Scheidler, the two daughters of the overseer of the Garden of Plants at Vienna, and myself, were one day botanizing. On our return, we were obliged to traverse by moon-light a forest, where, the evening before, a miller's boy had been murdered. Suddenly four men were seen approaching us, each with a sabre in his hand. "My God, my God," cried the young

ladies, "we are lost." I instantly picked up some stones, with which I filled my pockets, and keeping two in my hands, I enjoined upon Scheidler to throw sand in their eyes, in case I engaged with them. Having placed the ladies behind us, I waited with firmness for my four assassins to come up; but they being apparently as much frightened as ourselves, took the other side of the road, without saying a word, and pursued their way. Such a denouement made me laugh most heartily. Proud of my bravery, I offered my arm to the trembling ladies; but where was Scheidler all this time? At the approach of the men, he sunk down on the ground, and crept into the bushes. Certainly, I too was afraid, both for myself and the young ladies; but which of us was courageous, and which a coward? On the same occasion, he returned a minute afterwards accompanied with five students. When we had gone nearly a league from Vienna, we heard, at a distance, a great uproar and cries of distress. What was to be done? Should we continue our route, or return to the nearest village? Four of our companions returned, myself and another determined to pursue our course to Vienna. Having reached a piece of woods, we observed people running this way and that, in all directions. Being well provided with stones and sand, we marched on steadily and slowly, while the people ran by, as if frightened, to the right and left, and suffered us to pass unmolested. A quarter of a league further on, the people of a tile-kiln came out to see who we were. I had often got a bowl of milk of one of the women, and when they recognized us, we were congratulated on arriving safe and sound, since, a butcher had been murdered just before, near the kiln. Here again, we both felt fear — a fear of calculation — but we were not poltroons, like those who had deserted us, since their fear arose from want of courage.

"Fear or terror," continues Demangeon, "causes a whole army to shake and tremble before the battle, and the fall of a chief damps courage in the midst of its

efforts; and this, according to Gall, must result from the exhaustion or absence of the organ on which he makes courage depend. To save his organology, we must admit effects without causes; for, to attribute a sinister presentiment which is deduced from a precipitate judgment or from reflection, to a negative cause, is to attribute it to a nullity of cause, or, in fact, to no cause at all. It must be admitted, that a prejudice like this, so strong as to resist all evidence, in order that a favorite system may suffer no disturbance, is not just the thing in a physician; and Gall would do well to consider, lest, in charging his opponents with bad faith, this reproach may attach to himself; for, no one has shown more obstinate adherence to his errors, than himself."

That Demangeon, in writing this passage, felt a little turning of the stomach, appears from a foot note appended to the words, *it is not just the thing in a physician.* I will pardon him therefore, for confounding *obstinate adherence to his errors*, with *bad faith.* So long as the facts that support my propositions are attacked by nothing but tangled reasoning, I shall obstinately maintain them. But whenever I find myself opposed to nature, I shall abandon them at once, notwithstanding the customary charge that is always ready, of versatility of opinion. It is bad faith to put into the mouth of an opponent expressions he never used, and torture his words in such a manner, as to make his meaning absurd. For instance, when it is said that, according to Gall, fear or panic results from fatigue or absence of the organ on which he makes courage depend, they are as guilty of bad faith, as if they had said, that, according to Gall, the impotence that suddenly succeeds the most ardent desire, in consequence of the discovery of some disgusting circumstances, results from the fatigue or absence of the organ in which he makes the sexual passion depend. It would also be bad faith, if, after all that Gall has said of the influence of circumstances upon the activity or inactivity of the organ of courage, they should still charge him with the position, that the danger of the

child could not arouse and put in action the mother's organ of courage; that confidence, hope, honor, excitement, denial of every thing for the sake of the favored object, such as the object of a passionate love, a child, a husband, a dear parent, a benefactor, or one's self—objects that Demangeon alleges to be the principal elements of courage,—could not renew a courage, ready to yield.

"That Gall," continues Demangeon again, "may try no longer to sustain the opposite of the truths I establish, I mean to confirm them by proofs which he has furnished himself, without wishing or even suspecting it. He says, that *we begin and remove one obstacle after another in succession, but that we recoil, on the contrary, before an imposing mass of difficulties; that the most courageous feel fear, when in the presence of an enemy, or a danger superior to their strength; that the most resolute dog retreats before the tiger; and that then fear is a matter of calculation, the consequence of circumspection; he admits, that fear is sometimes negative, sometimes positive, but that cowardice is always passive, and a negative quality.* All this now is contradictory, for if fear may be a matter of calculation, it is impossible for courage not to be another calculation based upon a different judgment; and then it would be wrong to admit an organ for courage, or else one should be admitted for fear also. As he does not explain, how one kind of fear differs from another, it is to be believed that he is no stranger to positive fear,—to that which is a matter of calculation, and which causes one to retire before a difficulty. If negative fear is courage, as negative courage is fear, all we can say is, the proposition sounds very much like nonsense, and perhaps it is because Gall was aware of it himself, that he avoids explanation. In no case can we consider functions to be negative qualities, in his sense, by making them result from absence or inactivity of organs. To admit that fear is sometimes a matter of calculation, is to yield us considerable, since it cannot but be admitted,

also, that, with more favorable chances, courage would have been the result; or, in other words, it would be the effect of the combination of many faculties, which compare the means of attack and defence with obstacles and resistance, and thence deduce the chances of success, according to the degree of prudence or temerity. We are discouraged by fruitless attempts, and encouraged when undeceived respecting imaginary difficulties. We say of one, who undertakes more than he is able to perform, that his courage is greater than his strength, or his prudence; because the principal elements of courage are hope and confidence; otherwise, it would be nothing but folly and rashness,—two qualities which Gall derives from the too partial exercise of faculties. Courage, therefore, does not belong to a particular organ, and this conclusion is deduced from the acknowledgments of Gall himself."

All that I have said, in the passage quoted by Demangeon, is perfectly in accordance with nature and daily experience. I not only admit, but will maintain, that fear is sometimes negative, and sometimes positive; and that cowardice is always passive, and a negative quality. Where does Demangeon find the contradiction? True, fear and courage may be a matter of calculation, without there being a particular organ for fear. A danger beyond my whole strength, reduces my courage to a reasonable fear — to a fear of calculation. Throughout my long paragraph on negative qualities, and in that quoted by Demangeon, the difference between positive fear, or the fear of calculation, and passive fear, or cowardice, is clearly explained; so that I still have reason to charge Demangeon with bad faith, in saying that I do not explain how one kind of fear differs from another. When he says, that the principal elements of courage are hope and confidence, the remark is true only in the sense, that courage inspires hope and confidence, and that cowardice paralyzes the strength which would be more than sufficient to surmount the danger. Every day I see timid persons getting much further out

of the way of the carriage, than is at all necessary, or going back while in the act of crossing the street, when it would be much shorter to continue on. Why do these persons want confidence? Because they have no courage. Courage therefore belongs to a particular organ, and this conclusion is not based upon sophisms, but upon the visible and palpable difference between the crania of courageous men and animals, and those of cowardly men and animals.

"In the following passages," continues "Demangeon, he proves that cowardice is not negative, while endeavoring to prove the contrary. 'When we say, that a man or brute is timid, we do not necessarily mean, that, at this very moment, he is agitated with fright or anger. We mean by this expression, that he is a timid, cowardly man or brute, as the case may be; and that such are more easily made to fear, than the courageous. Armies composed of men renowned for courage, have been seized with a panic: has not the intrepid Roman also sacrificed to fear? If a man or brute is timid or courageous, only at certain moments and in an accidental manner, it is necessary that his fear should be awakened by particular circumstances, and, consequently, that there should be some faculty to put him in relation with these circumstances, and make him acquainted with them. This now supposes, and absolutely requires, real functions and positive organs; so that fear is not a negative quality, even in the cases where Gall has more particularly designated it as such. If it requires the activity of faculties that preside over self-preservation; if it ceases, and its manifestation becomes impossible without the existence of these faculties; then it must, of necessity, depend upon them. On the contrary, if it may be equally manifested with or without courage, as is admitted, it does not depend on them, either positively or negatively. Courage and fear are two opposite impulses, or principles of conduct; that is, they are based on different views or judgments, but one is as positive as the other. This passage, therefore, proves just the

contrary of what the author wished to prove. He cannot pretend, that well-developed courage would silence the faculties that preside over self-preservation; for he declares himself, that this active state of a single organ is all folly, and it would be an absurdity *in adjecto* to suppose courage to be blind, and to result from the exercise of a single faculty. Rage or phrenzy only can be considered in this light; for, rashness itself supposes the exercise of many faculties.'"

In my work I made use of the following expression; "When we say, that a man or brute feels fear, we do not necessarily mean, that at this very moment, he is agitated with fear, as people are affected with anger or fright." Instead of this, he has quoted me as saying, "*that at this very moment he is agitated with fright or anger.*" I would like to attribute this mutilation to the inadvertence of the printer; but, when Demangeon skips over forty-one lines, and places immediately after this passage, a sentence from an entirely different paragraph, in which it is my object to prove, that the most courageous men and animals do not, on that account, lose the power of measuring their own strength with that of their enemies; that armies composed of men renowned for their courage, have been seized with a panic, &c., is the printer here chargeable with bringing together two sentences of opposite meaning, with the express design of justifying the author in constantly confounding cowardice with that reasonable fear, resulting from other faculties, which could never give rise to fear without the existence of an organ; a certain affection of which should constitute this sentiment?

Suppose I should reply to Demangeon, that, when a man or brute walks, or reposes, or is fatigued, or paralyzed only at certain times and in an accidental manner, certain faculties must produce in him repose, fatigue, or paralysis, and that therefore, repose, fatigue and paralysis are not negative, but must depend on particular organs, just as much as the power of voluntary

motion, would he not be charmed with the correctness of this conclusion?

Finally, Demangeon, after exhausting our courage, concludes,—"that the existence of a special and unique organ of courage is inadmissible; that the instinct of self-preservation is provided for in the brain, and that even courage, fear, circumspection, prudence, love of offspring, the desire of renown or immortality, &c., are more or less submitted to the influence of this instinct, which, being all essential to the ends of nature, could not have been forgotten by the Creator of all things, as it has been by our two physiologists, who have left a great many waste places in the domain of thought."

On this last point, we are precisely of the opinion of Demangeon, and the more we speculate, the more vast and barren will these waste places become. As for the instinct of self-preservation, I am equally persuaded, that the Creator of all things has not forgotten it. Neither have I forgotten it. For a long while, I thought this idea extremely plausible, but, as I discovered fundamental qualities and faculties, I perceived that they were all destined to the great end of self-preservation. The existence and preservation of an animal are intimately connected, and the instincts, dispositions, talents, in one word, the qualities and faculties, are so many indispensable means of the preservation of his existence. For this reason, I have said that self-preservation supposes the instinct of self-defence. But preservation also supposes the social state, the instinct of a fixed abode, the instinct of being nourished on animals or vegetables, the instinct of cunning, the memory of facts, the instinct of emigration, the instinct of construction, &c. Demangeon himself, attributes to the conservative instinct, not only courage and fear, but also circumspection, prudence, love of offspring, the desire of renown or immortality. Reasoning in this way, all the functions of the brain and of the whole organism, might be reduced to a single function, a single end, a single instinct—the instinct of self-preservation; and in the midst of

our reasonings we should get, more than ever, lost in the abstractions and generalities of the metaphysicians,—an impassible barrier to all further research, the eternal tomb of all positive and special knowledge.

V. Carnivorous Instinct; Disposition to Murder.

History of the Discovery of this Instinct, and of its Organ.

By carefully comparing the skulls of animals, I found a characteristic difference between those of the frugivorous and those of the carnivorous species. Placing the skulls of the frugivora in a horizontal position on a table, and raising a perpendicular from the external opening of the ear, I found that there remained behind this perpendicular, only a small portion of the posterior lobes and the cerebellum; consequently, the external opening of the ear, and the petrous portion of the temporal bone, mark the limits of the cerebrum, in these species. Testing the skulls of the carnivorous species in the same manner, I saw that, in the most of them, the perpendicular strikes the middle of the whole encephalic mass, or, at least, leaves behind it a very large portion of the cerebral mass. Ordinarily, in the carnivora, the greatest prominence of the brain is exactly over the external opening of the ear.

I saw therefore that, in the carnivora, there are cerebral parts above and behind the ear, not possessed by the frugivora, and the same difference I found in birds as well as the mammifera. In all the birds of prey, this part of the brain swells out, while in all other species of birds, it seems to retreat, and the whole brain is situated in front of the external opening of the ear. For a long while I contented myself with communicating this observation to my hearers, without making the slightest practical application of it to organology. I showed them only how, by inspection of the skull, even when

the teeth were wanting, they might tell whether it belonged to a frugivorous or carnivorous animal.

The skull of a parricide was once sent me, which I put aside, without ever thinking that the skulls of murderers could be of use to me in my researches. Shortly after I received the skull of a highway robber, who, not satisfied with committing robbery, had murdered a number of persons. I placed these two skulls side by side, and examined them frequently. Every time I was thus engaged, I was struck with the fact, that, though very differently formed in other respects, there was, in each, a prominence strongly swelling out immediately over the external opening of the ear. The same prominence I found also in some other skulls in my collection. It appeared to me not merely accidental, that, in these two murderers, the same cerebral parts should be so much developed, and the same region of the skull so strongly prominent. I then began to make use of my discovery, on the different conformation of the brain and skull in the frugivorous and carnivorous animals, and for the first time understood the meaning of this difference. The brain of the latter, I said to myself, and that of the murderers, is developed in the same region. Is there any connection between this conformation, and the disposition to kill? At first, the idea was revolting, but, when the object is to observe, and to state the result of my observations I know no law but that of truth. Here too, then, let us endeavor to unveil the mysteries of nature: it is only when we have discovered the secret springs of our actions, that we can learn to guide the conduct of men.

Natural History of the Instinct of Murder in Animals.

Animals are divided into three principal classes; frugivorous, carnivorous, and omnivorous. Some, naturally frugivorous, such as the hare, horse, &c., may, in

case of necessity, feed upon flesh; and some carnivora, such as the dog, bear, cat, &c., may be nourished on vegetables; but this does not at all affect their real destination. It only proves that, because certain animals digest animal substances, they are not, on that account, solely, to be classed with the carnivora; and that others which digest vegetables, cannot be considered as belonging to the frugivora. They are accustomed sometimes to feed tame ferrets on milk, but they do not therefore renounce their original instinct, and are no less ready to suck the blood of a rabbit. With no more propriety can we call certain birds, the gallinaceæ for example, *insectivorous*, which commonly live on seeds, though they devour insects with avidity. I here confine myself exclusively to the carnivora, properly so called. Although they are all destined to devour other animals, there exist great differences among them relative to their murderous instinct. Many of them kill only such as are necessary for their subsistence; while others, like the weasel, tiger, &c., without impelled by hunger, kill and tear in pieces every living creature around them. The difference between dogs in this respect, proves to demonstration, that hunger and thirst for blood are not the sole motives that determine animals to slay one another.—All dogs are carnivorous; they prefer flesh to any other nourishment; still there are some in which we can hardly observe the carnivorous instinct, and which, surrounded by birds, mice, and hares, manifest no wish to destroy them.

Let it not be objected, that habit and education will account for all this. I know very well that we may accustom cats to live in peace with birds, mice, &c.; but I have had dogs, which, from their earliest youth, I tried to inspire with a taste for hunting these animals, but I never could succeed in giving them this instinct, because an inward antipathy opposed it. Other dogs, on the contrary, though fed on vegetable substances, and having even an antipathy to venison, have manifested an invincible passion for the chase, and an unbridled

rage for killing every kind of creature. With what a zest will they strangle cats, hares, foxes, &c.! We may remark, even among real hounds, a great difference in this respect. Some bring to their master, with the utmost precaution, the partridge, quail, fox, or hare, without doing it the slightest harm; while others always begin by finishing the work of the hunter, although frequently beaten to break them of this habit.

I have elsewhere spoken of one of my little dogs. He was reared by a very sensible lady, and it certainly was not his education that inspired him with the instinct for strangling animals. From the first hour he came into my house, he rushed upon every animal there, and strangled them, one after another. Did a bird leave its cage, he chased it till it fell on the ground exhausted with fatigue, when he killed it. A hundred times I beat him very severely, in the hope he would lose this passion, but in vain; it terminated in his becoming the hero of the place. Though smaller than a cat, he was the terror of these creatures; for the moment he perceived one, he laid down flat before it, and the instant the cat raised its paw, he leaped on its neck, nor let go his hold till it was dead. Several times, my friends and myself amused ourselves, with letting him run in a room where were some dozens of rats. The strongest spaniels often recoiled from their furious attack, while my little lap-dog was shaking with impatience in my arms, till I put him down, when he ran with the greatest sang froid from one to the other, and killed them by one grip in the neck. He never turned his head to look at one he had destroyed. Frequently, he would watch a rat for whole weeks, and would always succeed at last in entrapping and killing it. When he perceived a water-rat in the river, he sprang from the bridge, and never took to the shore till he had either taken, or lost sight of it. These examples prove that it is not hunger and thirst only, that impel animals to slay one another.

There are authors, who call such facts old-wives' fables, and think it ridiculous for me to support organ-

ology, by citing the qualities of a lap-dog; but with what but facts can we support a doctrine? and what matters it whether they relate to a shrew-mouse or to an elephant?

The proof of the independence of this disposition is strengthened by the fact, that it reached so high a degree of activity in a creature, whose education and want of physical strength would induce us to presume a disposition precisely contrary.

External Appearance of the Organ of the Carnivorous Instinct and the seat of the organ in animals.

Naturalists are in the habit of drawing the characters that distinguish the carnivorous animals from one another, from the teeth, claws, stomach and intestines. If they may be believed, the conformation of these parts sufficiently explains the instinct that impels these animals to kill, and consequently they disdain to seek in the brain for an organ of the disposition to murder. These instruments are all in harmony with the higher internal power, but they cannot give rise to it. We may give to the sheep, the teeth and claws of the tiger, but unless we change the disposition of its brain, it will never feel the internal impulse to attack and destroy.

The tiger, in a meadow covered with grass, would perish with famine, sooner than he would think of eating it. The idiot and the maniac, with the best formed hands, would never learn to paint or build, while the necessary impulse from a higher power were withheld. When we stop confounding the executive instruments of an instinct or disposition, with the internal legislative power, we shall be forced to admit a particular organ for each particular instinct.

Before passing to the proofs, I wish to draw the attention of naturalists to a phenomenon, which they certainly cannot explain by means of the teeth, claws, stomach, and intestines of the carnivora. Each species has its

peculiar manner of killing its prey; while some strangle their victim and tear open his throat, others seize him by the nape of the neck, &c. Who, now, has taught these animals to follow these methods of killing? How can the teeth, claws, stomach, and intestines determine the kind of death, which is always suitable to the nature of the victim? Our ideas on this subject will become much more precise, from the moment we admit that the external world, so far as man and other animals act upon it, is in harmony with all our senses, both internal and external; and that the relations of the external world are revealed to all alike, by means of the cerebral organs. In this way, the actions of animals become in unison with one another, and suited to the nature of external objects; thus the falcon and marten act as though they had some knowledge of anatomy and physiology.

I may here remark, that, in all carnivorous animals, the organ is not situated exactly over the external opening of the ear. In some species, the stork, cormorant, heron, gull, sea-swallow, king-fisher, for example, the external opening of the ear is considerably drawn back, and the organ of the carnivorous instinct is placed immediately behind the orbits, forming a large prominence on each side. In comparing the crania of carnivorous birds with the skulls of those that can live indifferently either on animals or vegetables, this prominence is found to be less conspicuous in the latter, such as the duck and the thrushes; and it becomes less and less prominent, in proportion as the birds exhibit a more distinct preference for vegetables, such as the swan, the goose, the gros-beak, &c. It is particularly prominent in those that live exclusively on animal food, such as the spoon-bill, wren, falcon, and stork.

If we compare the crania of the mammifera, such as the bull, horse, ass, ram, buck, elephant, camel, hare, rabbit, guinea-pig, kangaroo, beaver, marmot, with those of the lion, tiger, hyena, lynx, wolf, bear, seal, rat, mole, ermine, weasel, pole-cat, ferret, marten, shrew-mouse, bat, &c. we shall invariably find the difference I have

indicated. This difference is more marked in different species and individuals, the more the carnivorous instinct predominates. The cerebral part above indicated is sensibly larger in the eagle and falcon, than in the crow and magpie; larger in the tomtit, particularly the largest species,* than in most birds that live on insects; larger in the wren† than in the mocking-bird; larger in the wolf than in the dog; larger in the lion than in the tiger.

At Vienna we always had two species of bears, the brown and the black. The former could be made to fight with every kind of animal; while we had to be satisfied with setting the dogs on the other, which lives almost entirely on roots and fruits. The same species may be seen in the royal garden in Paris. The head of the carnivorous brown bear is much broader and more swelled out over the ears than the other's, which is narrower and shorter.‡

I possess quite a collection of the heads of cats and dogs, in forming which, I always attended to the degree of the murderous instinct that each individual manifested. All good mousers, especially those that always give chase to rats and birds, have this region of the brain and cranium much more developed than those that live in kitchens and parlors. It is necessary to compare a great number of crania of animals of the same species, to be convinced, that the diversity of their form explains the difference of their characters. The intuitive knowledge thus obtained, also produces the most complete conviction of the omnipotence of innate dispositions.

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* It is well known that tomtits, especially the large species, devour one another.

† When we put a wren into an aviary with other birds, it drags the young of the others from their nests, and kills them.

‡ In Poland, they call the brown bear, *pferdeboer*, (horse bear,) because he attacks horses in preference to other animals. The black bear, in Norway, is called *gruss boer*, (grass-eating bear,) because he lives on grass and the leaves of trees: at the approach of winter they get fat by eating nuts.

All dogs, also, which are fond of pursuing and killing mice, rats, birds, hares, hens, foxes, have this region of the brain and skull much more prominent, than those that have no taste, or rather have a distaste, for such things. Let all who are not yet perfectly convinced of the truth of my positions, make a collection of dogs' heads, always carefully informing themselves of the disposition of each individual. They will scarcely have collected a dozen, when they will be so far converted, as to become the most zealous defenders of organology. This diversity of forms is not confined to those little variations, that may leave room to doubt; they are, on the contrary, very striking.

The comparison of the black rat,* (*mus rattus. Lin.*) the brown, or Norway rat, (*surmulot, Buff. mus decumanus, Pallas.*) the hedgehog, the hamster, (*mus cricetus, Lin.*) the ermine, and the weasel, (*mustela vulgaris,*) with one another, is very instructive. The black rat and the hedgehog do not live exclusively on vegetable food, but devour small animals also. The brown rat is far more carnivorous and sanguinary. The hamster devours all small animals it meets with, even its own female, which also devours its own young. A dog must be perfectly trained, to attack successfully the brown rat and the hamster, while the ermine and weasel always come off best in the encounter. The head of the brown rat in the region in question, is much broader and more prominent than the black rat's; the hamster's is more so than the brown rat's; and the ermine and weasel, which are exclusively carnivorous,

* I do not here mean the same to which the name *mus rattus* is ordinarily given by authors, who confound the black rat with the one found in granaries. The former never climbs trees, nor frequents granaries, and is smaller than the brown rat. Its pelage is of the same color as the brown rat's, and its tail is scaly, like that of the latter, and as long in proportion to the body. The granary rat, in German *Speicherratze, blaue ratze*, has longer hair, which is of an ash-gray color; the tail is equally smooth, but half an inch or an inch longer than that of the two other species.

have the organ of the carnivorous instinct still more developed. Thus the cerebral organization explains why the brown rat and the hamster are eminently sanguinary, though naturalists, guided by the teeth, have classed them with the gnawers, (*rodentia,*) and, consequently, with the frugivora.

Thus then the whole animal kingdom concurs to prove, that the carnivorous instinct does not depend on the teeth, nor on the claws, nor intestines, but results from a particular cerebral organ, and that this organ is situated in the region of the brain which I have pointed out; that is, in the most external convolutions of the middle lobes in the mammifera; and which is manifested outwardly by a large round prominence, placed, in most animals, directly above the ears, and in others, a little before them.

Objection.

"If Gall and Spurzheim," says Demangeon, "would be consistent, after admitting a carnivorous instinct, why should they not also admit a frugivorous, ichthyophagous, and galacthophagous instinct, because the only result of the absence of the organ, is to prevent them from eating animal food, without, at the same time, giving them an elective instinct for vegetables, fish, milk, insects, &c.? If nature had not been more liberal than they, the non-carnivorous animals would have perished with hunger. There must be some organ yet, at the bottom of the bag, for putting the herbivorous and other animals in relation with their food, or else there is no reason for admitting one in favor of the carnivora. The conclusion appears to me strictly correct. Besides, the carnivorous instinct, to which our authors refer murder and cruelty, should also be an attribute of the non-carnivorous animals, which implies a contradiction. Or else they must explain, by the instinct of quarreling, or some other not mentioned by them, why the elephant

and rhinoceros engage in deadly combats; why the stag sometimes kills its female and young; why the working-bee kills the drone; and why man himself is far more cruel than brutes, without being actuated even by the want of nourishment, or by the instinct of quarreling or fighting; as appears in the gratuitous cruelty of a cowardly, pusillanimous tyrant; the cruelty towards defenceless animals and children, as well as that manifested in the shows of gladiators, bull-fights, &c. If all this can be explained by the organ of quarreling and fighting, then the instinct of murder is supererogatory, and an organological superfetation."

Reply.

If Demangeon had attended to the list of animals I mentioned, and which I have also drawn, he would have found some that eat fish; others, that eat milk; and others, insects; and he would have concluded, that the organ of the carnivorous instinct, accordingly as it is differently modified, assigns to each species its appropriate nourishment. In the spirit of Demangeon, we ought to admit as many organs of singing and construction, as there are different kinds of songs and of bird-nests; as many different instruments of locomotion, as there are different kinds of walking and flying. Since I find the same organization essentially in all animals, whether feeding on fish, insects, or oysters, &c., the fact arrests my attention, and I explain the variations of the result by the modifications of the organ. I am ready to admit a frugivorous organ, as soon as the cerebral parts belonging to it can be indicated; or whenever the instinct for animal food can be demonstrated to be nothing more than a modification or increase of the general alimentive instinct, obtained by means of a cerebral part, added by nature to that which alone would produce the frugivorous instinct.

In the rest of the passage quoted, Demangeon con-

founds the result of the instinct of quarreling with that which requires animal nourishment. As for the instinct of bees for killing the drones, I willingly resign to Demangeon the task of explaining this phenomenon, which, although still problematical, can never destroy a general and invariable truth.

Natural History of the Carnivorous Instinct in Man.

The first question presented to our notice is, whether man is naturally carnivorous, or is destined by nature to be exclusively frugivorous, using animal food, only in consequence of degenerating from his primitive destination.

Man is omnivorous. Flesh nourishes him full as well as vegetables. In the structure of his teeth, jaws, stomach, and intestines, he holds a medium between the frugivora and carnivora; relishing all animals, from the oyster to the pheasant, and all vegetables from the potato to the pine-apple. If the Creator had designed him to be nourished by vegetables only, nothing certainly could have turned him from his destiny. If, in certain climates, he is more exclusively carnivorous or frugivorous, it depends on the influence exerted upon him by surrounding objects and circumstances,—one kind of climate favoring the development of one organ, and repressing that of another, and vice versâ. Since then man was designed to feed on flesh, it is necessary, that, like the other carnivora, he should be induced, by an internal impulse, to kill other animals, and the history of all times shows that he is really endowed with this quality. It only remains for me, therefore, to show how differently this instinct is manifested in different individuals, and the part it sometimes bears in insanity and idiocy, in order to prove, that, in man, and other animals, it is an independent and peculiar function, and must consequently result from a particular organ.

In the fifth section of the first volume, I have describ-

ed the different degrees of the manifestation of this disposition. To save the reader the trouble of recurring to that volume, and to present the whole subject at once, I will repeat the passages relative to the carnivorous instinct, or disposition, to murder.

There is in man, an inclination, which varies in degree, from simple indifference at seeing animals suffer, and from simple pleasure at witnessing the destruction of life, to the most imperious desire of killing. Our sensibility revolts at this doctrine, but it is, nevertheless, only too true. Whoever would judge justly of the phenomena of nature, must have the courage to acknowledge things as they are, and, in general, not to make man better than he is.*

We observe that, among children as among adults, among coarse people as well as those who have received education, some are sensitive, and others indifferent to the sufferings of their fellows. Some even find pleasure in tormenting animals, in seeing them tortured, and in killing them, without our being able to charge it either to habit, or to a defect of education. I could cite several instances, in which this inclination, when very energetic, has decided individuals in their choice of employment. A student used to shock his companions by the particular pleasure he took in tormenting insects, birds, and other animals. It was to satisfy this propensity, as he himself said, that he made himself a surgeon. An apothecary's boy experienced such a violent propensity to kill, that he took up the trade of a hangman. The son of a shopkeeper, whose mind took the same turn, embraced that of a butcher. A rich Dutchman used to pay the butchers, who made large contracts for supplying vessels with beef, to let him kill the cattle.

We may also judge of the existence of this propensity and of its diversity, by the impression produced on spectators by the punishment to which criminals are subject-

* Vol. 1. p. 259.

ed. Some cannot support the spectacle; others seek it as an amusement. The Chevalier Selwyn made particular exertions to be placed near the criminal who was undergoing punishment. They relate an anecdote of La Condamine, that, one day, making efforts to penetrate the crowd assembled at the place of execution, and being repulsed by the soldiers, the executioner exclaimed, "Let the gentleman pass, he is an amateur." M. Bruggmans, professor at Leyden, mentioned to us a Dutch clergyman, who had so decided a desire for killing, and for witnessing death, that he took the place of almoner of a regiment, solely to have an opportunity of seeing a great number of men destroyed. This same individual raised at his house, the females of various domestic animals, and when they brought forth young, his favorite occupation was to cut their throats. He used to take charge of killing all the animals that were to be cooked. He corresponded with the executioners throughout the country, and would travel several miles on foot, to be present at executions; so that the executioners always secured to him the distinction of a place near them. On the field of battle we find striking examples of the different degree in which this disposition exists. One soldier, at the view of the blood which he causes to flow, feels the intoxication of carnage; another, moved by pity, inflicts feeble blows, or at least spares the conquered; turns away at the sight of a child, of a woman, and of an old man, and checks himself after a victory.

The man enslaved by the cruel propensity of which I here speak, still preserves the faculty of vanquishing it, or of giving it a direction which is not injurious. But the power of subduing a vicious propensity, is weakened in such an individual, in proportion as he has received less education, or the organs of the qualities of a superior order are less developed. If it happens that this propensity is carried to the highest degree, the man experiences but little opposition between his pernicious propensities and his external duties; and though even in this case

he is not deprived of moral liberty, or the faculty of being determined by motives, he still finds pleasure in homicide. I shall include in this case all the robbers, who, not content with plunder, have shown the sanguinary inclination to torment and kill without necessity. John Rosbeck was not satisfied, like his companions, with ill-treating his victims to make them confess the place where their treasures were concealed; he invented and exercised the most atrocious cruelties, for the sole pleasure of seeing the sufferings and the blood of children, women, and old men. His first imprisonment continued nineteen months; he was shut up in a subterranean dungeon, so narrow that he could hardly breathe. His feet were loaded with chains; he was up to the ankles in dirty water; and when he was taken from this sink, it was to undergo cruel torture. Still he would confess nothing; he was set at liberty, and the first use he made of his freedom, was to commit a robbery in open day. He soon committed new murders, and was finally put to death. At the beginning of the last century, several murders were committed in Holland, on the frontiers of the country of Cleves. The author of these crimes was a long time unknown. Finally, an old minstrel, who used to go to play the violin at all the weddings in the neighborhood, was suspected from some conversation among his children. Carried before the magistrate, he confessed thirty-four distinct murders, and asserted that he had committed them without malice, and without any intention to rob, solely because he found in them extraordinary pleasure. This fact was communicated to us by M. Serrurier, magistrate at Amsterdam.

The well-known Sabatino, condemned at Palermo, for various crimes, at the moment he ascended the scaffold, confessed that he had killed a man with a musket shot two years before. When asked what could have induced him to commit such an outrage, he coolly replied, that he had fired his musket on the man, to satisfy

himself that the powder was good! Journal des Maires, Saturday, Sep. 19, 1818.

Louis XV., says M. Lacratelle,* had a well-founded aversion to the brother of the duke de Bourbon Condé, the Count de Charolais, a prince who would have revived all the crimes of Nero, if, to the misfortune of mankind, he had been permitted to occupy a throne. Even in the sports of his childhood, he manifested an instinct of cruelty which might make one shudder. He amused himself in torturing animals: his violence to his servants was absolutely ferocious. They pretend that he tried to mingle cruelty even with his debaucheries, and that he practised divers barbarities on the very courtezans who were brought to him. The popular tradition, confirmed by several records, accuses him of several homicides. He committed murder, as is said, without interest, resentment, or anger. He used to fire at bricklayers, in order to enjoy the barbarous pleasure of seeing them fall from the top of the houses, on which they worked.

These last facts, fortunately very rare, show us that this detestable propensity is sometimes altogether independent of education, of examples of seduction or habit, and that it has its source solely in a bad organization. In fact, there are sometimes committed crimes so barbarous, with circumstances so revolting and disgusting, that it would be difficult to explain them in any other manner. Prochaska† relates that a woman of Milan used to lure children to her house by flatteries, kill them, salt their flesh, and devour them daily. He also cites the example of a man, who, in the indulgence of this atrocious propensity, killed a traveller and a young girl, to devour them. I have already mentioned the daughter of a cannibal, who, though educated at a distance from him, partook, from an early age, of this savage passion.

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* Historie de France, tom. ii. p. 59. † Opera Minora, tom. II. p. 98.

We cannot deny, then, that certain individuals have propensities to crimes, and even to those of the most atrocious character. Helvetius himself, the great antagonist of the innateness of the qualities of the mind and soul, is obliged to allow "that there are men so unfortunately constituted, as never to be happy, but in doing deeds which will send them to the gallows." Cardinal Polignac,* also speaks of men "born vicious, for whom crime has actual charms, and who are borne along by a furious passion, which obstacles only irritate."†

Professor Bruggmans, of Leyden, showed the skull of a leader of Dutch robbers, who had precipitated several persons into canals, for the sole gratification of seeing them struggle with death. "What can they do with me," he said on his trial; "am I not an honest man?" Schinderhannes and his accomplice took the greatest pleasure in telling the story of their crimes, and their eyes would sparkle during the recital. Every circumstance calculated to heighten the effect, was dwelt upon with the most intense delight. There have been some, who, at the very moment of their execution, when calling up to their recollection the pleasures in which they had reveled during life, have boasted that none have equaled those produced by the exercise of cruelty.

If any of my readers deem this portrait of man too deeply shaded, let them retrace the whole history of ancient and modern nations. Is there a single spot on the globe, that has not been reddened with human blood? Let them read the history of God's chosen people; the history of the Romans; the discovery of America; — let them follow the Spaniards to Cuba, to Mexico and Peru; — let them open the history of Inquisitions, and of the religious wars; — let them call to mind the Sicilian Vespers, St. Bartholemew's day, and the French revolution. Every where we tread on bat-

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* De l' Esprit, p. 578.

† Anti Lucrece, trad. par. M. de Bougainville, Louis, 1754, p. 184.

tle-fields; every where we encounter funeral piles, wheels, and a thousand instruments of torture invented to abridge man's life. What an immense diversity of machines of destruction and death fill our arsenals! In fine, is not military glory ever placed above all others?

If you would see, in all his nakedness, the man whose bosom harbors the most atrocious passions, observe him when the very multitude of his crimes renders every sort of disguise superfluous. Look at him who hires the midnight assassin, or at the assassin himself, who barters his stabs for gold, and makes a business of destroying his neighbor's life; at the poisoner, and at those robber chiefs, surrounded by the most ferocious wretches, whom they lead to rapine and murder. Especially observe those miscreants, born with the thirst of blood, when seated on the throne, where no law can reach them, and no considerations whatever check their unbridled fury. Behold Caligula, cutting out the tongues of innocent people, throwing them to wild beasts to be devoured, forcing parents to assist in the execution of their children, giving the unfortunate wretches their choice of the wheel or the rack, and amusing himself with their agony, summing up his rage in one wish, that the Romans had but one neck, that he might decapitate them at a single stroke, feeding wild-beasts, kept for the shows, on living men, and whose strongest wishes were for famine, pestilence, conflagration, earthquake, and the loss of an army. Look at Nero, poisoning Brittanicus, murdering his mother, and the husband of the woman he wished to violate; passing the night in the streets, with a rabble of unbridled youths, fighting, robbing and killing; sacrificing to his fury his own wife Octavia, Burrhus, Seneca, Lucan, Petronius, and his mistress Poppæa; setting fire to the four corners of Rome, and then ascending an elevated tower, to enjoy the terrible sight at his ease, with the wish that he could see the whole world on fire; covering the Christians with wax and other combustibles, and burning them by night, that they might serve for lamps; laying a plan to murder all the gover-

nors of provinces, all the generals of the army, all the exiles and all the Gauls in Rome; to poison the whole senate at their meal, to burn Rome a second time, and, at the same moment, turn the wild beasts reserved for the shows, into the streets, to prevent the people from extinguishing the fire. Behold a Louis XI., the ungrateful, unnatural and rebellious son, whose father died from very fear of being killed by his own son; who, formed by nature for a cruel and implacable tyrant, wished to reign only by terror; and looked on France as a meadow, that he might mow every year, and as close as he pleased. Few tyrants have slain more citizens by the hands of the executioner, and the most refined methods of destruction. The chronicles of the time reckon four thousand subjects, executed publicly or privately, in his reign. Dungeons, iron cages, and chains, that loaded the victims of his barbarity, are the monuments he left behind him. While criminals were put to the torture, he stationed himself behind a lattice, &c. &c. Nothing but gibbets were to be seen around his palace, and he personally assisted in the execution of his vengeance. When the Duke of Nemours was executed for high treason, he caused the children of this unfortunate prince to be placed upon the scaffold, that they might be sprinkled with the blood of their father. They descended covered with his blood, and in this state were conducted to Rochelle, and put into scuttle-shaped dungeons, where the cramped condition of their bodies operated as a perpetual torture. Forever covered with relics and images, and wearing a leaden figure of Our Lady in his bonnet, he asked pardon for his murders, and then proceeded to commit new ones. Look at Sylla, Tiberius, Domitian, Marcus Caius, Aurelian, Caracalla, Septimius Severus, Henry VIII., Catherine de Medicis.

It would take years to enumerate the scenes of horror, which the earth has exhibited; and those, who would know the hearts of ordinary men, must transport themselves into times when there existed no restraint on the

passions. Who is ignorant of the horrible scenes that have stigmatized the French revolution? Who has not heard the names of Rossignol, of Pethion, of Marat, of Chalier, of Robespierre, of Danton, of Carrier, of Henriot, of Collot d' Herbois, of Fouquier, Tinville, &c.? Think of the murders, that are every day committed with all the refinements of cruelty, in spite of education, morality, religion, and the laws. When, too, will the barbarous and infamous custom of duelling cease to be authorized? Who, now, will dare to maintain, that there is not in man an innate propensity, which leads him to the destruction of his own species? Where is the creature, that evinces more ferocity towards all other animals, not excepting his fellows, than man?*

Disposition to Murder, joined with Mental Imbecility.

To show, further, that this disposition may act, independently of other qualities or faculties, I present the following examples, where it was manifested, notwithstanding an extreme feebleness of all the other faculties and qualities. An idiot, after killing his brother's two children, went and told him of it, as something to laugh about. Another, who had murdered his brother, was desirous of burning the body with parade and ceremony. A third, after killing a hog, thought he could murder a man, and he actually did. A fourth, without the slightest motive, killed a child.† The dreadful cases of this kind, that so frequently happen, shows the necessity of imposing the strictest surveillance on idiots that have manifested mischievous propensities.

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* In vol. 1. sect. iv. I have shown, that the existence of a propensity does not necessarily suppose its action, nor exclude moral liberty.

† Vol. 1. p. 277.

Disposition to Murder in Insanity.

At Berlin, M. Mayer, surgeon of a regiment, showed us, in presence of M. M. Heim, Finney, Hufeland, Goericke, and others, a soldier in whom sorrow for the loss of a wife whom he tenderly loved, had greatly enfeebled the physical powers, and induced excessive irritability. At length, he had every month an attack of violent convulsions. He was sensible of their approach, and as he felt, by degrees, a violent propensity to kill, in proportion as the paroxysm was on the point of commencing, he was earnest in his entreaties to be loaded with chains. At the end of some days, the paroxysm and the fatal propensity diminished, and he himself fixed the period at which they might set him at liberty without danger. At Haina, we saw a man, who, at certain periods, felt an irresistible desire to injure others. He knew this unhappy propensity, and had himself kept in chains till he perceived that it was safe to liberate him. An individual, of melancholic temperament, was present at the execution of a criminal. The sight caused him such violent emotion, that he at once felt himself seized with an irresistible desire to kill, while at the same time he entertained the utmost horror at the commission of the crime. He depicted his deplorable state, weeping bitterly, and in extreme perplexity. He beat his head, wrung his hands, remonstrated with himself, begged his friends to save themselves, and thanked them for the resistance they made to him. M. Pinel has also observed, that in furious madmen there is often no disorder of the mental faculties. Hence he likewise declares himself against the definition which Locke has given of mental alienation. He speaks of an individual, whose mania was periodical, and whose paroxysms were regularly renewed after an interval of several months. "Their attack was announced," says he, "by the sense of a burning heat in the interior of the abdomen, then in the

chest, and finally in the face; then redness of the cheeks, an inflamed aspect, a strong distension of the veins and arteries of the head; then fury, which led him, with irresistible propensity, to seize some weapon, and kill the first person who came in his way; while, as he said, he constantly experienced an internal contest between the ferocious impulse of his destructive instinct and the deep horror inspired by the fear of crime.—There was no evidence of wildness in the memory, imagination, or judgment. He avowed to me, during his close confinement, that his propensity to commit murder was absolutely forced and involuntary; that his wife, notwithstanding his affection for her, had been on the point of becoming its victim, and that he had only had time to warn her to take to flight. All his lucid intervals brought back the same melancholy reflections, the same expression of remorse; and he had conceived such a disgust for life, that he had several times sought, by a final act, to terminate its cause. "What reason," said he, "should I have to murder the superintendent of the hospital, who treats us with so much humanity? Yet, in my moments of fury, I think only of rushing on him, as well as the rest, and burying my dagger in his bosom. It is this unhappy and irresistible propensity which reduces me to despair, and which has made me attempt the destruction of my own life."* Another madman experienced paroxysms of rage, which were periodically renewed for six months of the year. The patient himself felt the decline of the symptoms toward the end of the paroxysms, and the precise period when they could without danger restore him his liberty in the interior of the hospital. He himself requested to have his deliverance deferred, if he felt that he could not yet govern the blind impulse which led him to acts of the greatest violence. He confessed, in his calm intervals, that, while the paroxysm continued, it was impossible for him to

* L. c. p. 102.

repress his fury; that then, if any one appeared before him, he imagined that he saw the blood flowing from that man's veins, and experienced an irresistible desire to taste it, and to tear his limbs with his teeth, to render the suction easier.*

The truth of the following very extraordinary case of madness, is warranted by the Mercury of Swabia. "A carrier, belonging to the bailiwick of Frendenstadt, who had quitted his family in perfect health, was suddenly attacked by a paroxysm of furious madness, on the route between Aalen and Gemunde. His first insane act was to shut himself up in the stable with his three horses, to which he gave no fodder; and when departing he harnessed only two of his horses, accompanying the carriage, mounted on the other. At Moglengen he abused a woman; at Unterbobingen, he alighted, and walked before his horses with a hatchet in his hand. On the route between this last place and Hussenhofen, the first person he met with, was a woman whom he struck several times with his hatchet, and, left her lying in a ditch by the road-side. Next, he encountered a lad thirteen years old, whose head he split open; and, shortly after, he split the skull of a man, thirty years old, and scattered his brains in the road, and after hacking the body, he left his hatchet and carriage, and thus unarmed, proceeded towards Hussenhofen. He met two Jews on the road, whom he attacked, but who, after a short struggle, escaped him. Near Hussenhofen, he assaulted a peasant, who screamed till several persons came to his aid, who secured the maniac, and carried him to Gemunde. They afterwards led him to the bodies of those he had slain, when he observed, 'It is not I, but my bad spirit, (*mauvais esprit,*) that has committed these murders.'"†

For the following narrative, I am indebted to the po-

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* L. c. p. 283.

† *Aristarque Francois* of Thursday, 13 April, 1820.

liteness of Dr. Zimmermann, of Krumback. "A peasant, born in Krumback, Swabia, of parents who never enjoyed very good health, twenty-seven years old, and a bachelor, had been subject from his ninth year, to frequent epileptic fits. Two years ago, his complaint changed its character, without any assignable cause, and ever since, this man, instead of having the epileptic fits, has been attacked with an irresistible inclination to commit murder. He felt the approach of the fit many hours, and sometimes a whole day, before its invasion, and at its first coming on, he begged to be secured and chained, that he might not commit some dreadful crime. 'When the fit comes on,' says he, 'I feel under a necessity to kill, even if it were merely a child.' His parents, whom he tenderly loved, would be the first victims of his murderous propensity. 'My mother,' he would cry with frightful voice, 'save yourself, or I must kill you.' Before the fit, he complains of being exceedingly sleepy, without being able to sleep; he feels depressed, and experiences slight twitchings of the limbs. During the fit, he preserves his consciousness, and knows perfectly well that, in committing murder, he is guilty of an atrocious crime. When he is disabled from doing injury, he makes the most frightful contortions and grimaces, singing or talking in rhyme. The fit lasts from one to two days. When it is over, he cries out, 'Now, unbind me. Alas! I have cruelly suffered, but I rejoice that I have killed nobody.'"

A pregnant woman was seized with an irresistible inclination to kill her husband and eat him. She did so, and even salted the body, that she might feed upon it for many months.

M. Fodéré, also, quotes examples of the great activity of the disposition to murder in insanity, and, among others, of a young man, twenty-five years old, who had often raised his parricidal hands against his respectable father, and who, on this account, was put into an insane hospital. He was always neat in his person, and appeared quite intelligent, "which induced me," says Fodéré, "to try

to excite in him some feelings of remorse, but he would never admit the enormity of his crime, and he would frequently look at me, as if measuring the chances of a successful attack; his manners, all the time, however, being extremely polite."

Never has this propensity a more atrocious character, than when accompanied by visions. Pinel cites the case of a monk, alienated by devotion, who thought he had one night seen the Virgin Mary surrounded by a choir of angels and happy spirits, and received an express order to kill a certain person, whom he considered as an infidel; he would have executed this commission, had not his actions and manner betrayed him. The same author speaks of a credulous vine-dresser, who was so violently shaken by the sermon of a missionary, that he thought himself and his family damned to everlasting pains, if he did not save them by the baptism of blood, or martyrdom. He therefore first endeavored to murder his wife, who escaped with difficulty; he then killed two of his children, to procure them eternal life; and, when confined to prison before trial, he cut the throat of a criminal in the same room with him; still with the intention of doing some expiatory act. His insanity being proved, he was ordered to be shut up in the Bicêtre for life. Long solitary confinement exalted his imagination, and because he had not been executed, he fancied himself the Almighty; or, according to his own expression, the fourth person of the Trinity, sent to save the world by the baptism of blood. Having been confined for ten years, he became tranquil, and was permitted to converse with the other convalescents in the court of the hospital. He passed four years in this way, and his health seemed restored; but he was again suddenly seized with his former superstitious and sanguinary ideas. The day before Christmas, he conceived the project of offering up an expiatory sacrifice, by killing all who might fall under his hands; he consequently got possession of a shoemaker's knife, with which he gave the keeper a thrust from be-

hind, which fortunately slipped over the ribs; he then cut the throats of two other lunatics, and would have continued his homicides, had he not been overpowered and prevented.

It is not improbable that some such cause had a share in the assassination of Henry IV. Ravaillac belonged to the order of the FEULLANS, but his notions, *visions*, and extravagances drove him from the cloister. Indicted but not convicted of murder, he escaped punishment. Some fanatical preachers were then teaching, that it was permitted to kill those who endangered the Catholic religion. Ravaillac, whose character was naturally of a sombre, bilious cast, eagerly embraced these abominable principles, and resolved to assassinate Henry IV., whom his heated imagination represented as a protector of heresy, and about to make war with the Pope. He left Angouleme six months before the crime, with the intention, he said, of speaking with the king and not killing him, unless he failed of converting him. He presented himself at the Louvre several times, when the king was to pass out, was always repulsed, and finally went back. For some time he was less afflicted by the visions that disturbed him, but near Paques, he was tempted more strongly than ever to execute his design. He came to Paris, stole from a shop a knife, that appeared suitable for his execrable project, and again went back. When near Etampes, he broke off the point of his knife between two stones, in a fit of repentance, and almost immediately re-sharpened it, returned to Paris, and followed the king for two days; finally, his purpose constantly gaining strength, he accomplished it, 14th May, 1610.

What, in such cases, is the cause of temptation? It is a state of disease and extreme irritation, or, at least, an excessive and fatal activity, of the organ of murder. Examples of this kind are so frequent, that I can hardly conceive, how jurists and legislators should have continued, to the present moment, to be so little acquainted with this subject. This is why I considered it a matter

of duty, to treat it so particularly in the third section of the first volume; and so much importance do I attach to it, that I cannot refrain from requesting my readers to re-peruse that section. Every day, I see treated, as atrocious crimes, actions which, in fact, are only very unfortunate events, resulting from mental alienation. Let me here repeat some cases that I have related in the above-mentioned passage.

I know a woman, twenty-six years of age, now well, who was attacked with the same disease: she has had successively all the symptoms of this disease: she experienced, especially at the times of the periodical evacuations, inexpressible torture, and the fearful temptation to destroy herself, and to kill her husband and children, who were exceedingly dear to her. She shuddered with fear, as she pictured the combat which took place within her, between her duty, her principles of religion, and the impulse which urged her to this atrocious act. For a long time she dared not bathe the youngest of her children, because an internal voice constantly said to her, "Let him slip, let him slip." Frequently, she had hardly the strength and the time necessary to throw away a knife, which she was tempted to plunge in her own bosom, and that of her children. Did she enter the chamber of her children or husband, and find them asleep? the desire of killing them at once assailed her. Sometimes she shut precipitately after her, the door of their chamber, and threw away the key, to remove the possibility of returning to them during the night, if she happened not to be able to resist this infernal temptation.

Those of my readers to whom a thorough examination of so important a subject, will not appear tedious, will permit me here to insert entire the account of a tragical event, relative to the subject under discussion. This account will not only furnish me with an opportunity of making many remarks, but it will be useful to physicians and jurists, as a guide and a standard for judging of the different degrees of alienation. The editors of the *Patriotic Journal of the Austrian Empire*,

have taken it from the fourth volume of the Annual Register of legislation and jurisprudence for the Austrian states, published by M. F. de Zeiller, aulic counsellor.

*Criminal case of H**, who assassinated two persons.*

On the 2d December, 1807, a woman, aged fifty, and her daughter-in-law, aged twenty-four, were fatally wounded at Trieste, in the pit of the theatre, during the performance of the play. The author of the deed came forward, exclaiming, "There are those who have murdered me," and remaining still, he quietly suffered himself to be arrested. The eldest woman received but one wound, but, in the opinion of medical men, it was mortal, and, in fact, it occasioned her death a few minutes after. On the other were discovered five wounds, one of which was dangerous, and another, mortal. She died at 3 o'clock next morning.

The murderer, whose name was H**, born at Trieste, aged twenty-seven, and a bachelor, was a ship-broker. In the summary examination, which he underwent immediately after his arrest, he answered to the first question, "that he was arrested for having cut off two women who had assassinated him." The officer, in arresting him, took away from him a manuscript very carefully prepared, in which the motives of his crime were detailed at length. He begged the officer to read it, loudly attested its truth, and even signed it. The facts gathered from his answers to the ulterior questions addressed to him by the court, were as follows. He had finished the manuscript the evening before. Having then experienced more severely than ever, the pains produced by his miserable destiny, of which the persecutions of the two women were the principal, he formed the plan of killing them. As he could not execute his design in the street, nor in their house, he went the next day to the theatre, but not seeing them where they were accustomed to sit, he waited for them outside the house.

When they arrived, he re-entered the theatre, gave them time to sit down, and opened the door of their box, and effected his purpose. "I never intended," he added, "to withdraw from the arms of justice, notwithstanding the ease with which I might fly by sea or land into Italy. God be merciful! I submit to whatever the court shall order." The circumstances of the assassination were confirmed the same evening by the young woman, who was mortally wounded, and by a person who was in the box at the time, and who, when the first blow was given, went out to call assistance.

The manuscript prepared by the murderer occupied four leaves, and was written in Italian. The ideas are connected, and the style flowing. It is entitled, "*Summary exposition of my life for the last eight years.*" We proceed to give an extract, omitting the frequent repetitions, and such circumstances as throw no light on the facts or the character of the author.

The frightful and almost unexampled position of the author, says the manuscript, originated with the elder of the two women, whom he killed. He has lived opposite to her for the last twelve years, and she has made him wretched by diabolical artifices of astrology. It is about eight years, since he inferred from the manner of Theresa, the daughter of the merchant with whom he often met her at the theatre and elsewhere, that she was deeply in love with him. He was unable to reciprocate her affection, because the impious woman, of whom he is going to speak, had deprived him of his reason, and hardened his heart. He sought to gain admission to the merchant's house, but was politely refused. To divert his thoughts from this subject, he left home in 1799, and went to Venice, Leghorn, and Florence. At the end of a year, he returned, but remained for a short time only, and then made a second tour into the provinces near Italy, in spite of all that was done, according to his own account, to prevent his departure by the father of Theresa, who bribed the inn-holders and shopkeepers, to make him acquainted with his daughter's

love for him. This merchant even tried to make him return, while he was on his way. Want of money was a source of some severe troubles to him, during this excursion. He once, for sixty hours, had nothing but a glass of water and a morsel of biscuit, and often passed the night in the open air. His body was extremely enfeebled. Two months after his departure, he returned, and, for four months, his parents, with considerable difficulty, supplied his wants. He was offered the place of clerk of a ship, whereby he made a voyage into different provinces of Italy, to France, Spain, Holland and Hamburgh. During this voyage, which lasted a year, he was exposed to storms, shipwrecks, pirates, and to every kind of danger. Finally, he was in partnership with a ship-broker in Trieste for three months and a half, and made considerable money, which, by his own confession, he spent in high living and all kinds of excess. He again tried short trips on foot, in order that he might live quietly, but he found no rest. "Thus," he cried, "have I lived for the last eight years, wretched and idle, while I should have been the father of a family, and obtained general esteem."

"But the almost incredible physical sufferings I endured in my travels, were nothing, compared to the frightful visions brought on me by astrological artifices, that have tormented me day and night ever since Nov. 16, 1805. Frequently I have dispersed them with the crucifix." The elder of the two women would appear to him sometimes, to advise him in a friendly manner not to struggle with his passions, and sometimes to overwhelm him with the painful recollection of the sufferings he experienced during his travels. At another time, she loaded him with reproaches for corresponding with other women. The young woman would appear to him in the most voluptuous attitudes, which inflamed his imagination to the highest degree, and produced the usual consequences of such visions, too often fatal to the health of young men.

This young woman inspired him with an inordinate

passion, and he sought every opportunity to see her at the window, in the street, or at the public shows, by placing himself near her seat. He has frequently heard the elder woman converse about him. She exclaimed one day, for instance, "I will not fear the devil." He was become the slave of these women; they knew all his thoughts and every one of his acquaintances. They had so persecuted him by their apparitions, or their emanations, that he had lost considerable blood, and his strength was much exhausted. He said, in concluding, "it is a most black and terrible crime, and deserves, in heaven and on earth, the severest vengeance."

On addressing him some questions, relative to certain obscure passages in his memoir, and to what he had done since it was written, he replied, that, by astrological artifices, he meant the sorceries of the women who made him suffer like a martyr. In saying that the two women had murdered him, he meant that they had deprived him of rest, and that the younger had inspired him with a violent passion, which abated a little during his travels, but gained fresh strength on his return, and had entirely broken his constitution. The conclusion of the manuscript had relation to the vengeance he wished to execute on the two women, who, by their witchcraft, had deprived him of his senses. He began his memoir in August, 1807, and after frequent interruptions, finished 1st December, when he immediately resolved to kill the two women the next day, that he might be delivered from his torments. For this purpose, he thought of buying a knife instantly, but abandoned the design. The next morning, he reconsidered the matter, bought a knife, and sharpened it. He then went on Change, transacted some business, and dined at his parents; after which he took a walk, and meditated on the consequences of the act, sometimes renouncing his design, and again returning to it. He entered a wine-shop, and drank a pint of wine; he then played at a café, and at half past six o'clock, he went to the play. As it was still early, however, he drank another pint of

wine at a wine-shop, returned to the play, where he accomplished his design, as he acknowledged on his first examination. He believed, he added, that he had stabbed each woman but once. He had never spoken to them. He had sometimes done business with the husband of the elder woman, but never had courage to ask admission to his house. He had composed his manuscript, in order that he might leave to the world, after his death, a monument of his singular destiny, and had undertaken to justify the deed, which, after a long internal struggle, he had committed in a paroxysm of irresistible fury and violence, though conscious of what he was about at the moment.

So far, the prisoner answered, positively and rationally, the questions that were addressed to him. Two physicians, who, by way of precaution, had been called to attend the summary examination, declared that, after the clear and rational answers of the accused, they held him to be of sound mind, and that he could not have been mad. But, in a subsequent examination, the accused made no other reply to the questions, that were put to him for the purpose of penning down, in relation to the act, than that "he was mad, and lost his senses; he could not answer, because he was mad; he could no longer say his prayers, because he was mad."

This conduct of the accused, on the second examination, appeared to the court to be nothing but obstinacy, or a mere feint; for on the first examination, which took place but a little while before, he was calm and collected, and had shown but little bad humor. Consequently, they read to him, that he might not sin ignorantly, the 363d and 364th articles of the first part of the Code, enacting that, whoever, by feigning insanity, tries to deceive the Court, or obstinately persists in not answering the questions addressed him, shall be punished by fasting and whipping. During the reading, the accused seemed to be violently agitated; he changed color, and wept profusely, but answered none of the questions that were put to him. The Court then referred the case to eight

professional men, physicians and surgeons, gave them the memoir of the accused, as well as a copy of his verbal answers, and proposed to them the two following questions, to examine and answer.

I. Is the accused really mad, or is he feigning madness?

II. Can his act be imputed to this cause?

The professional men, in their report, considered the allegations of the accused, relative to his physical constitution, to be devoid of foundation. They declared that he had no defect of body, that his limbs were sound, and that he had the requisite quantity of blood. They added, that the present disorder of mind was only a feint; but they thought that the accused, in consequence of the tumult and derangement of his imagination, had been insane, and that during the paroxysm of insanity, he had not acted maliciously and with a design to harm, but committed the act in a moral state, to which crime could not be imputed.

The Court again summoned the accused, in order to examine him as to his intention in committing the double murder. He answered, "It may be clearly seen, from my own picture of my life, what was the motive of this action." Then reflecting a few minutes, he continued, "You may ask me what questions you please, I can only answer what I have already answered,—that I have lost my senses."

As, notwithstanding all the representations that were made to him, it was impossible to get any answer from him, they put a stop to the examination, and gave him the space of three days, the time fixed by law, to prepare his defence. During this interval, several witnesses gave some very precise information, relative to the intellectual faculties of the accused. The prisoners, who were near him and the jailer, deposed that he conducted peaceably, spoke to no one, and appeared to be always musing. People, who had formerly employed him, described him as a regular, attentive, serious and very abstracted young man, but, at the same time, head-

strong, high-spirited, and particularly vain of his person. His father-confessor and parents, said, that he had always enjoyed good health, and was addicted to no excesses; that he was of a quiet character, and was kind to his parents. When the three days of preparation had elapsed, and he was asked by the court for his defence, he answered, "I am mad and have lost my senses, and know not what I did." Two days after, a clergyman sent a note to the court, certifying that four or six days after the assassination, the father of the accused came to him to confess, and that, after confession, he observed to him that his son's conduct had always been regular and quiet, indeed; but, from his earliest youth, he had evinced some signs of madness about the period of the new moon, such as swearing and making a great racket in the house; and that at certain times he had left home, and undertaken journies more or less long. As the father of the accused had been already heard in his oral deposition, the court made no use of this certificate.

Opinions being divided, after the inferior and superior tribunals had deliberated on the question of the accused's responsibility for crime, the superior tribunal decided that all the proceedings at law should be communicated to the faculty of medicine at Vienna, in order that they might fix upon the points, on which the professional men of Trieste should give their opinion, so that they might be enabled to judge, with a full knowledge of the case, whether the accused committed the act in his right mind, or in a state of mental derangement.

The faculty concluded, that the three following questions should be proposed to the professional men at Trieste.

1. Does it appear, from the trial and other circumstances that have been noted, that the accused, during or after the assassination, has been mad?

2. If it is thought that madness took place, at one or the other of the above-mentioned periods, by what facts and circumstances can it be proved?

3. What idea do the professional men at Trieste attach to the term mania?

The faculty also expressed the opinion in this report, that the accused had never been mad, neither after, before, nor during the murder. He was not so before it, because none of the actions and circumstances mentioned in the verbal process, indicate it; because the physicians who assisted in the first examination, declared that he was in his right mind, and those who next examined him said his madness was feigned; and because the declaration of the prisoner, that he was mad and had lost his senses, proves precisely the contrary; since a person really insane, never proclaims himself to be so. Neither does there appear from the trial a single action or circumstance, by which it can be legally proved that the accused was mad, either before or after the murder. Let us barely call to mind the facts in the case, as they occurred. A young man, of an inferior condition in life, headstrong, full of self-love, but otherwise quiet, industrious, and healthy, falls in love with a pretty young woman, who lives on the opposite side of the street. For two years, he seeks every occasion to see her, and at the play, always stations himself near her box, that he may have a better view of her. His passion reaches the very highest pitch, and, without speaking to her, without making her acquainted with his feelings, he forms the design of killing both her and her constant companion; because it seemed as if he never should succeed with her, and he was desirous of being delivered from his sufferings. Nothing that appears on the trial, relative to his conduct on the day of the murder, as well as the day before, presents the least indication of madness, or mental impotence; on the contrary, every thing indicates reflection and the use of reason. The accused plans the assassination, and chooses the time, place and means for executing his purpose and insuring its success; his resolution wavers; he has a long struggle with his feelings, because he knew the consequences of his undertaking; and to shield himself from these conse-

quences, he takes care to carry with him, on the day fixed for accomplishing his object, a manuscript just finished, which should justify his conduct. He attended to his usual business on Change, dined with his parents; played at the café, drank twice, a moderate quantity of wine at a wine-shop, and all this took place without any one observing in him the slightest derangement. He goes to the play, and comes out because it is too early; he returns, and being well convinced of the presence of the two women, enters their box without injuring the door, and promptly committed the double murder. Neither are there any traces of alienation of mind in the previous conduct of the accused. All who had employed him, so far as they had been heard from, have described him as a regular, industrious person. He made no foolish or improper attempts to introduce himself into the house or company of the two women. It is true, the accused executed his purpose in the theatre and in the presence of every body, but this nowise proves his madness, for he confessed himself, that he was unable to perpetrate the deed any where else. No conclusion can be drawn from the fact, that he did not attempt to escape; for, besides that he could hardly expect to get clear, he probably trusted to the memoir he had prepared, for his justification. This memoir is methodically composed, and is all written on the same kind of paper and with the same kind of ink; consequently, it has been composed within rather a short space of time. On the day of the assassination, the accused takes with him this paper, which is to serve in his justification, and to the same motive we probably owe its existence. If the accused really writes, that the elder of the two women had bewitched him, it does not indicate madness, but a superstition, still quite common in Italy among people of his condition. The faculty concluded therefore, from all these circumstances, that there was no evidence that the accused was laboring under total or partial insanity. Nevertheless, in case his insanity should be positively proved, the faculty are

of opinion, that he could not, with safety, be let loose on society; since the difficulty of determining whether his disease is cured or not, would be increased by the circumstance, that no trace of mental alienation was discovered in him, previous to the terrible murder he committed.

The questions prefixed by the faculty to their opinion, were sent to Trieste, and the two tribunals were enjoined to deliberate anew on the affair, after the professional men should have given their opinion, and submit the result, with all the proceedings, to the supreme judicial court.

We now proceed to give an extract from the opinion of the Trieste physicians, omitting the numerous quotations by which it is supported.

The accused was laboring for a long time under a profound melancholy, which transformed the phantoms of imagination into real objects, deprived him of his reason, and finally degenerated into furious melancholy. In one of these paroxysms of fury, he committed the double assassination. His nervous system is extremely irritable, and he has the sanguine-bilious temperament; so that the slightest cause gives rise to the most violent excitement of the feelings. The outward appearance of this person indicates melancholy, and this indication is strengthened by his quiet conduct, his vivid imagination, and that constant restlessness, which, without any plausible reason, has kept him moving about from one place to another. One circumstance that may have contributed, in some measure, to increase this melancholy disposition, is, that the accused, having taken the itch when sixteen years old, was not properly cured by the use of sulphurous ointments. The action of this morbific matter repelled upon the nervous system, already very irritable, probably engendered that form of mental derangement, called by physicians, *Melancholia Narcissi*, in which the patient has a singular regard for his own person, and believes himself an object of universal adoration among the women. Several witnesses have said

that such was the state of the accused. His melancholy explains his discontented state, his unceasing restlessness, and his fondness for journeying without any object in view, and destitute of the necessary means. For this reason, too, he was able to bear extreme cold, heat, and nakedness, without material injury to his health, which, physicians say, is peculiar to melancholy temperaments, when their imagination is occupied with the images they have created. Besides, the accused lived opposite the two women, which operated so powerfully upon him, that their images were constantly before his eyes; and thus new aliment was furnished to his excited imagination. Hence the nocturnal visions that he took for realities, and his indomitable passion for the younger woman, which changed his *Melancholia Narcissi* into a *Melancholia Amorosa*. It matters little, that the accused has properly performed the duties of his condition, and has done nothing indicative of mental derangement. We know that it is one of the peculiar characters of monomania, that the patient, on every other subject, follows the suggestions of sound reason. The frequent use of hot drinks, and particularly the self-abuse, occasioned by his heated imagination, in which the accused habitually indulged, so contributed to increase his insanity, according to the numerous observations and testimony of several physicians, that, on the slightest cause, it was converted into fury; and its indications on the accused, may be seen in the want of sleep, love of solitude, and the almost continual singing in his ears. In such a maniacal disposition, the accused wrote the history of his life. He portrays his sufferings, whether real or imaginary, with much vividness of feeling, and we can conceive how, his imagination becoming extremely heated, towards the end of his narrative, he resolved to kill the apparent authors of his torments, and how, in a moment of fury, he accomplished his design. The preparation of the instrument, the choice of means to effect his purposes, does not prove that the mind of the accused was not in a state of derangement. We

know, in fact, that a maniac acts with regularity and order, in every thing that concerns his insanity, and the attainment of the object in view. The most common observation teaches, that people in severe fevers, whose reason has wholly left them, will invent the most ingenious means for committing suicide, on which they have determined. From these observations, the professional men of Trieste conclude, that the accused first suffered from melancholy, which was afterwards converted into insanity, and that, in a paroxysm of insanity, and in a moment of total absence of reason, he committed the murder. Immediately after, the paroxysm ceased; the violence of his passion and his vengeance being satisfied together, and the sight of blood affecting his feelings, the tumult of his imagination was calmed, and the equilibrium of his mind restored. Thus are explained the quietness and indifference of his conduct from the time of the first examination.

The interval of tranquillity that succeeded, and which is quite common in insanity, is the cause of the reserve and the laconic answers of the accused at the time of his last examination, and of his weeping on account of his present situation. These circumstances strengthened our belief in the previous derangement of his mind. The medical men concluded by observing, that having again examined the accused, prior to finishing their report, they found him in a state of apparent tranquillity. It seemed that a cutaneous eruption, which had broken out over his whole body, had contributed to this result. The acrid matter, which, before, rendered his nervous system so irritable, being disposed of by this outlet, the wild looks of the accused, and his weak, small, nervous pulse, would indicate that he had always a disposition to insanity. For this reason, they would not hazard the opinion, that the accused was entirely cured of his moral disease.

Notwithstanding this opinion of the physicians, the inferior criminal tribunal, according to the utmost rigor of the law, pronounced sentence of capital punishment

upon the accused. The superior tribunal, guided by the opinions of the physicians, decided that the case was not a matter for criminal process.

The supreme judicial court transmitted the new declaration of the Trieste physicians to the faculty of medicine in Vienna, in order that they should pronounce a definitive opinion. The faculty began by laying it down, as a necessary principle, that, in cases of legal medicine, we are to decide on the nature of the act, not from the presumption, or simple possibility, of what might happen in analogous cases, but from the facts proved, and the accessory circumstances which may have determined the act, and which are ordinarily set forth in each particular case. Consequently, after examining the new declaration of the Trieste physicians, they concluded to persist in their first opinion, viz. "that, from the documents they had inspected, there was no proof that H** was insane at the moment of committing the double murder." The following are the motives of this assertion.

1. The faculty of medicine, not feeling warranted, for want of clear facts and accessory circumstances, in its first opinion, to admit the alienation of the accused before, during, or after the murder, as proved, could not now alter its decision, because the new documents presented no new fact, nor clear circumstances, that could furnish any certain and positive data upon the mental derangement of the accused.

2. The remarks of the Trieste physicians, on the physical constitution of the accused, on his physiognomy, and the itch which he had when sixteen years old, or more than thirteen years ago, and which continued two months, and was cured by external applications, simply proves, that, under all these circumstances, there is a possibility of the alienation which sometimes results in different subjects, as is shown by the numerous quotations adduced in support of this opinion, but it does not follow that it exists in the person whose case we are treating.

3. In fact, the reality of alienation could not, on the principles of legal medicine, be judicially proved, except by certain manifest signs, characteristic of this state of mind; and in the present case they have not cited, nor have they indicated, very positively a single one.

4. One of the Trieste physicians says, in set terms, in the opinion p. 414, that the family of the accused never observed in him the least signs of alienation. Besides, none of his companions who have played with him, nor the woman who sold him wine in the shop, immediately before the murder, remarked the slightest trace of mental alienation. This same physician observes, in conclusion, that it was impossible to recognise the madness of the accused, without having been informed of it beforehand, which, in other words, is equivalent to saying, that he would be considered mad by those only who were already prepossessed with the belief that he really was so; for the alienation, not being manifested by any external sign, it was not perceptible to one not pre-occupied with the idea.

5. The memoir, narrating the history of his life, and composed with some effort of reflection, and which, as he himself says, was to serve for his justification, cannot be considered as a trust-worthy document, as well upon the principle of law, that *nemo testis in propria causa*, no one can be witness in his own cause, as because the truth of the facts there related has not been diligently investigated.

6. Finally, in the two interviews of the Trieste physicians with the accused, and in the verbal process that has been drawn up, there occurs no trace of mental derangement, previous or present. The physicians have even unanimously agreed, that the accused is not at present in a state of alienation. It is to be regretted, that when the Trieste physicians examined the prisoner, and conversed with him, they so superficially followed the train of ideas, necessary to establish the madness of the accused, and that, in breaking off the interview at the moment when it was becoming most interesting, and,

perhaps, in a physiological view, most instructive, they should have suffered the thread to escape, which chance had presented them, to find their way through this labyrinth; since the accused, by the disorder of his motions, and change of features, made known the embarrassment and disturbance, under which he was laboring.

The supreme court, after repeated deliberations, pronounced the following decision. "The indictment found against H * * for murder, is dismissed, for want of sufficient proof of his responsibility for crime. In the mean time, that the public safety may not be jeopardized by the accused, he will be handed over to the police for perpetual confinement. He will also pay the costs of the process."

Conformably to the dispositions of the 455th article of the first part of the penal Code, conferences have been held with the police court, in execution of the sentence, and the accused has been placed in a house of detention.

Excepting the clause relative to the costs, the sentence is perfectly adapted to the nature of the action, and is honorable to the intelligence and sagacity of the judge. The faculty of Vienna, with remarkable shrewdness, advised his detention for life, in case madness should be proved, because, in such cases, nobody can warrant a cure. It may indeed be admitted, as generally true, that relapses are to be feared where there is a natural and very strong disposition to the disease in the very organization itself.

I think, with the physicians of Trieste, that H * * should be considered insane. What motive could he have, in complaining of the loss of his health, and of his physical exhaustion, while he was full of strength and health, if he were not laboring under a total mistake as to his condition? If his mind had been right, would he not have seen that his appearance would instantly give the lie to his assertion? The statement made by his father to his confessor, that, from his infancy, he had committed acts of madness, and was in the habit of quitting his father's house, does not prove, indeed, that he

would afterwards become mad; but it does prove the existence of an extreme natural irritability, and a very strong disposition to see visions, and conjure up phantoms, when he experienced any violent agitation of the feelings.

The choice of the object of his love, also, proves his predisposition to madness. There is some sense in the saying, that he who falls in love with a queen, and, to use a common expression, becomes mad, has not only *become* so, but was already in that condition. H** declared that his love was the effect of the sorceries of these two women.

The faculty of Vienna rely on the declaration of the professional men present at the first examination, who pronounced the murderer to be in his right mind, and his madness to be feigned. They rely also on the testimony of the individuals, who had played with the murderer, and of the servant in the wine-shop. But why, in a discussion involving a man's life, do the faculty of Vienna refer to people, who allege nothing in support of their opinions, in preference to the assertions of the Trieste physicians, founded on experience, which teaches that a person may be insane in one respect, and sane in every other? Have these physicians answered the public expectation, by indulging in vain subtilties, and a blind zeal against vice? Are we not taught by daily experience, as the Trieste physicians have observed, that the insane are accurately conscious of the disorder of their sensations and ideas? Do the faculty of Vienna believe they have refuted these facts, by saying, that it is only a vain display of learning to mention them?

They conclude that the madness was feigned; but whoever designs to feign madness, must be well acquainted with it. But the natural history of this state being known to but a very few physicians, how can it be supposed that this young man, extremely ignorant in this respect, should be acquainted with it? The person who feigns, is not contented with declaring his dis-

order,—with saying, "I am mad, and have lost my senses;" he seeks to make it be believed, by wild and extravagant conduct. The murderer does not say, that it *seems* to him that he has had visions, but says that he is miserable and in despair, because he has *really* had them. In other cases, where there cannot be the slightest suspicion, that the insane are anxious to shield themselves from a sentence of death, we often hear them complaining of their madness in the accents of affliction and despair.

I admit that a criminal act, committed in a lucid interval, renders the person responsible; but, in regard to people who are subject to periodical fits of madness, we cannot be too cautious in deciding, whether or not, the act was committed in a state of perfect mental soundness. In cases of this kind, the decision is not difficult to those who possess the necessary information. The faculty of Vienna say, in support of their opinion, that the murderer chose the time, place, means, and occasion, most suitable for the execution of his design. But is not the very same thing done by those who commit suicide, destroying their life under the influence of the most terrible of all the forms of mental alienation? Do not the faculty of Vienna know that the most furious madmen, in the middle of their most violent paroxysms, act in a consistent manner?

The motive of H**, in assassinating the two women, only proves his madness. He was persuaded that they had bewitched him and made him wretched. Certainly, it cannot be said that he murdered the object of his love in a fit of jealousy, and with what could he reproach her companion?

H**, in manifesting his mental anguish by the tumult and disorder of his motions, did not show that he was not mad; for the most raving madmen are often tortured by the most bitter and unjust remorse. A woman got into violent rage every morning; she broke every thing in pieces, and abused whoever came near her. When put in a straight waistcoat, she calmed down. She re-

membered very well every thing she had done, and was so full of repentance, that she believed herself deserving the severest chastisements.*

Unfortunately, many insane people may be condemned, from the fact that, during the examinations, they speak and act in a rational manner; but the time of the examination is not that of the criminal action. Besides, the insane are not only consistent in their madness, as we have shown, but cases are daily occurring, when the mental disorder is manifested only on a single point. So long as the diseased point is not touched, we cannot observe the least trace of madness in conversations that turn on other subjects. In a species of periodical madness, where the patients are irresistibly impelled to commit murder, Pinel considers it a diagnostic symptom, that they are conscious of the atrocity of their action, and show no derangement of intellect, or imagination.

Finally, whatever the faculty of Vienna may say to the contrary, the extreme mental disorder of H** is proved by the fact, that he chose the theatre wherein to execute his design; that he made no effort to escape, and manifested no disposition to save himself. No sane man acts in this manner, unless excited by some sudden freak of unruly passion. But that H** was not at all influenced by anger, or a transport of passion, is evident from the fact of his dining peaceably, and attending to his business as well as ordinarily. The act of writing down the motives of actions, often precedes desperate resolutions, even in cases of suicide; and here is furnished a conclusive proof of the torments experienced by H**, and of his conviction that he had a right to avenge himself on both the malicious enchantresses.

Finally, it appears to me, that the judge ought not entirely to have neglected to take into consideration the prejudices that may have determined the crimes. They are among the moving springs that give rise to an ac-

* Pinel, l. c. p. 183.

tion, and, in many cases, ought to be considered as extenuating, in others, aggravating motives. If it often seems dangerous for a judge to treat a criminal with mildness, on account of the prejudices he has imbibed; governments are under an obligation still more indispensable to extirpate these noxious prejudices. Let us say, with Beccaria,* that we cannot properly call a punishment just, that is necessary, so long as the law has not employed, by way of preventing the crime, the means best suited to the circumstances of the nation.

Continuation of the Instinct of Murder in a State of Mental Alienation.

A baker of Manheim, who, from his youth, had shown in all his enterprises a very timid character, and who had for ten years experienced attacks of deep melancholy, also experienced from this last epoch a general weakness of nerves. He imagined that the purchase he had made of a house, caused his unhappiness, and that of his wife, whom he greatly loved. He complains incessantly, and laments his situation, which he regards as most desolate. He has sometimes had paroxysms of insupportable agony: he continually wishes for death, and would long since have inflicted it on himself, if, to use his expression, it were not a sin. He often speaks of a French blacksmith, who killed himself after destroying his wife. "You are to be pitied," he will sometimes say to his wife, in the most moving tone; "I must do as the French blacksmith did." We advised him to separate himself from his wife, but we know not whether he has adopted our precaution.

A cordwainer, at Strasbourg, killed his wife, and three of his children, and would have killed the fourth, if it had not been withdrawn from his fury. Having

* Crimes and Punishments.

committed this shocking action, he ripped open his own belly; but the wound not being mortal, he drew back the knife, and pierced his heart through and through. This man had the reputation of being mild and faithful, a good father, and a good husband. No one could discover what tempted him to this horrible action. At Leopold, in Galicia, a certain K. killed his wife, the object of his warmest affection, and would then have shot himself with a pistol, but missed. While people were forcing his door, he fired a second pistol and killed himself. His conduct had always been blameless, and all that could be learned was, that he was discontented with his condition, and thought he deserved a better. At Hamburgh, R—, a respected instructor, killed his wife and two small children, sparing two others who had been confided to him. A similar circumstance happened at Amsterdam, and several other facts of this kind have come to our knowledge.

Since these notices were written, I have read similar accounts in several journals; but not one has been judged with a knowledge of the cause, and in that philosophical spirit, which results from a profound acquaintance with the principles of human nature.

Again, a man at Frankfort, killed his wife, five children, and then himself. The authorities were embarrassed in the choice of outrages to be committed on his body, to avenge society thereby, as the expression is, for so atrocious a crime. A more recent example corroborates what I have already advanced. "A man named Guillon, of Tours, believing himself poisoned by drugs, which he had bought of a dealer in orvietans, resolved to murder him, and then destroy himself. Not finding the man at home, of whom he thought he had reason to complain, he wreaked his vengeance on his wife, and having killed her in a shocking manner, he was proceeding to drown himself, when he was arrested. Being condemned to death, the respectable pastor, charged with the spiritual concerns of the prisons in that city, was enabled, by the precious aids of religion,

to restore calm and consolation to the bewildered spirit of Guillon, but the unfortunate man constantly persisted in his desire to die, and not to appeal from his sentence."*

When such unfortunates do not succeed in destroying themselves, they surrender themselves at once into the hands of justice, and desire nothing more strongly than death. The execution of such a subject, it is said, is of little consequence one way or the other, though it is important that his family should not be disgraced. And why inflict punishments for actions committed in a state of insanity? Are you afraid of giving people an example that may be followed by fatal consequences? Then enlighten people on the subject of such diseases. Your first duty is to be just, and not commit cruelties that can have no object.

Since the publication of my large work, Falret, in his "*Treatise on Hypochondria and Suicide*," has recorded many facts, that are so much the more entitled to be noticed here, inasmuch as they are applicable to criminal legislation.

Disposition to suicide, and, in consequence of it, to murder, proceeding from an error of judgment relative to the crime.

"Margaret K——, a young woman, twenty-three years old, was sent to the house of correction in Onolzbach, Sept. 1755, in consequence of many crimes she had committed. Her reception was followed, as usual, by whipping and bad treatment. The whip made use of for this cruel purpose, wounded her seriously in the left breast, and caused her very severe pain. This treatment made such an impression on her mind, that she began to loathe life, and, to get rid of it, she determined

* *Journal des Maires*, June 30, 1818, No. 380.

to commit murder. She thought that, in doing so, there would be sufficient time for repentance, which she should not have, if she waited for her natural death. She formed her plan in cool blood, and executed it on another woman in the following manner:—

"One Sunday she complained of being unwell, and requested that she might be excused from attending divine service. A very simple, half-idiot girl, named Mederin, was set to watch her. Margaret persuaded this girl, that there was no hope of their being freed from their miserable situation, unless they decided on death, and proposed to her to be killed first. Mederin readily consented, with the only condition that she should suffer no pain. Margaret, therefore, accomplished her plan on Mederin by cutting her throat, which she held out to her, and the wound was received with the most perfect resignation.

"When Margaret was questioned in court, as to her motive in committing this horrible murder, she answered, that it was the blows and sufferings she endured in the house of correction. She thought to herself, 'if I take my own life, my soul is lost forever; but if I kill another, I shall not only die, but shall have time to repent, and God will pardon me.' When asked if she entertained no malice against her victim, or had been offended by her, she replied, that she could complain of no kind of injury on the part of this companion, who, on the contrary, was in the habit of coming to her, and communicating her troubles, as to a friend."

When asked if she slept peaceably, after committing such a dreadful deed; she said, that she had prayed to God, before going to bed; that she slept well; and, on waking, she again prayed. She seemed perfectly calm and collected during the examination, and until the moment when the nature of her crime was explained to her; but when made to understand, that, far from having taken the path to happiness, she had incurred the eternal wrath of God, she wept bitterly. Her physician

attributed her crime to despair and *tedium vitæ*, but the law paid no deference to his opinion, in its decision.

Disposition to suicide, and consequently to murder, produced by religious fanaticism.

"Daniel Voelkner, born at Friedland, six miles from Koningsburg, in Prussia, lost his father at the age of fourteen, and at this time he was apprenticed to a shoemaker. His apprenticeship finished, he went to Dantzic, to work at his trade; but before he had earned enough to procure the necessaries of life, his travelling chest, containing all his tools, was stolen from him. As it was impossible for him, after this, to labor, he enlisted for the term of sixteen years in the service of his Danish Majesty, and was sent to Copenhagen.

"Although, according to his own account, Voelkner suffered a good deal from his officers, yet he faithfully discharged his duties till the sixteen years expired, when he resolved to return to his native country. On his way thither, he met with a retired soldier, who was a master-shoemaker at Meyburgh. He made an arrangement with this man, but the work not pleasing him, he quitted the first day. Thence, he went to a tavern, and enlisted in the cavalry, and March 11th, 1753, he joined the regiment of Wentherkein.

"It appears that, from this time, till the 24th May following, thoughts of murder began to agitate his mind, and unfortunately they seemed to owe their origin to religious enthusiasm. His ideas of the happiness of a future life were of the most vivid kind, since they terminated in weariness of life, and in the desire of throwing off his mortal burthen. The only way which presented itself to his mind, to obtain this desirable end, was to forfeit his life by murder. After the accomplishment of this act, he imagined he should have time enough to make his peace with God.

"According to the testimony of his comrade and bed-fellow, this man lived a pious life, singing religious hymns and reading godly books, one of which he offered to his companion for his edification. He often admonished him to become devout, adding, that he himself had been very wild in his youth, but that he was now in the right way.

"One night, when in bed, the idea of teasing Voelkner a little, on account of his extravagant piety, occurred to his bed-fellow. He said, he looked upon it to be a thing unreasonable in some people to act so uncommonly devout a part, as if with a view of making it appear that they alone merited happiness hereafter. Upon which Voelkner answered, it was extremely unjust in him to think so, and immediately began to cry out, 'I must, I will be happy hereafter.' These words he repeatedly uttered with a loud and harsh voice, tossing his legs and arms about in a violent manner, and starting from one part of the bed to another. After this, he broke forth in sorrowful complaints about his past life, and began to exclaim, 'I am come to this at last, I am come to this at last,' which words he repeated three or four times. Upon his companion asking him to what he was come, he answered the same thing.

"According to Voelkner's own testimony, he had long entertained the idea of murdering a child, because he thought that, after having confessed and made his peace with God, he would soon reach that place, and that happy life, for which he sighed. Three weeks previous to the act, he suffered indescribable anxiety and uneasiness. It appeared to him as if he was obliged to kill some one. On some nights he slept well, on others not at all; but the idea of murdering some one always returned with the light of the day.

"Three days before he committed the crime, he went to the church-yard, and played with the children who were there, intending, if he had an opportunity, to kill one of them. At last, on the evening of May 23d, he accomplished his horrid purpose. A little girl, who had a companion

in the house where Voelkner was quartered, came that evening to pay her a visit. The landlord of the house and his comrade were both gone out about an hour before. Voelkner invited the two little girls into his room, and divided between them his supper. Immediately after which, placing his hand on the forehead of one of them, he bent her head back, and with a knife, which he had sharpened on purpose a day or two before, he cut her throat. He then went to the guard-house, surrendered himself, told what he had done, and acknowledged that it now caused him much regret. He was immediately taken to prison, where he slept calmly the whole night; for he acknowledged, that the uncommon uneasiness he had experienced for three weeks before, ceased upon his committing the act.

"During his examination he answered like a reasonable man, and expressed himself with precision, behaving himself decently, both in word and deed. He narrated the principal circumstances of his life, and said, he knew perfectly well what consequences were to be expected from such an action, and that he would be obliged to answer with his blood. But this thought, at that time, was by no means disagreeable to him."

Disposition to suicide; double homicide.

Catherine Hansterin, forty-five years old, lived in the village of Donovorth. Twelve years before, she was married to a man of harsh and austere manners, and had enjoyed pretty good health, never having suffered any indisposition, except some trifling febrile attacks, and some slight menstrual irregularities. In 1785, she was detected stealing milk in the village, and begged most earnestly, that her husband, of whom she stood in great fear, might not be made acquainted with the fact. It was promised her, but the husband got some imperfect account of it, and, finally, discovered the whole truth. From the testimony of several persons, it appear-

ed that the discovery of this theft made a deep impression on the mind of the woman, as much on account of her own reputation, as of the bad treatment she had to fear. She became melancholy and depressed. It appeared, also, from the written examination, that she confessed, though (what is rarely the case with Catholics,) her mind derived no consolation from this act. She often prayed without being aware of what she said, and was often seized with violent headaches, when she was unconscious of what she did.

"December 1st, 1786, she was still uncertain whether her tyrannical husband had any knowledge of the theft. Before this period he had frequently threatened to kill her, if what was said against her was true, and on that day he beat her cruelly. Nevertheless, before the court, she did not seem to remember the bad treatment she had received. Being asked how many times her husband had beaten her, she answered, 'I know nothing about it; my husband knows; I have no recollection.' After suffering this cruel treatment, she retired to rest, fearing still more for the morrow. Her daughter, about seven years old, came to her bedside and prayed with her. The mother, having made up her mind to leave her husband, asked the little girl if she would stay with her father. She answered, No; she was afraid of him. The next morning, after a fervent prayer, she abandoned her home, carrying with her her little daughter, and her other child two months and a half old. When about leaving, she again asked the little girl if she would not prefer staying with her father, and she replied, that she had rather die. The thoughts which this reply brought to the mother's mind, the distress that afflicted her, the fear of what would happen to her children in case of her death, and, at the same time, her ardent desire to terminate her own existence,—all these united, gave rise to the barbarous design of drowning her two children.

"Having arrived at the bank of the Danube, she made her little girl kneel down, and pray God for a good

death. She then placed the infant in the hands of its sister, blessed them both, and, making the sign of the cross, pushed them into the river. This done, she returned to the village, and told what had passed."

This case, as well as the two preceding, are taken from the *Psycological Magazine*, vol. vii. part 3. Crichton has given them a place in his excellent work on Madness, and I have made my translation from the English.

Suicide preceded by homicide.

M***, aged forty-seven, of a bilious-sanguine temperament, and of a hot, impetuous disposition, was born of parents sound in mind and body, passed the early part of his life without any severe disease, and served six years in the army. He married, and became the father of three children. He loved good cheer, and in this way had consumed his little property.

For a long time, he was tortured by jealousy, and kept a careful watch over the conduct of his wife. He had already had some warm altercations with her on this subject, and finally, one evening, after he thought he had detected her *flagrante delicto*, he armed himself with a mallet and knife, went to bed, and feigning sleep, waited till his wife was soundly asleep. When he saw the moment had come, he struck her on the head with the mallet, and finished the murder, by repeated stabs with the knife. The next morning, he rose from the bloody bed, sought out the attorney-general, (procureur imperial,) told him he had killed his wife, that he deserved death, and was going, of his own accord, to prison. He was carried into the town of ***, to take his final trial. Although he constantly maintained, that he was in his sound mind, that he killed his wife because she deserved it, and that if it could be done over again, he should not do otherwise, yet, guided by principles of legal medicine, it was decided that M***

was laboring under a true mental alienation. He was therefore remanded as insane, and sentenced to perpetual confinement in the hospital of that place. Some time after, this unfortunate man procured a pistol and blew out his brains. He left behind a letter, in which, after expressing his horror at injustice, he added, that if he had not killed himself after killing his wife, it was because he preferred to receive death at the hands of the executioner; but since they were unwilling to inflict on him so just a punishment, it belonged to him to discharge a debt due to society.

So, therefore, the different degrees of activity and the independent action of this propensity, in disease as well as health, prove it to be a fundamental quality, and, consequently, belonging to a peculiar organ.*

Incendiaries.

In prisons, we have examined criminals of every description, even when ignorant of what organ it was, whose vicious activity had led to the crimes for which they were confined; and in all who, from motives of revenge, or for the mere pleasure of seeing a fire, have committed arson, we were astonished to find a large development of the same cerebral parts, whose vicious activity produces the imperious disposition to murder. Reflecting a moment on the biography of the most sanguinary monsters, that have directed their fury against their own species, we saw, in fact, that they all found an atrocious pleasure in desolating their country by conflagrations. We have already mentioned some acts of Caligula and Nero. We recollect the band of Auxerre, known by the name of Chauffeurs, and it is probable,

* In treating of suicide, while discussing the organ of circumspection, I shall show, that, in cases like these, as well as in those of suicide, there is not only an irritation of the carnivorous organ, but, also, some derangement of the organ of circumspection.

that the pleasure experienced by certain people in firing buildings, is but a simple modification of the disposition to murder. The German language itself would seem to confirm the idea, that the propensity to kill, and the propensity to fire buildings, are closely related to, or even founded upon, each other; since those who burn from premeditation, are called, in German, *Mordbrenner*, from the substantive *mord*, murder, *brenner*, incendiary. Thus, the law punishes the incendiary, as well as the homicide, with death, and laws are very often founded in the nature of things, even when we least suspect it. Our opinion is also strengthened by the fact, that there have been some individuals in a state of idiotism, or mental stupidity, who were borne on by an irresistible impulse to the commission of incendiary acts. In the prison at Freyburg, in Brisgaw, there was a half-imbecile youth, fifteen years old, who had set fire to nine houses in succession. When the fire was over, he thought no more of it; which proves that he was governed solely by an animal instinct. In No. 46 (1802) of a German journal, the *National Gazette*, is related the following very remarkable criminal case:—

"August 16, Maria Franck, aged thirty-eight, was executed at Schwabnunchen, and her body burned. Within five years, she has fired twelve houses in the borough where she resided. The losses occasioned by these fires have been estimated at over seventy thousand florins. On the thirteenth attempt, she was arrested, and delivered into the hands of justice.

"It is hard to conceive how this woman could have arrived at such a degree of depravity. She was a peasant's daughter, possessed extremely limited intellectual powers, could hardly read, and all her religious knowledge was confined to external observances. In her younger days, she had several attacks of disease, for which, instead of calling in a physician, they had recourse to an exorcising father of a Franciscan monastery in the neighborhood. She never had much regard for her husband; her union was not very happy, and

she had no children. Her husband treating her harshly, and paying her but little attention, she neglected her domestic affairs, and sought consolation in devotion. As her domestic concerns went from bad to worse, she abandoned herself to intemperance, and robbed her husband to procure the means of indulgence. About this time a fire occurred, in which she had no hand. From the moment she witnessed this fearful sight, she felt a desire to fire houses, which, whenever she had drank a few coppers' worth of spirit, was converted into an irresistible impulse. She could give no other reason, nor show any other motive, for firing so many houses, than this impulse which drove her to it. Notwithstanding the fear, the terror, and the repentance she felt, in every instance, after committing the crime, she went and did it afresh. The government caused her to be examined several times by physicians, to ascertain the state of her health, and the temper of her mind; *but they could find no sign of alienation.* She heard her sentence with Christian resignation."

These facts, however, would not have induced us to admit an analogy between the propensity to kill, and the propensity to burn buildings, if we had not found the same cerebral parts developed in incendiaries, that we had, in murderers; and if the crania of these two kinds of criminals had not presented the same prominences.

What is the fundamental quality of the disposition to murder—of the disposition to kill?

To answer this question at all satisfactorily, we must first go back to the circumstance that led to the discovery of this propensity, viz. the difference between the skulls of the carnivorous, and those of the frugivorous animals; the former having a prominence above the ear, produced by a large cerebral mass, which the latter have not. My position in regard to the discovery of this quality, was the same, as for all the other fundamental qualities or faculties and their organs. It would

have been impossible for me to discover such a quality or faculty, unless it had been manifested in the highest, or, at least, a very marked degree of activity; and I was under the necessity of giving it a name, derived from this high degree of activity. Another reason for this cause was, that the carnivora must not only be forcibly impelled by this inward propensity to kill creatures necessary for their support, but it must also teach them the kind of death to be inflicted on their prey. Hence the denomination, *instinct of murder*. As man is the most formidable of all the carnivora,—as he confines his ravages to no single one, nor a few species, like the greater part of the other carnivora, that kill only for nourishment, and indulges his ravenous propensity upon every living thing, not even excepting his own species, he may be called carnivorous, (*carnassier*,) with a better title to the name, than any other creature. But never, as some of my opponents, with equal assurance and folly, have sedulously endeavored to make people believe, never, in speaking of the *instinct of murder*, did I mean thereby, a propensity to *homicide*. My principle is, and I shall always adhere to it, that to designate a fundamental quality or faculty, common to man and the lower animals, we must choose a name that will be applicable to it in the brutes, as well as in our own species. But, certainly, a propensity to murder impelling to homicide, would be totally inapplicable to the natural destination of the carnivorous animals.

The propensity to destroy, or *destructiveness*, as Dr. Spurzheim calls it, gives a too general and extensive signification to the carnivorous instinct. Spurzheim derives from the same propensity, the acts of quarreling, pinching, breaking, tearing, burning, biting, devastating, demolishing, overturning, &c. The architect who demolishes in order to build,—the gardener who roots up one tree, for the purpose of planting another, cannot be charged with destroying; otherwise, there is no animal, frugivorous, or carnivorous, destitute of the propensity. And, finally, this appellation does not at all convey to the mind of the reader, the idea of the quality, whose

natural history we have been considering. Perhaps I, or my successors, may succeed in determining its fundamental power with more precision. For the present, it is enough for the reader to know exactly what I understand by the quality in question, and how the gradual development of its organ may, subsequently, become the material cause of the propensity to homicide.

If man had sufficient force of mind to recognize the true place assigned him by nature, he would discover here, too, a wise institution. When man came from the hands of his Creator, the Supreme Being surely foresaw that he would live with his fellows in a state of eternal war. Would it have been just for nature to withhold from him the means of ridding himself of his enemies? Have not they done their duty, who have condemned criminals to death; or they who, with fire and sword, have destroyed the enemies of their country? And if the human species should remain at peace, for a few ages only, it would, for that reason, inundate the whole surface of the globe; every animal would be displaced, the whole equilibrium of nature disturbed, and its order completely inverted. This is the why—the final cause—that war has such singular charms, to civilized as well as savage nations; that they seem to be born and to live for it; and that, of all other passions, it is the one of which they make the greatest show. It is well proved, that the first ideas of religion were warlike ideas; that one of the first attributes given to God by men, was that of *God of battles, God of armies.*

I ever recognize and revere the supreme foresight, and submit to its laws. Let those who seek for glory, in leading nations to the work of butchering one another, and who slaughter their fellow-men by thousands, know that they act not altogether of their own will;*

* But we would have them know, at the same time, that obedience to the higher sentiments, and a strict regard to the organic laws, are the only conditions by which these great evils are to be avoided. Great

that nature has placed in their hearts the rage for destroying their own species; that, little as they suspect it, they are merely one of the instruments it employs for thinning the human population. Thus they figure by the side of devastating pestilences, and of all the disasters by which man is assailed, from within and from without.

The expression, *instinct of murder*, therefore, may be excused, even where man kills his fellow-man; for they will never be said to commit homicide, who destroy those of whom the country must be rid. I would, therefore, wish to keep my first name; but, as the multitude will always be tempted to confound murder with homicide, I prefer, for the present, that of *carnivorous instinct*.

Seat of the carnivorous organ, and its external appearance in the human cranium.

We ought not to expect to find a large development of the carnivorous organ in all murderers. There are unfortunate circumstances, in which an organ, even but moderately developed, may be so excited, as to acquire a high degree of activity. People who make rhymes in the delirium of fever, are not always poets. We

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evils are permitted, that great blessings may be appreciated; and examples of abuse and of human suffering tend to make known the conditions of health and happiness. We believe that man is destined to increase in perfection, as he increases in practical knowledge; and that his ultimate perfection will depend upon the complete ascendancy and control of those faculties and sentiments which are proper to man. War is an evil which originates in the predominance of the animal propensities; and the martial glory of nations is often nothing more than animal gratification. Not that wars are unjust or unnecessary, in the present state of the world; but they are contrary to the dictates of the higher principles of our nature, and therefore should be opposed as destructive to the best interests of man. The natural consequence of indulging in wars, is to increase them; and all influence that tends to subdue the passions of the human soul, will mitigate and lessen them.

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frequently see persons, whose conduct has always been irreproachable, from a concurrence of unfortunate circumstances, committing actions which they have sincerely abhorred, and which they detested even after they had committed them. No crime is naturally more repugnant to my feelings than homicide; still, looking to the very bottom of my heart, I would not venture to affirm, that I am beyond the reach of temptation under all possible events. A father, after educating a beloved daughter in the sentiments of honor and virtue, and believing he has secured her happiness by a settled match, sees this child, the object of his tenderest affection, dishonored by a vile seducer. At the moment of the consummation of the crime, this unfortunate father, hurried on by feelings as proper as they are heart-rending, becomes the murderer of the wretch who dishonors him. Would it not be a deplorable error, in legislation as well as the physiology of the brain, to confound such a father with the consummate cut-throat?

Besides, the physiologist well knows that depravement of moral character, or a propensity to murder, is sometimes the effect of a chronic and masked disease of the brain. We have very often found the skulls of homicides, like those of maniacs who have been such for many years. In treating of lesions of the brain, I have related several cases, where the whole moral character was found to be changed after one of these lesions. Who is not aware of the consequences of diseases or mutilations of the generative organs? None of my readers can be ignorant, how blindly the propensity to suicide acts, as well as that other mental affection, still more dreadful, in which the patient not only destroys himself, but, believing that he is inspired from on high, sacrifices others, and ordinarily those whom he most loves, his wife, and children. Such affections strongly show the necessity of caution in forming our opinion in cases of homicide, and that a righteous judge must have a profounder knowledge of man than is generally possessed by those, who, in applying the law to criminals, con-

sider only so much of the action as falls within the cognizance of their senses, and are capable of nothing but a literal interpretation of the law.

It must also be borne in mind, that the same degree of activity of an organ, may produce entirely different actions in different individuals. If we except idiotism and insanity, and cases of an entirely circumscribed excitation, actions are never determined by the activity of a single organ. The manifestation of a certain power will differ according to the strength and modifications of the action of the other organs. The propensity to murder, combined with courage, acts very differently from what it does when combined with deliberate malice; and still more so, when combined with philanthropy, &c. The possessor of superior intellectual powers, will know how to give his propensity a more favorable direction, than the man of feeble intellect. Education, habit, example, religion, morality, laws, &c., act on a man endowed with moral liberty, as so many motives for conforming to the social order, even in spite of his propensities. These are sufficient reasons, why a large development of the carnivorous instinct is not to be sought for in every individual who has been hurried to the commission of homicide, without being particularly disposed to it by his primitive organization. They will explain, too, why I am very far from considering a person as disposed to commit homicide, for the sole reason that he has the organ of this instinct largely developed. All we can confidently maintain is, that, *cæteris paribus*, a person who has this organ large, will be more easily induced to commit homicide, than one not naturally disposed to it by his organization. Amid the tumult of violent passions, the transports of jealousy, vengeance, and anger, the idea of revenging himself by fire and sword will be suggested to the former, while the thoughts of the other will take a quite different direction.

Having thus prepared the mind of the reader by these remarks, I now proceed to speak of the organ itself. Facts relating to this subject are so numerous, I must

be contented with recording a few, which particularly suggest some interesting reflections.

Comparing many skulls or heads together, we shall find some, in which the temporal and inferior-parietal region, that is to say, immediately over the ears, is flattened; while in others, this region is prominent and rounded out. This convexity exists precisely in the place where the temporal bones are so thin as to be transparent, and where, consequently, the cerebral parts beneath show their real dimension. When the development of this cerebral part is excessive, the whole portion of the cranium, from the inferior edge of the parietal bone, even to the ear, swells out; when less developed, the prominence is limited to the temporal bones. This region is marked vi. both on the brains and skulls.

In two of the Schinderhannes band, who had been guilty of more than twenty homicides, the organ of murder is very apparent. This region was extremely prominent, forming a segment of a sphere, in a soldier at Berlin, who was subject to an irresistible propensity to commit homicide, and who, on the approach of his paroxysms, which he was always aware of beforehand, caused himself to be confined, that he might be prevented from shedding blood. We found the same conformation in the girl that helped her mother kill her father, and who spoke of the parricidal deed with a smile, regarding it as nothing extraordinary. In a half-idiotical young man, who had killed a child from no other cause than obedience to a blind impulse; in a fellow called Homme-dieu, whose skull M. Brüggmann showed us at Leyden, and who pushed people from the dykes into the ditches below, solely for the pleasure of seeing them struggle with death; in a homicide belonging to Brunswick, who, with no other motive than the pleasure of killing, committed his second murder on a child; in twenty-five women guilty of infanticide, whom we had an opportunity of seeing in different houses of correction; in an assassin at Frankfort, who was executed after his second homicide; in another criminal, to whom

murder had become a habit; in Bouhours, who killed her victims with a hammer, in order to rob them of their money; in all the skulls of homicides in the collections of M. M. Habert, Sax, and Weigel;—in the skulls of all these people, I say, the same region was very prominent, and, consequently, the same cerebral part was very much developed.

In Bouhours, three organs had acquired a high degree of development. The excessive activity of one produced a propensity to steal; of the second, to murder; and of the third, to fight;—an unhappy concourse, which can only explain the atrocious conduct of this monster.

Lepelley des Longs-Champs had the organ of murder largely developed, while that of courage was small. He planned a murder, which he made Heluin, more courageous than himself, execute. The latter was strongly disposed to steal, which explains why he was always ready to commit homicide, for money. I have subjected the skulls of Valet and Mercier to the same test; Valet committed a quadruple homicide on his mother and three aunts. Mercier assisted in the massacre, but without giving a single blow himself, only he prevented the women from escaping. He had been promised a sum of money by Valet. In Valet's skull, the organ of murder is well developed. In Mercier's, it is not. The organs of self-defence, (courage,) of circumspection, and of benevolence, are all small. The organ of sentiment of property, on the contrary, is very prominent; hence, we have baseness, malice, want of foresight, or stupidity, and, to finish the unfortunate combination, an inveterate propensity to steal. I have plaster casts of these crania, which are in the Royal Garden.

The skull of Voirin, hatter, guillotined at Paris nearly ten years ago, for having committed two murders, is very remarkable. If, when I first saw this head, I had never before known the organ, possessing the degree of development, which produces the propensity to murder, I should have discovered it in this subject. The region above indicated is extraordinarily developed, and very

prominent, which explains the impulse that hurried him on to the commission of homicide. The following passage is taken from the record of the accusation of this murderer.

Perrin was descending the stair-case, holding a light, and preceding Voirin. Suddenly he felt a violent blow on his head. His hat fell off and extinguished the light. Frightened for his life, he struggled with his assassin, who redoubled his blows, sprung upon his victim, threw him on the ground, and, placing his knee upon his chest, continued to strike him. Perrin, however, did not entirely give up; he had strength enough left to seize his murderer by the hair; he also bit his hand severely, and wrested from him a piece of iron with which he was armed. Voirin got back the iron, and struck Perrin again, who still evinced compassionate and generous feelings for his assassin. "Wretched man," said he, "I have known you from infancy, and you are bent on murdering me! But I knew your father. I would not harm you; save yourself." He was about to open the door to let him out, when Voirin sprang upon him, and began striking him again. In the mean time, Perrin succeeded in opening the door, and called for aid. Hearing his cries, Voirin now determined to commit the crime. "I am a lost man," he exclaimed, "I am a monster, a cut-throat." These expressions would seem to refer to some previous crime. He even said, "that he was urged on by a frightful impulse, which prompted him to kill." Arrested at the very moment of finishing the murder, he exclaimed, "I feel the bitterest remorse; I am impelled by an irresistible power to shed the blood of my fellows; two months ago, I bought pistols for the purpose of blowing out my brains; I am sorry I did not do it."

When M. Danloux, after the murder of Geyer, observed the accounts of Voirin's expenses, and censured him for them, and even suspected his honesty, Voirin said that there was a woman who supplied his extravagance. In his defence he accounted for his money, by

saying that he won it at play, a short time after the murder of Geyer.

Voirin, indeed, was not an idiot, and, consequently, not absolutely incapable of reflecting, or of being guided by motives of an elevated order. For this reason, he wished to destroy himself, that he might prevent the crime to which he felt himself impelled; but his very low forehead shows, that his intellectual faculties were extremely small. The upper part of the frontal bone is flattened, indicating a want of benevolence. The head of the fratricide Dautun, is cast almost in the same mould. When, to such an unfortunate organization, there is joined a want of education and of moral and religious instruction, it is easy to foresee how such a character would terminate, how little soever circumstances might impel him to the crime. It is for this reason, that I insist so strenuously on the instruction of the lower classes, who have far stronger excitements to vice and crime, than others.* How often have we had occasion to observe, that those persons are the really guilty, who suffer the mind of the people to stagnate and corrupt in ignorance and superstition. The following account presents many points of resemblance between Voirin and the author of a crime, committed at Albi, in 1808.

"The court of criminal justice of 'Tarn," says M. Coutele,† "condemned to death, Jan. 21, 1809, a man who was convicted of having killed his brother-in-law. The jury and the spectators were struck with the unwavering ferocity, manifested by this person during the trial. He had the most sinister aspect, and such was the expression of his sombre and savage look, and haggard eyes, that none could see him without a shudder. The judges were convinced they had never seen the figure of a man-tiger drawn in such strong relief.

"The court had followed the traces of his crime, but

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* V. Sect.

† Observations on the medical constitution of the year 1808, at Albi, part II. by M. Coutele, M. D. at Albi, 1809, p. 163 and 165.

no evidence had fixed it upon him as the author, because no witness had seen it. He confessed it himself voluntarily, and of his own accord, and with the utmost sang-froid, detailed every circumstance that attended it. The dreadful story made the large audience that listened to it, shudder with very horror. After confessing all with calmness, and with an air of familiarity with the subject, he declared *that he had been urged on by an impulse to this murder*, adding, *that he could not resist the temptation of killing and shedding blood.* He seemed to be aware, that, if left to himself, his existence would be a calamity to his species.

"In the special examinations, he had already made known a series of crimes, previously committed on his nearest relations. Among others, he made several attempts to poison his mother and step-father.

"The announcement of his sentence did not intimidate him. He heard it without fear or remorse; he declined to appeal, and requested them to hasten his death. He refused all spiritual aid, appeared to be unmoved by the thought of his near destruction, and mounted the scaffold without emotion.

"The great importance," continues Dr. Coutele, from whom I have taken this account, "of ascertaining whether the conformation of the skull in this subject corresponded with his well-known character and the expression of his countenance, induced me not to neglect examining it.

"Decending into the pit, shortly after the execution, I hesitated for a moment to take up the head, which had been separated from the trunk. The eyes glared, and the features retained, to the full, their fierce and threatening expression. I soon found, by the touch, a prominence in the temporal region, just over the ear; having exposed the squamous portion of the bone, I found, on its posterior third, a round bump, from three to four millimetres (0.11811 to .15748 of an inch) high in the centre, and a dozen centimetres (4.7244 of an inch) in circumference at the base. It bore some

resemblance to those little balls of ivory or stone, that children play with. The two prominences were perfectly symmetrical."

The whole region over the ears is more remarkable than in any other cranium. In that of Madeline Albert, of Moulines, it is so developed, that, without exaggeration, it might be thought to have been blown up. (Pl. lxviii. fig. 1.) This monster killed her mother, brothers and sisters with a hatchet. During the preparation for her trial, she spoke continually and with pleasure, of her atrocious deed. For the convenience of the artist in drawing her figure, she willingly placed herself in the attitude she took, when meditating the crime, (Pl. lxix. fig. 1.) Excepting the organ of murder, (vi.) the whole head is but moderately developed. The forehead is low and narrow. From all appearances, this girl had none of the resources furnished by education, for combating the pernicious impulses, to which her internal organization made her a prey.

Since the publication of my large work, I have obtained six skulls and casts of murderers, all of which show the organ much developed, viz.; the cast of Merlin, who murdered his father for refusing him money; that of Boutiller, who murdered his mother for the purpose of robbing her; that of Foulard, who murdered his mistress, in a fit of intoxication, to get possession of her jewels; and that of Guichat, an assassin and robber. These four murderers had, besides the organ of the propensity to murder, so large a development of the organ of the sentiment of property, that there was also a propensity to steal. The next, the skull of a hussar, and pump-maker by trade, who killed his mistress for her infidelities, presents the organ of the propensity to murder only, largely developed.

A society of physicians* charged M. Trolliet, physi-

* I beg these gentlemen to receive my warmest thanks. If such zeal were every where manifested, what progress would not the science make in a few years!

cian of the Hotel-Dieu, to send me a cast of a remarkable criminal, executed at Lyons. His name was Lelievre, and he styled himself Chevalier. He was accused of robbing the bank of France, where he held some office, of sixty thousand francs, (about twelve thousand dollars.) He had poisoned his mistress, and his first three wives, killed two of his children, and robbed another. He was for seven or eight years, employed in the prefecture of Rhone, in quality of chief of the bureau. The cast shows an unfortunate combination of several organs largely developed, viz. those of the propensity to murder, to cunning, and to theft. The organs of calculation, wit, mimickry, &c. are large, with a small development of the organ of circumspection; consequently, we have heedlessness, perverse inclinations, and a temper of mind to be extremely pleased with their indulgence!!

Dr. Spurzheim saw, in the Hunterian Museum, two Carib skulls, which swelled out greatly over the ears. See, also, Pl. lxxiv. fig. 2. vi. the skull of an adult Carib.

I have constantly observed, that bloody spectacles have a peculiar charm to those women in whom this organ is large. They are fond of the chase; they would like to be men, to follow the profession of arms; they bestow their affections on military men exclusively; battles are never murderous enough for their taste; and, in reading the newspapers, their curiosity is excited only by the accounts of murders and executions. Like Aurelian and Louis XI., they are fond of attending executions, and, if decency permitted, they would adopt the example of Catherine de Medicis, and be pleased to make their children spectators of such revolting spectacles.

In the engraving of the Marquis of Toirus, who excelled in the chase, and whose principal passion was that of arms, I observe this organization expressed in a very high degree.

I have elsewhere said, that painters, draftsmen, engravers, and sculptors, sacrifice truth to erroneous

notions of beauty, and endeavor to render less striking those uncommon forms, which they sometimes meet with in their models. Still, there occur, from time to time, forms so striking, that the likeness absolutely depends on it, and then the artist is obliged, in spite of himself, to remain true to nature. In this way we obtain some faithful portraits of remarkable persons. The busts and portraits of Caligula, Nero, Sylla, Septimius Severus, the most cruel and warlike of the Roman emperors; Charles IX., Richard Coeur-de-Lion, Philip II. of Spain, the sanguinary and cruel Mary of England, Catherine de Medicis, Ravaillac, the famous corsair Storzenbecker, the fierce and sanguinary Knipperdolling, (pl. lxix. fig. 2.) and bishop Bonner, who, in the space of four years, sent more than two hundred victims to the flames, all bear the outward mark of a cruel and bloody character.

The action of this organ, when very active, must be necessarily modified by the co-existence of one or many other faculties, equally very active. Combined with love of fighting, it constitutes the warrior, brave to temerity, as well as the invincible brigand. Combined with a high degree of lasciviousness, it constitutes those debauchees, who, like Nero, the author of Justine, and Count Charrolois, stained their debaucheries with blood, and sacrificed the same victims, both to their lust and their blood-thirsty temper.

In treating of the dispositions to theft, pride, devotion, &c., I shall show how they modify the propensity to murder, when they accompany it.

From what has been said, my readers will comprehend, why even Montaigne, who had probably reflected on such facts, could not help expressing the following sentiments:—"I could not be convinced, before seeing it, that there are spirits so brutal as to murder for the single pleasure of the thing; who would hack and hew the limbs of a fellow-being, rack their ingenuity to invent new means of torture, and enjoy the charming sight of the writhings, the dreadful cries and groans of

a man dying in agony,—the utmost refinement of cruelty. *Ut homo, hominem, non iratus, non timens, tantum spectaturus occidat.* Seneca, epist. 90.—2.

"I seldom take a wild animal alive, which I do not restore to liberty. Pythagoras bought them of the fishermen and fowlers for the same purpose. The barbarous treatment of brutes, indicates a natural propensity to cruelty. When the Romans had become accustomed to the shows of the murders of wild beasts, they they were not long in getting to those of men and gladiators. Nature, I fear, has implanted in man some instinct of inhumanity." *

It is proved, therefore, by the natural history of man and brutes—of man, in disease as well as health—that the murderous, or sanguinary instinct, is an innate primitive power, and, consequently, a fundamental quality, resulting from a particular cerebral part, placed just above the ears, in the majority of the carnivorous and omnivorous animals.

VI. Cunning, Trick, Tact, (List, Schlauheit, Kluheit.)

History.

In early youth, I was struck with the character and form of the head of one of my companions, who, with amiable dispositions and good abilities, was distinguished for cunning and trickery. His head was very large at the temples, and naturally inclined forwards. Although a faithful friend, he felt an extraordinary pleasure in employing every possible device to make game of his school-fellows, and mystify them. His natural language was precisely the expression of cunning, such as I have often observed in dogs and cats, when playing together, they wished to give each other the slip. Subsequently,

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* Montaigne, Essais liv. 2. chap. 2.

I had another companion, who, at first sight, was candor personified. No one had ever mistrusted him, but his gait and manner were those of a cat, watching a mouse. He proved false and perfidious, and shamefully deceived his young school-fellows, his tutors and parents. He carried his head as before mentioned; his figure was handsome, and his head exceedingly large at the temples. One of my patients, who died of phthisis, generally passed for a very honest man; after his death, I was struck with the size of his head in the temporal region; and shortly after, I learned that he had cheated his acquaintances, and even his mother, out of considerable sums. At Vienna, I was often in company with a physician of uncommon attainments, whose character for cheating, rendered him universally despised. Under pretence of dealing in objects of art, and of lending on pledges, he fleeced all who put any confidence in him. He carried his trickery and cheating so far, that the government warned the public, through the newspapers, to beware of him; for he had practised his arts with so much dexterity, that he never could be legally condemned. He frequently told me, with an air of sincerity, that he knew no greater pleasure, no more exquisite enjoyment, than that of duping people, and especially those who distrusted him most. As this physician's head was also very large at the temples, I was naturally impressed with the idea, that the essential quality of this character, cunning, is a primitive one, and is manifested by a particular organ of the brain.

Natural History of cunning in man and brutes.

The lower animals make use of innumerable arts for procuring food, and escaping from their enemies. If we bear in mind, that these means are always really the best, the most appropriate to the end in view, and that the faculties of the creatures that employ them are, in every other respect, quite limited, we shall be obliged to

admit in them, a peculiar power, or, if the expression be preferred, a peculiar genius, by which they are inspired. All are acquainted with the stratagems of the cat family, of the marten, of the pole-cat, of the fox, and the diving-birds. Who would believe that the stag and hare often deceive the most experienced hunter and the best trained dogs? They make a thousand turns, leap over bushes and walls, return upon the old track, save themselves, sometimes in the open plain, and sometimes in the coppices, according as they are pursued by greyhounds or blood-hounds; start up other deer and other hares; increase their speed, or retard it when the danger or the need of husbanding their strength requires it. Who has not observed the art, with which a squirrel or wood-pecker turns around a tree, or a marten stretches himself out on a limb, and remains motionless, to prevent his being seen by the hunter?

The fox and wolf, unless pressed by hunger, will rarely levy contributions on their neighborhood; they never forget that they must beware of snares. When warned by the wind that their prey is near, they steal slowly along, but, when at a distance, they fly to approach it. Often, when hunting in packs, will they carefully reconnoitre the course the roe-buck, stag, or hare has taken, and then divide into parties, the more easily to put their victim at bay. In the circus at Vienna, they very frequently put several ducks into a reservoir of water, and then let loose upon them some bears. The moment a bear entered the water, nothing more was to be seen of the ducks. When, after many efforts, a bear succeeded at last in getting a duck, the latter would feign death, so as even to appear stiff and cold; but hardly had the bear laid him on the ground, when the duck fled swiftly back to the water. I must pause, for I should never finish, were I to relate a few only of the facts with which I am acquainted, respecting the artifices of animals.

In man, cunning is displayed in various ways, from his very infancy. There are children, for example,

who, without being indebted to education for the habit, lie continually, and without necessity, alter every fact, and fabricate false reports, even when it would be easier for them to tell the truth.

Who shall depict all the artifices, hypocrisies, cheating and perjury of rich and of poor, of strong and weak, of citizen and warrior, priest and parishioner! "Artful and hypocritical man constantly endeavors to control the expression of his countenance and motions; he is impenetrable, he dissembles bad offices, smiles upon his enemies, checks his temper, disguises his passions, belies his character, speaks and acts contrary to his sentiments; all these are but refinements of the single vice, falsehood."*

Every body knows, that there is a class of people that take a pleasure in artifice, dissimulation, perfidy, falsehood, circumvention, duplicity, and lying; and that there are others, who act with rectitude and speak with frankness. All that I can say on this subject particularly, is, that neither the character of the disguised, artful, intriguing and perfidious man, nor that of the frank and upright man, is the result of their own will alone; but that these different kinds of character result from a particular organization.

Seat of the organ of Cunning, and the character by which it is manifested externally.

In the brain, this organ is situated above and a little in front of the organ of the carnivorous instinct, (ix. pl. viii. and ix. pl. xi.) It forms on the head and cranium a prominence swelling out and extending longitudinally from behind, forwards, and terminating above an inch from the upper superciliary arch, (ix. pl. xxviii.) When the organ of the carnivorous instinct is very much de-

* The Courtier of la Bruyere.

veloped, we may easily confound it with that of cunning, unless we bear in mind that the latter is placed higher up, and further forwards on the temples; and that, instead of forming the segment of a sphere, it extends longitudinally. When both are large, the whole side of the head and skull forms one large, full prominence, as in vi. ix. pl. xxvii.

This organ requires particular study in each species. In the most common species of ape, for example, it commences above the origin of the zygomatic arch, and extends forwards to nearly the middle of this bone. Its situation is the same, in the tiger, cat, and fox. Generally speaking, without excepting the frugivora and the birds who are remarkable for their cunning disposition, the region above mentioned is very prominent in the lower animals. Observe persons, whose head is very prominent on the sides and flattened on the top, and you will always find them false, artful, perfidious, venal, vacillating and hypocritical. Such persons overwhelm you with politeness, and deafen you with flattery; they make you feel at home with them, that they may unsuspectedly lay their plots against you, and the more easily work your ruin.

When a considerable development of this organ is combined with a large development of the higher qualities or faculties, its activity is capable of receiving a legitimate and useful direction. Persons thus endowed have considerable tact, (*savoir faire*,) they are very well suited to perform secret missions; and, naturally disposed to intrigue themselves, they have a wonderful facility in scenting out, and penetrating into the intrigues and cabals of those with whom they are negotiating conflicting interests; consequently, they are capital people to oppose to those of a similar character. At Paris, I was shown a personage of this kind, M. de S——, and at first sight, I divined his character in respect to this quality. Being told of the opinion I had formed concerning him, he was quite enchanted, and commenced a conversation with me, in which he detailed at

length the means he was accustomed to use, in accomplishing the objects of the various missions with which he had been entrusted. He was one of the most skilful diplomatists the government had ever employed.

I once dined with a family, the mother of which, one of the sons and one of the daughters, presented this same organization in a very high degree, while the utmost frankness and sincerity were displayed. Spurzheim and myself determined to keep these three individuals in view, and during the nine years our acquaintance with them continued, we found that our first opinion was but too often confirmed. The same thing occurred, relative to a young woman who seemed innocence itself. Again, no one ever seemed so glad to receive us; no one, with a more yielding, sweet and winning air, overwhelmed us with so much politeness and flattery as a certain professor; but his organization warned us to be on our guard. It was this same very polite professor, who has often undertaken to decry our labors by metaphysical and philosophical declamations, though always prevented from entering thoroughly into the subject, by the weakness of his means and the evidence of my doctrines.

In houses of correction, we have found this quite large, in those who had committed the offences of which they were guilty, under circumstances of considerable cunning and perfidy. Never, for example, within our experience, did a robber, endowed with an ordinary development of the organ of cunning, commit an ordinary theft; for, in fact, he would steal only when the larceny required consummate address. A robber of this class is delighted and amused, with detailing all the means he has used in arriving at his ends, and omits none of the comical circumstances of the adventure. When the organ of cunning predominates over that of theft, the thief is not strongly disinclined to restore the stolen object, provided always he has an opportunity of proving his skill in committing the theft.

In hospitals for the insane, we have met with this

organization, in patients who were addicted to cheating tricks during the paroxysm, but especially in those who were impelled to them by an irresistible impulse: examples of this nature are not rare. Pinel relates several, and he proves that this disposition depends on a particular organ.

The writer, with this organ large, will choose the department of romance. The poet, will have great facility in skilfully combining his fictitious or real events, in such a manner as to work up his story ingeniously, and bring it to an unexpected denouement.

In war, this organ inspires the general with stratagems, by which he surprises the enemy, conceals his force, masks his designs, and makes feigned marches and false attacks. As this organ always supposes an intention, a plan,—it also plays a peculiar part in society. It sees a settled design in the most innocent words and actions; a forced construction is put upon every thing, and they would often make us responsible for what we never even thought of. The portraits of Caracalla, of Catherine de Medicis, of Claudine Alexandrine Guerin, and of Tencin, all of whom were fond of intrigue, present us with examples of this organization The development of this organ, like that of all the rest, is capable of being favored by the influence of climate, and perhaps, also, by customary occupations. Artifice and perjury appear to be characteristic of certain nations, (*græca fides,*) while others believe themselves irrevocably bound, when they have once shaken hands upon a bargain.

Again; I remark, that we must be careful not to confound this character with that of certain persons, who, from a want of good sense, never conduct with straightforward frankness, and are constantly twisting one way and another, and who, therefore, get the reputation of being intriguers. But they are not actuated by a spirit of intrigue; for the excuses they offer for their conduct, still more than the action itself, show a silliness of character.

What is the primitive faculty of this organ? "When," says Spurzheim, "I consider the mental operations of man and brutes that possess this organ, particularly, when I observe the natural language of cunning creatures, it appears to me that the primitive faculty is the instinct to conceal. Cunning animals conceal with adroitness. The cat pretends to be asleep, and the moment the cook's back is turned, he runs away with the meat. Mice he watches for, without the slightest motion of body. The dog, to keep a bone to himself, hides it in the ground. Cunning men, in a thousand ways, betray the instinct to conceal; they often will utter a falsehood, to get at the truth; exaggerate the good, to learn the evil; and attribute suppositious virtues to those whose faults they are anxious to know. The primitive faculty, therefore, is always the same, whether the concealment refers to intentions, ideas, persons, or things. I propose to call this propensity, *secretiveness*."

In all these actions of men and brutes, I see only cunning, dissimulation. Why crowd the language with terms, the meaning of which nobody can divine?

"Cunning," says Demangeon, "appears to me to be a conspiracy of all the intellectual organs against the effects of force, malevolence, and injustice. Hence force and power, as such, disdain its use, and have recourse to it, only when incompetent to undertakings of doubtful success, or attended with danger. Cunning consists in eluding injurious measures, and preparing successful ones, the knowledge of which, by Gall and Spurzheim, is attributed to many faculties. There seems to me a contradiction, in supposing that this is able to elude and to obtain, what it is not able to know. Our authors place the organ of cunning, as well as the organs of theft and circumspection, in a lateral swelling of the brain. But this swelling indicates only a voluminous brain, and, consequently, faculties more numerous and more largely developed, which ought to be accompanied with more intellectual resources, and, consequently, a greater aptitude to foresee and obtain success of every kind.

This shows how easily we may be imposed upon respecting the situation of the organs, for want of precise ideas relative to the faculties to be attributed to them. I, therefore, had some reason for saying, that, to determine the faculties, we must know exactly their sphere of activity; we must have determined them rigorously. Here, then, is the mountain, at whose foot our authors stand; and we would take it kindly of them, if they would turn about, and show us some way of climbing over it.

"But this propensity encroaches on the sphere of circumspection, and is therefore supererogatory; or, it leads to stratagems, and to all kinds of surprise and deception, that the organs of courage, of destruction, of the generative power, of theft, love of offspring, &c., can suggest; and again it is supererogatory. I conclude from these reflections, that neither cunning, nor the propensity to conceal, can constitute a special faculty, and are not to be considered as general attributes, or acts of free-will."

In each objection, the reasoning of Demangeon takes, and is obliged to take, a different turn, by which the previous objections are subverted. Just now Demangeon reduced all the instincts, all the faculties, the generative instinct, philoprogenitiveness, attachment, courage, carnivorous instinct, circumspection, theft, &c., to a simple conservative instinct; and, as all the functions of the organism, even those of the five senses, are designed for our self-preservation, ought not the conservative instinct to be considered the immediate source of all the other instincts and faculties? In his objections to cunning, Demangeon, in place of all the faculties and propensities, would substitute free-will. It is this free-will, which, in the cuckoo, refuses to take care of its offspring; which, in the squirrel, constructs a nest; which, in the stork, migrates; which, in the nightingale, sings; which, in the ferret, sucks the blood of the rabbit, &c. Give the name of *mind*, or *soul*, to Demangeon's free-will, and we shall again be able to dispense with the brains and its different organs altogether. We

have no fear of being charged with inconsistency in relying upon a more voluminous brain, to explain the phenomena of a more complex, and wider intelligence; and, if this intelligence is manifested by instincts, propensities, and faculties altogether different, according as the brain is more voluminous in the inferior-posterior regions, or the superior-anterior, or lateral regions, we have only to say, that it is the free-will, which, independently of all these conditions, impels to gratification, to acts of cunning, to murder and robbery, or to religious thoughts, and philosophical conceptions. Cunning appears to Demangeon, to be a conspiracy of all the intellectual organs against the effects of force, malevolence, and injustice. This high moral conception, so admirably fitted to cloak the little intrigues of coquetish women, is perfectly established by the conspiracy of so many intellectual faculties in certain idiots and maniacs, who, entirely destitute of common sense, in all other respects, are inexhaustible in the arts of cheating and cunning. This conspiracy of the intellectual organs is also very striking in the artifices of the fox, the diving birds, the sparrow, and particularly the hare, which so often deceives the best trained dogs, and all the intellectual organs of the oldest hunters. Lo, the sublime achievements of reason, when it exercises its powers at the expense of observation!

VII. Sentiment of Property; Instinct of Providing; Covetousness; Propensity to Theft, (Eigenthumssinn, Hang zu stehlen.)

History.

The errand-boys, and others of that class of people, whom I used to assemble in my house in great numbers, would frequently charge each other with petty larcenies, or, as they called them, *chiperies*, and took great pleasure in pointing out those who excelled in these prac-

tices; while the *chipeurs* themselves would come forward, proud of their superior address. What particularly struck me was, that some of these people showed the utmost abhorrence of thieving, and preferred starving to accepting any part of the bread and fruits their companions had stolen; while the *chipeurs* would ridicule such conduct and think it very silly.

When I could assemble a considerable number, I would often divide them into three classes. The first would include the *chipeurs;* the second, those who had an abhorrence of theft; and the third, those who regard it with indifference. On examining their heads, I was astonished to find that the most inveterate *chipeurs* had a long prominence, extending from the organ of cunning, almost as far as the external angle of the superciliary ridge; and that this region was *flat* in all those who showed a horror of theft; while, in those who were indifferent about it, the part was sometimes more and sometimes less developed, but never so much as in the professed thieves.

These observations were not long in impressing me with the idea, that the propensity to steal might also be the result of organization. All the subjects of my observations were mere children of nature, left exclusively to themselves. None had received the least education, and their conduct, therefore, might well be regarded as the result of organization. Those who detested stealing, were often the very ones whose education had been completely neglected. The wants and circumstances of all of them were nearly the same, and the examples set before them were the same. To what cause, then, could the difference be attributed?

At this time I was physician to the Deaf and Dumb Institution, where pupils were received, from six to fourteen years of age, without any preliminary education. M. May, a distinguished physiologist, then director of the establishment; M. Venus, the teacher; and myself, had it in our power to make the most exact observations

on the primitive moral condition of these children. Some of them were remarkable for a decided propensity for stealing; while others did not show the least inclination to it. The most of those who had stolen at first, were corrected of the vice in six weeks; while there were others, with whom we had more trouble, and some were quite incorrigible. On one of them, were several times inflicted the severest chastisements, and he was put into the house of correction; but it was all in vain. As he felt incapable of resisting temptation, he wished to learn the trade of a *tailor;* because, as he said, he might then indulge his inclination with impunity.

The more active and incorrigible the propensity to theft in these young people, the more indubitably was my first observation confirmed. Here, too, education could not come into the account; for, from the moment they came into the institution, their wants, their instruction, and the examples before them, were all the same. I was therefore obliged to conclude, that the propensity to steal is not an artificial product, but *is natural* to some people, and inherent in their organization. I took casts of the heads of all the confirmed thieves, to increase my means of comparison.

At this time, there was in the house of correction, a lad, fifteen years old, who had been a thief from his infancy, notwithstanding all the punishment he had received, and was finally condemned to confinement for life, as absolutely incorrigible. He is the same mentioned in vol. i. sect. v. His head was small and unsymmetrical, (pl. xxvi;) and the forehead very retreating. His intellectual powers were so far below mediocrity, that I was astonished the incorrigible nature of his thieving propensity was not always attributed to this circumstance. In him, the region just mentioned, is very prominent, and the corresponding cerebral part was the only one very active; and as its activity was not balanced by the action of other parts, and the subject was incapable of higher motives, it became predom-

inant. This case was conclusive proof to me, that the propensity to theft, is produced by a particular cerebral part, or has its proper organ.

Two citizens of Vienna, who had always lived irreproachable lives, became insane, and from that time they were distinguished in the hospital for an extraordinary propensity to steal. They wandered over the hospital, from morning till night, picking up whatever they could lay their hands on,—straw, rags, clothes, wood, &c.,—which they carefully concealed in the apartment which they inhabited in common; and though lodged in the same chamber, they stole from each other. In both, the cerebral part in question, was very much developed, and the corresponding region of the skull very prominent. The case of these two persons proves, that a man, whose intellect is not quite too feeble, may, in health, overcome the unfortunate impulses of certain organs. It proves, also, that the propensity to steal, proceeds from a particular cerebral part; for a quality which, independently of all others, may be carried to such a pitch of activity, as to deprive the individual of all control over the actions that result from it, must be referred to a cerebral part, independent of all the rest.

These facts were enough to induce me to pursue the natural history of the propensity to theft. My readers being probably acquainted with all that remains to be said on this subject, it will not be difficult to convince them, that the propensity to theft is innate, and has its proper organ.

Natural history of the propensity to steal.

The following cases, from the fifth section of the first volume, page 256, conclusively prove, that the propensity to steal is not the result of moral depravement, nor of a defective education, but is an inherent quality in human nature.

Victor Amadeus I., King of Sardinia, was in the con-

stant habit of stealing trifles. Saurin, pastor at Geneva, though possessing the strongest principles of reason and religion, frequently yielded to the propensity to steal. Another individual was, from early youth, a victim to this inclination. He entered the military service, on purpose that he might be restrained by the severity of the discipline; but having continued his practices, he was on the point of being condemned to be hanged. Ever seeking to combat his ruling passion, he studied theology and became a capuchin. But his propensity followed him even to the cloister. Here, however, as he found only trifles to tempt him, he indulged himself in his strange fancy with less scruple. He seized scissors, candlesticks, snuffers, cups, goblets, and conveyed them to his cell. An agent of the government at Vienna had the singular mania for stealing nothing but kitchen utensils. He hired two rooms as a place of deposit; he did not sell, and made no use of them. The wife of the famous physician Gaubius, had such a propensity to pilfer, that when she made a purchase, she always sought to take something. Countesses M., at Wesel, and P., at Frankfort, also had this propensity. Madame de W. had been educated with peculiar care. Her wit and talents secured her a distinguished place in society. But neither her education nor her fortune saved her from the most decided propensity to theft. Lavater* speaks of a physician, who never left the room of his patients without robbing them of something, and who never thought of the matter afterward. In the evening his wife used to examine his pockets; she there found keys, scissors, thimbles, knives, spoons, buckles, cases, and sent them to their respective owners. Moritz, in his experimental treatise on the soul, relates with the greatest minuteness the history of a robber, who had the propensity to theft in such a degree, that, being "in articulo mortis," at the point of death, he stole the snuff-box of

* Physiognomie, Edit. de la Haye, t. ii. p. 169.

his confessor. Doctor Bernard, physician of his majesty the king of Bavaria, speaks of an Alsatian of his acquaintance, who was always committing thefts, though he had every thing in abundance, and was not avaricious. He had been educated with care, and his vicious propensity had repeatedly exposed him to punishment. His father had him enlisted as a soldier, but even this measure failed to correct him. He committed some considerable thefts, and was condemned to be hanged. The son of a distinguished literary man offers us a similar example. He was distinguished among all his comrades for his talents; but, from his early infancy, he robbed his parents, sister, domestics, comrades, and professors. He stole the most valuable books from his father's library. Every kind of means was tried to correct him: he was sent into the service, and underwent several times the most rigorous punishments: but all was useless. The conduct of this unhappy young man was regular in all other respects; he did not justify his thefts; but, if they addressed to him on this subject the most earnest and the most amicable representations, he remained indifferent; he seemed not to understand them. The almoner of a regiment of Prussian cuirassiers, a man otherwise well educated and endowed with moral qualities, had so decided a propensity to theft, that on the parade he frequently robbed the officers of their handkerchiefs. His general esteemed him highly; but as soon as he appeared, every thing was shut up with the greatest care; for he had often carried away handkerchiefs, shirts, and even stockings belonging to the women. For the rest, when he was asked for what he had taken, he always returned it cheerfully. M. Kneisler, director of the prison at Prague, once spoke to us of the wife of a rich shopkeeper, who continually robbed her husband in the most ingenious manner. It was found necessary to confine her in gaol; but she had no sooner escaped than she robbed again, and was shut up for the second time. Being set at liberty, new thefts caused her to be condemned to a third detention longer

than the preceding. She even robbed in the prison. She had contrived, with great skill, an opening in a stove which warmed the room, where the money-box of the establishment was placed. The repeated depredations she committed on it were observed. They attached bells to the doors and windows to discover her, but in vain ; at length, by the discharge of pistols which went off the moment she touched the box, she was so much terrified that she had not time to escape by the stove. In a prison at Copenhagen, we have seen an incorrigible robber, who sometimes distributed his gains to the poor. In another place, a robber shut up for the seventh time, assured us with sorrow, that it did not seem possible to him to conduct otherwise. He eagerly begged to be retained in prison, and to be furnished with the means of gaining his living.

To these facts, I would also add some others. At Munster, a man was condemned to imprisonment for eight years, on account of some robberies. He was no sooner liberated, than he committed fresh depredations, and was thereupon imprisoned for life. Sixteen years afterwards, he revealed a conspiracy which had been formed among the criminals, and it was proposed to reward him by setting him free. The judge objected to this, that it would be dangerous to do so; as the man himself had previously assured him, that his thievish propensity was so rooted in his constitution, that he could not by any possibility resist it. About a year after, he escaped from prison, betook himself to his old practices, and was again arrested; shortly after which, he hanged himself. "During the ten years that I had known this man in prison," said Wernsking, from whom we had these facts, "he was remarkable for activity, and devotion during divine service; but I learned, after his death, that he was constantly committing petty larcenies, even in the prison itself."

In the most of these cases, the persons were mastered by the unhappy propensity to theft, from no defect of education, or weakness of intellect, nor even necessity. Nei-

ther have I quoted these cases, because they are rare; for the like may be daily seen, though they are always wrongly considered, because people start from the idea that our actions are solely determined by our will. What can be more important to the moralist, legislator, and judge, than a knowledge of the true sources of criminal actions?

Undoubtedly, defect of education, superstition, bad examples, &c., are just so much food for vicious propensities. We have always observed, as has been already mentioned, that crimes of every description are frequent in a country, in proportion to the neglect of education and instruction. Still these unfavorable circumstances would not produce the propensity to theft, if it were not inherent in our nature.

Among all nations, and at all times, theft has held the most conspicuous place among offences. Few men can lay their hand on their heart and say, "I never stole," especially if they go back to their childhood. In the majority of men, the propensity to theft must be incessantly combated by powerful motives, penal enactments, and religious sanctions. What variety in the forms of theft! How long the chain, from the most petty larceny to rapine and piracy!

In war and litigation, in the administration of the property of orphans and minors, in commercial transactions, in almost every mode of gaining a living, even in many establishments created or protected by the government, such as lotteries, games of chance or skill, &c., sponging, cheating, theft, piracy, and pillage, may be seen in every direction. The most ardent panegyrist of human nature has never succeeded in freeing it from the stigma of an almost universal propensity to fraud.

The whole difference consists in the amount. In one, the propensity is held in check by a happy organization; in another, by the influence of education, the force of habit or the fear of punishment; in a third, the vicious disposition is produced by an organ so powerful, that the same motives, which would have made any body

else an honest man, have no influence on him. It is the *power* of this propensity to steal, towards which the attention of the legislator and the judge should be directed. The theft, or value of the object stolen, are accessory circumstances; it is the gradation of the propensity, the useless attempts to reform, the relapses, the indifference of the criminal, the absolute want of repentance, the effrontery and insolence with which robbers boast of their crimes,—these are what should require the attention of the observer.

I find nothing better suited to the nature of man, than the institutions of certain states. For the first offence, the criminal is removed, not to prison, but to an establishment, whose object is to reform him; and when he has been prepared, by moral and religious instruction, to lead a regular life, and can provide for himself, he is restored to society. At each relapse, however slight, the penalty is increased, and it is not, till after numerous relapses prove that he is incorrigible, that he is excluded forever from society. Before pronouncing this final sentence, every chastisement is avoided, that would prevent the individual from re-appearing among his fellow-men, in case he should alter his conduct. Exposure in iron collars, branding, advertisements in public prints, &c., we look upon as directly contrary to the end proposed, anti-philanthropic, and pernicious. When will wise legislation, like that just mentioned, be generally adopted? Alas! how far are we yet from it in a country, where, almost daily, they prevent the penitent offender, by infamous punishments, from returning to the paths of honor! He is forced, we may say, to support his existence by banding with criminals, whom society has rejected from its bosom. All those robber-bands, composed of men marked with the seal of infamy, that pillage on the highways, and even in towns, are a striking proof of this sad truth. We are forced to acknowledge, that the means at present employed for reforming offenders are insufficient. In the *Annales politiques, morales et litteraires*, 1818, Oct. 24, it is stated, that, "the case

that occupied the Court of Assizes to-day, most clearly and strikingly proves, that the majority of liberated criminals finally die impenitent. Whether they are debased by their residence in prison, or are naturally inclined to crime, they nearly all re-appear before the Court of Assizes, stained with new crimes."

Natural history of the propensity to Theft in disease, with remarkable weakness of understanding.

Here again I quote some cases, already mentioned in the fifth section of the first volume.

Among the young boys who were brought to us in one of the prisons of Berlin, (Stadt-Vogtey,) there was one who particularly attracted our attention. We advised that he should not be set at liberty, because he would not be restrained from a continuance of his robberies. We added, that the best thing which could be done, was to keep him always in a place of security. We communicated our reasons to those who accompanied us. They consulted the register, and found, to their great surprise, that this young boy had, from his earliest infancy, shown the most obstinate propensity to theft. Our adversaries availed themselves of this opportunity, to place in the strongest light what they were pleased to find frightful and dangerous in my doctrine. "To condemn," said they, "a young boy to perpetual imprisonment, because he has committed a theft, what can be more cruel or more revolting to humanity?"

What reason had we, then, to give this advice? I have already made evident, that we ought to consider man in two points of view; first, as having qualities common with animals; that is to say, those of an inferior order; then, as being endowed with the character of humanity, or with qualities of a superior order. I have also shown that man, in virtue of his superior qualities, is capable of subduing and directing his propensities of an inferior order. But, if the qualities of a

superior order are controlled in an extraordinary manner, to such a degree that their free action is prevented, while those of the inferior order, on the contrary, are active, then the animal part of the man predominates exclusively, and the flesh, or the brutal desires, hold in subjection the spirit, or the dispositions of the superior qualities, which are hardly developed. With such an organization for the functions of the soul, which belong to a superior order, the same happens which takes place in regard to each organ whose development is defective; that is, there results a relative imbecility, and, in consequence, the incapability of acting morally; while the propensities of an inferior order act with uncontrolled energy. Such an individual finds himself under the absolute necessity of acting solely from the impulse of the passion which governs him, and his organization often places him in a worse state for self-government than that of a well-organized animal. This imbecility does not always exclude other very active properties which are common to animals, such as that of cunning; so that this same individual, even while abandoning himself to a guilty and irresistible inclination, seems, in this respect, to act with reflection and deliberation. It is thus, that the most stupid idiots often find means the most ingenious to satisfy their brutal wantonness, or their mischievous desires.

Such was the condition of the young robber of whom I have just spoken. The superior organs had but a defective development; that organ, on the contrary, whose too great activity leads to theft, had acquired a great degree of development and energy, and this mischievous quality was likewise seconded by the activity of cunning. This man was short, and thick set; his forehead was very low, depressed back immediately above the eye-brows, very sloping laterally above the eyes, but broad and saliant towards the temples. His physiognomy announced no attention for reasonable subjects; nothing could be there discovered but cunning and malice. Was it, then, very difficult to conclude from

the organization of this simpleton, that he must be incorrigible?

In the history of the propensity to theft, I mentioned the case of a young man, fifteen years old, half imbecile and incorrigible, who died in the house of correction, at Vienna.

"We saw in the prison of Berne, a boy of twelve years, ill-organized and rickety, who could never prevent himself from stealing; with his own pockets full of bread, he still took that of others. At Haina, the overseers gave us a long account of an obstinate robber, named Fesselmayer, whom no corporal punishment could correct. In the prison he stole every thing he saw; and they had put on his arm a card which served as a mark of disgrace, warning others not to trust him. Before seeing him, we anticipated what his organization must be, and our expectation was confirmed at the very first glance. He appeared about sixteen years of age, though in fact he was twenty-six. His head was round, and about the size of a child of one year. This individual was also deaf and dumb, which often happens in cases of mental imbecility."

The following case was communicated to me, by M. Esquirol. "A knight of Malta, the son of an officer, and carefully educated, quitted the army, like all the gentlemen, at the beginning of the French revolution. Having retired to the country, he gave himself up to excessive indulgence in the pleasures of love. When thirty-five years old, his parents and friends perceived that his intellectual powers were beginning to be enfeebled; that he was not so cheerful; that he often lost his memory; and that the object of his passion was a source of extreme chagrin. He became restless, quarrelsome, impudent, insulting men and women, and finally a thief. The propensity to steal was so strong, that, when dining at inns, he would pocket his plate, &c., and his conduct was no different when in the houses of his friends or strangers. He was obliged to travel eighty leagues to get to my establishment; and during his journey, though accompanied by several persons, he always

found means to steal the plates at the inns; and if he could not cram them into his pockets, he would slip them into his boots. At my house, he was permitted to walk, accompanied by his servant, and in every other respect he was rational. He would go into the café, and instead of paying for what he had, would come away with the spoon and cup and saucer in his pocket. At table, I seated him near myself, and the first time he slipped his hand along to get the plate, I stopped him, and exposed him before the whole company. This lesson was sufficient; and, for more than eight days afterwards, he took care to remove his plate towards the middle of the table, either to prevent temptation, or to convince me that he was not stealing it. This disposition to theft was perfectly cured, although his head remained weak."

In the first volume, I mentioned the case of a young man, who, after a severe wound on the temple, was trepanned by Acrel. After leaving the hospital, he, contrary to his ordinary disposition, manifested an invincible propensity to steal. After committing several larcenies, he was imprisoned, and would have been punished according to law, if Acrel had not declared him insane, and attributed his unfortunate propensity to a disorder of the brain.

Natural history of the propensity to steal in insanity.

In the history of this propensity, I have already remarked, that certain maniacs are irresistibly impelled to steal. M. Pinel, also, has frequently observed, that such persons, though models of probity in their lucid intervals, could not help stealing and cheating during the paroxysms; taking every thing they could lay their hands on, entering the cells of the other inmates, and carrying off whatever they could find. I have also mentioned the cases of four women, who, ordinarily, had no inclination to steal, but who, when pregnant, were excited to it by a strong propensity.

The *Journal de Paris*, 29th March, 1816, states,

that, "An ex-commissary of police, at Toulouse, Beau-Conseil, had just been condemned to eight years' confinement and hard labor, and to the pillory, for having, while in office, stolen some pieces of plate from an inn. The accused persisted to the last in an odd kind of defence; he did not deny the crime, but attributed it to mental derangement, produced by wounds he had received at Marseilles in 1815." I am far from wishing to criticise the sentence of the court; but certainly, if the conduct of Beau-Conseil had been irreproachable before he was wounded, and he had really received wounds on the head, either his counsel was inexcusable, in not availing himself of these facts in his defence, or the court was blamable in not listening to it.

All these cases of irresistible theft, and I might relate many more, will no longer suffer the friends of truth to doubt the existence of an innate propensity to steal. The most scrupulous philosophy must be silent before facts, which all times have presented, and which are still of daily occurrence. All the reproach that has been heaped upon my doctrines, on account of the thieving propensity, have never deterred me from speaking of it publicly. Never should the naturalist so degrade himself by fear, or hypocritical compliances, as to profane the sanctuary of truth.

Thus far, I have conducted my reader by a path to which nature herself had directed me; and I presume that the facts I have related, have awakened in his mind the same painful sensation which they did in mine. In all the other qualities of man, we discover a necessary end, a beneficent institution; while here, we suddenly encounter a propensity, in direct opposition to social order.* But, I may be asked, have we not here one of those cases, where the manifestation of the quality, as

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* With regard to Gall's organs of '*theft*' and '*murder*,' the views of Spurzheim are generally adopted by Phrenologists. "We may inquire," says he, "whether stealing is natural; and if so, the effect of a special propensity? To answer in the affirmative, is both irrational and dangerous: irrational, because the Creator could not bestow any

I have observed it in subjects who had it very largely developed, was only the result of its excessive activity, but is, by no means, the fundamental quality itself? Let them continue to follow me in my observations, and they will, to a certain degree, soon see that I am in accordance with nature.

On the innate sentiment of Property.

While embarrassed by the revolting idea of an innate propensity to theft, I thought of the following objection: Theft supposes property, but in nature there is no such thing as property; it is only the result of certain social conventions; therefore, there can exist no innate propensity to theft, nor organ of such propensity.

In all my public courses of lectures, I have noticed this objection, and refuted it. The opponents of organology have universally received it, as an unanswerable argument against the existence of the propensity to steal, and they have been busy in making it known. Although my reply may be found in the numerous works of my pupils; yet all my opponents have been dishonest enough to pass it over in silence, and have made the public acquainted with the objection only, for they calculated upon it for a certain victory. Let us see, therefore, if property does not really exist in nature, and whether property has produced the laws, or the laws, property.

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faculty, absolutely hurtful, on man; dangerous, because it would apologize for acts, punished as crimes by law. Theft must depend upon a certain faculty, and this must be manifested by means of an organ; but theft being injurious, can only be an abuse of that faculty."

In relation to the organ of '*murder*,' Spurzheim says,—"Gall formerly called this organ that of murder, because he discovered it of large size in the heads of two murderers; but no faculty can be named from its abuse. The error Gall committed, however, was natural, for the functions of all the organs are most easily discovered in their state of extreme development, when they are very apt to produce abuses. Such, then, was the origin of this erroneous name of a faculty, whose well-regulated employment is, like that of every other, essential to life." [Ed.]

Property is an institution of nature in brutes.

Brutes have none of those laws and social conventions, from which property is said to result in man; yet property does exist with them, and they have a strong sense of it, too. They have their fixed abode, and the ardor with which they defend it against all usurpation, proves well enough that they consider it their property. When there is any fear lest the soil they occupy, should prove insufficient for their support, they are careful to drive away immediately every intruder. A certain number of chamois will inhabit a certain mountain, upon which they will suffer no other whatever to come. The wolf, fox, hare, marten, &c., occupy a district of a size proportioned to the quantity of nourishment, from which they instantly drive away all intruders. They who imagine that wild beasts wander at hazard through the woods, are deceived; for each of these animals has, in fact, a chosen abode, which it never abandons, unless forcibly driven away from it. When they are obliged to leave it, in the rutting season, or on account of inundations or the chase, they return as soon as circumstances will permit. The same pairs of storks, swallows, nightingales and redbreasts, return in the spring or in autumn, to the same country in which they had passed the season the preceding year, and establish themselves; the storks on the same steeple, the swallows under the same roof, and the nightingales in the same bushes. If another pair of birds attempt to seize the place already appropriated, war is immediately waged against them, and the intruders are forced to depart. These facts are known to every hunter and naturalist, and my own observations have confirmed them. He who would repeat them, must mark the old and not the young ones; for, with the lower animals, as with our own species, the parents remain in their establishment, and the young people go out.

Cows, returning from pasture, are observed, not only to enter their usual stable, but each one to take its own place and suffer no other to occupy it. We see the same thing in respect to geese and pigs. Each one of the thousand bees that come home loaded with honey, enters its own hive, and wo to the pilfering bees that undertake to lay a foreign hive under contribution! With what courage do all creatures defend their nest, their female, their young! What rash intrepidity will not the dog display in his master's house! Warmed, by the sense of property, how boldly he defends his bone against a stronger dog than himself! The stag leading along his harem, with a proud step and a firm look, seems to threaten every one that would encroach on his rights. Among the lower animals, a leader never yields the prerogatives obtained by his strength and address, and sanctioned by all the members of the republic. The dog and cat, in hiding food to be used when hunger returns; and the squirrel, hamster and jackdaw, which collect provisions for the future, undoubtedly have the notion of property in the stores they accumulate. If they have no such notion, why this ardor in collecting provisions, this anxiety to conceal them? Where do we see in nature such a contradiction between the instincts of animals and the end of those instincts? The manners of brutes, therefore, prove that the sense of property is inherent in their nature.

Property is an institution of nature in man.

The opinion is constantly thrown out, even now, that the idea of property is unknown to the savage. "The idea of property," says Cuvier, "does not exist in savages, and they cannot have the same notion of theft as civilized nations have." But, let us see what travellers, such as Lafitan, Charlevoix, and the history of the Caribs teach us on this subject.

In a tribe that subsists by hunting or fishing, the

weapons, tools and skins of an individual, are his only objects of property, but still, they are always property. The nourishment of to-morrow is still living and roaming free in the forests, or concealed in the waters, and it must be taken, before it can become property; and even then, when taken by several who have united to hunt or fish in common, it belongs to the company. It is used for present need, or set apart for the public store; so that it is still property; not of one, but of all who helped to acquire it.

All savage nations, which, in addition to hunting, attend to some rude kind of agriculture, as in almost every part of America, always go upon the same principle, in respect to goods and the fruits of the earth.

The women labor in common, as the men hunt in common, and after sharing the work of cultivation, they share the products of the harvest. The extent of soil that is cultivated, as well as the district they are accustomed to hunt over, is considered the property of the nation, but it is not apportioned by it to the individuals of the nation. They go in bands to prepare the soil, sow, plant and reap. The harvest is gathered into the public granary, and finally distributed to the different families for their subsistence. When the nation trades with strangers, the goods even thus obtained are put into the common stock.

In the same way that the skins and the bow belong to the individual, just so do the lodge and its utensils belong to the family; and, if the women are charged with the domestic cares, it appears that they own the domestic property. The children are considered to belong to the mother in all cases. The males remain in the lodge where they were born, till they marry; but on that event, they change their abode, and become an acquisition to the family into which they marry. The hunter and the warrior are considered by the mother of the family as part of her wealth, and are reserved for dangers and important actions,—a sufficient proof, certainly, that property exists as well among savages as with us.

The youngest children, who are anxious for playthings, have a notion of property. The boy must have his soldiers, and the girl, her kitchen utensils. What terrible outcries, when other children are carrying off 'my shells, my butterflies, my birds' nests!' We have, each one, his books, pens, and little garden. If we would have the hens, rabbits, and birds well taken care of, they must not be owned in common, but one by him, another by you, and a third by me. Who would trouble himself about the property of another? And when the man has grown up, and become a husband, head of a family, a citizen, and man of business, how could he be expected, without a sense of the rights of property, to display the least activity? How could he desire to possess certain things, unless he supposed a respect for property in others? And, generally speaking, if this sentiment did not exist, how could we conceive of a state of society?

Henry Home* (Lord Kaimes) has already proved, that property is not based on social conventions, but on a particular internal sentiment, and that every encroachment on the property of another, is contrary to another sentiment—that of justice and equity—which is equally innate. Man, in fact, unlike the carnivorous animals, who, when their hunger is appeased, yield themselves to repose, has, independently of the instinct which impels him to seek for nourishment, a desire to possess other things besides. He needs quiet and a mixed diet; and he therefore gives up hunting and fishing, and procures flocks, which furnish him a more certain means of subsistence. He ploughs up a patch of ground, clears it of weeds, sows it and reaps the harvest; thus the land gradually becomes the property of man. He makes provision for the different seasons, and anticipates want; in this respect, he acts like the brutes, obeying a law

* Essays on the principles of morality and natural religion, 3d ed. 1779, chap. vi. Justice and Injustice.

much less liable than his reason, to lead him astray—a natural and innate propensity to make provisions. This propensity, without the sense of property, would be as inconceivable in man as in the brutes. He would be incessantly making provisions, yet knowing beforehand that his trouble would be lost. Would not man, in this case, be in contradiction with himself? Without the sentiment of property and respect for property, there would be only the right of the strongest; and without this sentiment, what should induce even the strongest to appropriate the provision of the weak, the more industrious? So, therefore, the case of him who stores up provisions, as well as he who plunders them, proves the propensity to own property and its foundation in nature. We attach far more value to a horse, an ox, a house, or garden, when they are our own property, than when we have merely the temporary use of them. Whence comes the universal belief of the injustice of theft and piracy, if the possessor have no right of property to the stolen object? Why should we be afflicted with the loss of an object, if we have no sense of the property of that object? It is with this sentiment, as with all other qualities. If nature had not given it to man, we should have had no idea of it, and would never have thought of making laws against theft.

Admitting, however, that the sense of property is innate, our views of the subject become quite different. There are people who, from cupidity, are induced to appropriate the property of another—usurers, cheats, pickpockets, thieves, and pirates. La Bruyere has said—Supposing there are but two men on the earth, who have sole possession of it, and have divided it between them, I am persuaded that a rupture would soon take place from some cause or other, if it were only a dispute about their boundaries. For this reason, every one feels the common sentiment, that property should be secured from the attacks of such plunderers. We make the laws, or rather it is Nature, the Creator himself, that inspires them, while we imagine them to be our own work. The

laws therefore have sprung from the sense of property; not the latter from the former.

Some think, that the wants of society alone would have produced the sense and the right of property. Social conventions may determine, under what conditions we are the legitimate proprietor of a thing, but society cannot give origin to the sentiment nor to the right. I have repeatedly shown, and I shall have again to revert to the subject, that there are no *artificial qualities*. Society presents points of contact, by means of which the activity of the fundamental qualities is displayed; but, it has as little to do with the origin of these qualities themselves, as woman has with the instinct of propagation in man. If man and gregarious animals possess certain qualities suitable to the social state, it is because nature has designed them for the social state. It is only on such an hypothesis, that we can conceive of the existence of society. Sheep, when the sun is hot, put their head under the belly of their neighbor; gregarious species place sentinels, and render mutual aid; bees divide the different tasks among different individuals. The instincts which thus lead these and all animals to act, exist in each individual, before he has lived in society; they remain inactive, when the same individuals are obliged to live solitarily, and are awakened at the moment society is formed. It is proved, therefore, that property and the sense of property, are institutions of nature, in man and brutes; and as theft supposes property, theft is a natural phenomenon in man and brutes.

Every uncivilized nation is a band of robbers, that pillage their neighbors without measure or remorse. The cattle in the fields are always fair game, and, in the spirit of such jurisprudence, the coasts of the Egean Sea are ravaged by Homer's heroes, for no other reason than that these same heroes were fond of seizing on the brass, iron, cattle, slaves and women of the surrounding people.

A Tartar mounted on a horse, is a real beast of prey, who knows only where cattle are to be found, and how

far he must go to seize them. The same spirit reigned in all the uncivilized nations of Europe, Asia, and Africa. The antiquities of Greece and Italy, and the fables of all the ancient poets, are full of the examples of its influence. It was this spirit that first impelled our ancestors to enter the Roman empire; and in later times this spirit, rather than respect for the cross, led them into the East, to divide with the Tartars the spoils of the Saracenic empire. Even the lower animals steal, such as the cat, dog, magpie. I know a dog, that will eat only what he has stolen. When these creatures commit a larceny so skilfully as not to be detected, they are extremely delighted. A tame magpie cares nothing for a piece of money given to it, but the moment you hide it away, and pretend to look after it or not to think of it, he will take all the trouble in the world to get possession of it. Here now is an observation that may be repeated daily. So certain is it, that theft is practised by the lower animals, that nature has taught them many means to prevent their being robbed. They hide away, bury in the ground, and watch their property. Every body knows how vigilantly bees guard the entrance of their hive, against all animals whose appetite is excited by their honey; and such precautions could never have taken place, if theft were not a natural phenomenon in the animal kingdom. These considerations, in relation to the sense of property, naturally lead us to the solution of the question, What is the fundamental quality, to which the propensity to steal, belongs?

The fundamental quality, to which the propensity to steal, belongs, is the sentiment of property, or the propensity to make provisions.

The sentiment of property and the propensity to provide for the future, are not only useful, but really indispensable, both in man and in brute. It was impossible to discover the organ of this propensity, confined to its primi-

tive destination; this could be done, only when the organ was excessively developed. But, when the organ has obtained this degree of development and of corresponding activity, the legitimate sentiment of property, the rational propensity to make provision, of acquiring a competence, grows into a cupidity, which engenders a desire for appropriating the goods of another; and, finally, when the organ is developed in the very highest degree, unless prevented by internal and external motives, it degenerates into an irresistible impulse to theft. All these different vitiations are so many degrees of activity in a fundamental propensity, which is essential to the sentiment of property and the propensity to provide. Here, then, we see something similar to the gradual depravement of the instincts of propagation, of defence of self and property, and of the carnivorous instinct. But we do not flatter ourself, with having saved nature from the reproach of creating a propensity to theft, though it is only the result of a very large development, and extreme activity of the sentiment of property. The two conditions exist in certain individuals, in virtue of the laws of organization, without their agency being concerned in it, in the slightest degree.

Seat and external appearance of the organ of Property and the propensity to make provision. Modifications of the manifestation of this organ.

This organ is formed by the convolutions marked viii. pl. viii. When these cerebral parts are very much developed, they produce a prominence on the head and skull, extending in a longitudinal direction, (viii. pl. xxvi. and xxvii.) from the organ of cunning, (ix.) nearly to the outer angle of the superior superciliary arch.

I have constantly found this prominence, in all inveterate thieves confined in prison, in all idiots with an irresistible propensity to steal, and in all those who, otherwise well endowed with intellect, take an inconceiva-

ble pleasure in stealing, and even feel incapable of resisting the passion which forces them to theft. One of my friends, a man of the finest talents, a good husband and father, and remarkably inclined to religious fanaticism, has this organ very large. When he sees scissors, knives, and other similar trifles, he feels a certain uneasiness, (malaise,) until he has put those objects in his pockets. He often has a store of tools of this kind in his house. If they are found there by the owner, he restores them with a hearty laugh; if not, he often presents them to his friends. He appears to be greatly delighted because two of his children have the same propensities, and manifests not the least concern about the influence they may have on their lot. These two children have the same organization as their father.

The physician of the prison at Grætz, in Styria, sent me a box of skulls, and in unpacking them, I was so struck with one of the skulls, which was extremely broad in the anterior-temporal region, that I exclaimed, "My God, here is the skull of a murderer!" The physician observed in his letter, that "the skull marked ***, belonged to N***, an incorrigible thief;" and yet he had not been able to discover in the skull the protuberance I designated as the organ of theft. Pl. xxvii. presents a front view of this skull; pl. xxviii. a profile view. We have never seen the organs, whose great activity disposes to theft, cunning, and murder, more largely developed than they were here.

In Ackermann's collection, we saw the skull of a horse-stealer, shaped very nearly like that represented in pl. xxviii., that is, flattened on the top and in front, and very broad in the temporal region. In the prison at Brucksal, we saw a skull precisely similar, which also belonged to a horse-stealer. In examining those who were confined in this establishment for a second offence in stealing, we found they all had the organ very much developed. In the prison at Bern, they brought me a man, thirty years old and over, and asked my opinion of his head. I found the organ in question very prom-

inent, and they then told me that this person was condemned to death for repeated thefts, and many escapes from prison. I found this organ just as large in two inmates at the prison at Hamburgh, called *Frohnerey*. One was the robber Zander, well known in the country; the other, Paul Peterson, was also an inveterate robber. At Marburgh, we found this organ extraordinarily large in three notorious robbers; one of the three and a woman, in whom the development of this organ was very well marked, had stolen from their infancy, notwithstanding all the punishments they had received. They laughed most heartily, whenever their thefts were spoken of; and so far were they from showing any repentance, that they related, with infinite zest, all the details of their thieving tricks.

At Manheim, the most incorrigible robbers, and those who have oftenest relapsed, are confined in the same establishment. In all, we found the organ of the sentiment of property, largely developed. We were particularly struck with its size in an old man, of whom I have already spoken, who was imprisoned for the seventh time, and who declared, with tears in his eyes, that it was impossible for him not to steal. It would be easy to add a hundred other cases, besides those I have related, and some of them have been mentioned while treating of the organ, whose excessive activity determines the propensity to murder.

It is with this organ, as with all the rest, climate and external circumstances appear sometimes to prevent, and sometimes to favor, its development. This organ is very small in the skulls of Caribs, that I have had an opportunity of seeing, although they were flattened before and on the top, and this people are said to have but little propensity to steal; and, therefore, says Rochester in his *History of the Antilles*, when they are robbed, they always insist that it must have been by a Christian. The Negroes are also little prone to steal, and in them the organ is moderately developed. I saw among the Spanish troops, that both the Arragonese and Castilians

have the anterior temporal region a good deal flattened; and I was assured, that they were the most faithful servants, and equally incapable of stealing as of lying. Very different are the Calmucs, who have always been known for thieving and bad faith; and, accordingly, Blumenbach, speaking of their skulls, observes, that they swell out on the sides, *capita ad latera exstantia*. This remark is perfectly substantiated by two Calmuc skulls in my collection. If, in future, travellers would observe the organization of different people, and compare them with their manners, qualities, and vices, we should soon have the reality of this organ confirmed by a multitude of observations.

The propensity to theft is differently modified, according to its combinations with other very active propensities; but, in this subject, I must be contented with a few general views. When the instinct of theft and that of self-defence are both very active, the robber will despise ordinary larcenies: nothing less than burglary will satisfy him, and he will glory in the success of his enterprises, in spite of the danger which accompanied them. Heluin, the subordinate of Lepelley, united courage to the instinct of theft, and was therefore willing to be the mercenary agent of the blood-thirsty Lepelley. Bouhours, besides the instinct of theft in a remarkable degree, had considerable courage, and a pretty large instinct of murder. With her, homicide was merely a means, her main object being to rob. Robbers, endowed with great courage, are generally the most dangerous; and when to courage is joined the instinct of murder, the combination produces the most sanguinary brigands, like those of Cartouche, Schinderhannes, Picard, Storzenbecker, and the wretches of the Auxerre band.* The addition of cunning produces

* "Chaillard, called l' Eveillé, (*The Vigilant*,) declared an outlaw, was long the terror of this commune and the vicinity. Many attempts had been made to arrest him, but in vain. His habitation, which had several outlets, was a kind of fort, from which he defied all pursuit; he

pick-pockets, cheats, forgers, receivers of stolen goods, both male and female, (for women are still more disposed to this crime than men,) and those fellows, who raise money by telling people where they may discover treasures. When cunning predominates over the instinct of theft, the thief is often satisfied, provided he can steal with skill and address; and, like the magpie, it is indifferent to him whether he shall keep his stolen goods, of which he makes no use, or restore them, even with pleasure.* When the instinct of the love of offspring and that of attachment, are combined with that of theft, the first determines the father or son to rob, to prevent those whom they love, from perishing with hunger,—a very commendable motive, and one which ought to

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seldom went out of it, and never, unarmed. The inhabitants of the district would throw no light on his movements, so well persuaded were they that the very first suspicion would bring down destruction on its object. To threaten the authorities with his vengeance, he announced, that they would soon see him at the head of fifteen determined men like himself.

It was all important to prevent such a project. On the 11th, at 10 o'clock in the evening, a considerable force marched to the brigand's retreat. It was composed of a detachment of the legion of Vaucluse, of five mounted chasseurs and a brigade of gens d'armes. Chaillard's house was surrounded, sentinels placed at all the outlets, and on the roofs of the neighboring houses; and as soon as the day dawned, the leader of the detachment, followed by the gens d'armes, pushed into the wretch's den, and summoned him to surrender. He instantly disappeared, and a moment after, was perceived intrenched in a donjon, on the top of a little square tower, and pierced on each side with loopholes. He fired on the troop, and his first victim was a fusileer on the roof of a house, and another soldier fell soon after, grievously wounded. Chaillard's fire was so well sustained, that it was impossible to approach his house without exposing the troop to fresh losses. Finally, after a fusilade of four or five hours, he was shot in the arm by a ball, and a few moments after, one of the gens d'armes shot him dead with his carbine. In the donjon were found three fusils, and three pairs of pistols, six bundles of cartridges, two bags of balls, a little bag of flints, about four pounds of bread, and a demijohn of water."—*Journal des Maires*, 22*d* Sept. 1818.

* In those exorcising scenes, got up by several cunning thieves together, to cheat their dupes by degrees out of the money which they have promised them, the one that is endowed with a large development of the organ of *theosophy* takes the part of the priest, to conjure up the devil.

extenuate the crime.* When the robber is, at the same time, strongly impelled to travel by reason of a large development of the sense of locality, he will lead the life of a vagabond, and serve as a guide and a spy to robber-bands. The robber endowed with a great activity of benevolence, will distribute the products of his larcenies among the poor; and, as it is repugnant to his feelings to wrong private people, he will rob churches, and the public treasure. In the Copenhagen prison, called *Das Sklavenhaus*, we saw a very cunning and incorrigible thief, Peter Michell, who never stole but to give to the poor; and I have already mentioned a robber in Vienna, who, in consequence of his benevolence, confined himself to robbing churches. If the robber is an artist, or mechanician, he will make false keys, forge writings, and counterfeit money. The robber, endowed with the instinct of attachment and firmness, will die, rather than expose his accomplices. At Chaillot, I was shown a young man, of feeble intellect, who was remarkable for his piety, and had founded several chapels. The moment I saw him, I pointed out to M. Danécy, and to the others who accompanied me, an extreme development of the sense of property, which considerably astonished them, since they had merely considered him a religious bigot. Subsequent inquiries, however, disclosed the fact, that he was a consummate thief, and had even stolen the furniture of the chapels he had founded.

These modifications are infinitely numerous, and, by

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* There was stolen from the church, at Mauleon, (Lower Pyrenees,) a ciborium, on the night of the 8th or 9th of June last; on the morning of the 7th of this month, a ciborium, of double the value, was found in a cross-aisle of the church, and in it the following billet:—

"As soon as I could sell a part of the grain which I have reaped, I spared no pains to repair the crime which the necessities of my six children, who were near perishing with hunger, induced me to commit. It is impossible to find me out; and, therefore, if I have now satisfied God, whose church I have aggrieved, I pray that all farther proceedings may be stopped."—*Journal des Maires, 22d Sept.* 1818.

knowing the reciprocal influence of the organs, I have often astonished the people who have accompanied me to houses of correction.

VIII. Pride, hauteur, loftiness, love of authority, elevation. (*Stolz, Hochmuth, Hersch-sucht.*)

History of the Discovery.

A beggar attracted my attention, by his extraordinary manners. I reflected on the causes, which, independently of an absolutely vicious conformation, or of misfortunes, could reduce a man to mendicity, and believed I had found one of the chief of them in levity and want of foresight. The form of the head of the beggar in question confirmed me in my opinion. He was young, and of an agreeable exterior, and his head, in the region of circumspection, was very narrow. I moulded his head, and, on examining it with attention, remarked on the upper and back part of the middle line, a prominence extending from above downwards, which could arise only from the development of the brain beneath. I had not previously observed this prominence in other heads, and, for this reason, I was very anxious to discover what it indicated. His head, moreover, was small, and announced neither strong feelings, nor much intellect. After many questions addressed to the beggar, with a view to discover the remarkable traits of his character, I requested him to relate his history. He said he was the son of a rich merchant, from whom he had inherited a considerable fortune; that he had always been too proud to condescend to labor, either for the preservation of his fortune, or the acquirement of a new one, and that this unhappy pride was the sole cause of his misery. This reminded me of persons who never cut their nails, in order to convey the idea that they are not obliged to work. I made several remarks to him, and let him know that I doubted his veracity; but he always

reverted to his pride, and assured me that, even now, he could not resolve to follow any kind of labor. Although it was difficult to conceive how pride should cause a man to prefer begging to working, yet I was led by this person's repeated assurances, to reflect upon the sentiment of pride.

I very well recollected the grave and haughty air with which one of my cousins would draw out his handkerchief, fold it up, and return it to his pocket. He was seven years old, and I was hardly six, yet I was disgusted with his proud and pompous airs. He also scorned all the occupations in which our family were accustomed to engage, and wished to learn nothing that was going on; he wished to enter the army. A prince in Vienna was remarkable for his ridiculous pride, his stiff gait, and his practice of constantly quoting his ancestors. Happily, he was bald in the region of the head, where I had noticed the prominence in the mendicant's head, and I thus assured myself, that he had the same conformation. These facts were sufficient to produce the idea, that pride is a fundamental quality, connected with a particular organ of the brain. I cannot believe it necessary to prove to my readers, that pride, loftiness, hauteur, are innate, and not acquired qualities. Every one, within the circle of his acquaintances, can find examples of proud and haughty men, and, consequently, proofs of my assertion. I shall, therefore, expose very briefly the natural history of pride.

Natural History of Pride, Hauteur, Good Opinion of One's Self in health.

Pride, arrogance, disdain, self-sufficiency, presumption, insolence, &c. are all derived from the same source. Modified by different degrees of intensity of action, and by the varied influence of other qualities, they are all the manifestation of the same organ. I pass by in silence, therefore, the discussions of grammarians and other

authors, on the force of each of these modifications, and proceed to examine the parts that each does and ought to perform in the human species.

"All men," says Charles George Leroy, "incline to despotism, but, as wishes without hope are seldom durable, this tendency to despotism is limited, in the great majority, by a feeling of impotence, of obtaining an elevated rank in the class to which they aspire. The only result, however, is, that every one is excited, vexed, and harassed, for his whole life, by an uneasy desire of elevation. The idea of distinction once established, it becomes predominant, and this subsequent passion annihilates that which gave rise to it. From the moment a man compares himself with his neighbors, and attaches some importance to their regard, his real necessities are no longer an object of his attention or his measures. If the reality is denied, he wishes at least the appearance; hence, for the most part, results the love of outward decorations and of every thing calculated to give to others an impression of power. If he cannot expect to draw upon him the looks of the universe, or a whole nation, he is contented with being an object of remark to his neighbors, and of overtopping his equals, and thus his happiness arises from the concentrated attention of his little circle. This desire of rising above the place assigned to us, seems to be a contradiction to that proneness to servility, which is observed in most men, and which is also but a consequence of the love of power. We crawl at the foot of the throne, in order that we may still be above the crowd of heads which we love to bow down. No other result could be expected, than that the lowest slaves, in the view of their superiors, should be the haughtiest despots among those whom fortune has placed beneath them; and thus, in fact, is the constant phenomenon. The vizier humbles himself in the presence of his master, yet puts on the disdainful airs of the Grand Seignor before the pachas."*

* Lettres philosophiques sur l' intellignce et la perfectibilite des animaux. Nouvelle edition à Paris, 1802, p. 187, 190.

This internal sentiment, according as it is combined with different qualities, is manifested in so many different ways, that it seems sometimes to be in contradiction with itself; yet still, whatever form it may assume, it is always pride, haughtiness. One, like Antisthenes, covered with rags, and with not a sous in the world, feels it dishonorable to work for a livelihood, looks at every thing around him with contempt and disdain, thinks nothing worthy of his attention, and, in the fulness of his self-sufficiency, remains completely inactive as to all outward things. Another, puts no limits to his insolence; every thing above him, irritates and wounds him. With contempt in every look, and envy gnawing at his heart, he tramples every thing under foot, feels beyond the control of nature's laws, and, by statues, monuments, and temples, takes his place, even while living, among the immortal ones. Pride led Philip II. to compare the loss of twenty thousand men with that of a brook, and, under the dominion of the same sentiment, Aurelian chained vanquished kings to his triumphal car, and Septimius trampled upon the dead body of his enemy. Pride, too, under the form of generosity and magnanimity, induced Marcus Aurelius and Henry IV. to pardon traitors in their power. Here, pride is mortified with the slightest offence, or even indifference; there, it braves all attacks of its enemies, which only increase the opinion of its high importance.

There are certain men, with heads and hearts sufficiently strong, who are so deeply impressed with a sense of their own value, and so independent withal, that they know how to repel every external influence that tends to subject them. As far as practicable, they choose the freest countries to live in, and follow an employment that renders them independent, and exempts them from the caprices and favor of the great. That domination over their inferiors, which would lead to slavery under an absolute master, would be insupportable to them. The honors and distinctions that belong to merit, are humiliations in their eyes, when lavished on insignifi-

cance. If they prosper, it is only by their own efforts; like the oak, they are sustained by their own strength, and to their own resources would they be indebted for all that they have. This is a bold, high-spiritedness, that has not yet degenerated into pride—a merit, rather than a defect; often the companion of great virtues, the enemy of all meanness, and the support of courage in adversity.

Under whatever form pride may appear, it is no less indispensable. As man is designed for the social state, some must be born to command, and some to obey. Master and slave;—such are the two conditions of uncivilized people, and, even where man pretends to have reached the height of civilization, each rash attempt to shake off the yoke of authority, proves him incapable of liberty. It is not true, that all men are born equal, and are destined to exercise the same reciprocal influence. Nature has allotted to each one a different station, by giving them a different organization, inclinations, and faculties. The slave-born man may rise to the master's rank, if endowed with talents, worth, courage, and a domineering spirit; and he who is clothed with authority at his very birth, unless he knows how to preserve the gifts he has received from the caprices of fortune, will descend to the rank of a slave.

Observe children at their sports. There is always one who arrogates authority over the rest. He becomes a general, minister, and legislator, without either he or the rest suspecting it. The same thing takes place in schools and families. We every where encounter disdain, self-sufficiency, presumption, haughtiness, by the side of modesty, humility, submission, and even meanness. In civil and military institutions, we see only chiefs and subordinates, and power gradually concentrating, comes at last, willingly or forcibly, into the hands of one. Such is the fate of governments of every description, and associations of every kind. Even in republics, there is always one man from whom public opinion emanates. The very ones to whom the mon-

archical form of government is so revolting, are moved by envy and jealousy, their own spirits being excited by a thirst for power. Those, also, who trample upon all social order, robbers and banditti, testify in favor of the established law of nature. The one in whom the thirst for rule is strongest, puts himself at their head, and his comrades acknowledge him for their captain and leader.

Let those who may still be inclined to take pride, spirit, or love of independence for an acquired quality, look at savage and uncivilized people. All feel their equality, and are warm in the maintenance of their rights. Even when they follow a chief in the field, they suffer him to pretend to no formal command. They are not bound by his orders, and they march, not in consequence of a military engagement, but of mutual faith, and warmed by an equal ardor for the success of the enterprise. Among the Iroquois, and other nations of the temperate zone, the titles of *magistrate* and *subject*, of *noble* and *plebian*, are as well known as those of *rich* and *poor*. The Caribs, even after choosing a military chief, take good care to confer on him no civil authority. Their captain is not called in to decide their domestic disputes; the terms *jurisdiction*, and *government*, are not in their language. Even in the midst of pillage, glory is their principal object; the spoils of the vanquished are, to them, only the pledge of victory. Tribes and nations are their prey, but the solitary traveller, from whom there is nothing to gain, unless it be a reputation for generosity, they suffer to pass without insult, or even treat sumptuously.

The rude nations of the West, preferred death to captivity in their wars. More than once, when the Roman armies were pouring into captured cities, or forced entrenchments, they found the mother slaying her children, that they might not fall into the hands of their enemy; and the father shedding the blood of his family, and ready to plunge the dagger into his own bosom.

Among the North American Indians, courage is the principal point of honor. It is this that animates alike

the prisoner under the most painful tortures, and the torturers themselves. Indeed, they practise most cruelty upon those, whom they are desirous of treating with most consideration, to give them an opportunity of displaying all the energy of their courage. On the cowardly, they inflict a speedy death, by the hands of women. They disdain, as mercenary and vile, every occupation and enterprise which does not present dangers to be confronted, and glory to be acquired.

Thus every thing concurs to prove that pride, hauteur, love of authority, are innate in man; and, consequently, that this sentiment is founded upon a particular organ. The phenomena presented by disease, will convince us still more strongly of this truth.

Pride, Hauteur, Love of Authority in disease.

In conformity to principles, I have more than once announced, we may infer, that when, in disease, some particular quality is manifested in a much higher degree of activity than the others, it is fundamental. But in insanity, pride and haughtiness are frequently carried to an extreme degree. "It is common," says Pinel, "to see alienation accompanied with a presumptuous tone, and every feature swelling with pride, only during the paroxysm, and as a symptom peculiar to it. This same propensity, excessively active even from early youth, and inherent, it would seem, in the constitution, may be gradually increased, till it becomes the cause of real insanity. A tall, middle-aged man was remarkable for the harshness of his expressions and answers, as well as for his austere manners and violent gusts of passion. His looks and features bore the impress of the most haughty, gloomy, and morose spirit; his frame was agitated with continual restlessness, and bitter reproach and invective were liberally bestowed on every body around him. His savage misanthropy was augmented also by misfortunes in his business, and then his insanity burst forth.

He drew bills of exchange for enormous sums on his banker, as well as upon other houses entirely unacquainted with him, and soon after, he was confined for madness. He manifested the same pride in his confinement, and gave orders with all the arrogance of an Asiatic despot. He finally believed that he was Chancellor of England, Duke of Batavia, and a powerful monarch." (*Dr. Perfect, Annals of Insanity.*)

M. Fodéré ran great risks from a melancholic patient, who believed that he was the Eternal Father, because, he said, he did not evince sufficient respect for him. He afterwards speaks of an erotic mania, complicated with pride. "This kind of melancholy does not always depend on the natural instinct that brings the two sexes together, but it is complicated with sentiments of vanity and pride, that persuade us that we merit something more than human, or, at least, that we have attracted the notice of the first among mortals. We are not captivated by youth, beauty, nor charms, but by power, high rank, costly dress, servants, and wealth. Hence, the notion of some devotees, that they are loved by sylphs or angels, and of some men I have known, who withered away in the persuasion that queens and princesses have regarded them with favor."*

Mental alienation, accompanied with pride, disdain, and arrogance, and that, when the patients imagine themselves to be generals, sovereigns, and even God himself, is a very common form of the disease.

A maniac of this kind, who lived in a house within sight of the dome of the Val-de-Grace, imagined that it was necessary for that edifice to be removed into the garden of the Tuilleries, and that two men were sufficient to perform the removal. He thought he saw a relation of equality, between the strength of two men and the resistance of this enormous mass. They tried to make him sensible of the immense disproportion of one to

* Traité du Delire, T. i. p. 357.

the other, by calculating the weight of each of the stones in this vast structure, but he continued to think that the measure was possible, and even offered to undertake its execution. There soon succeeded extravagances, of another kind. He believed himself proprietor of all the forests in France, and, under this title, issued drafts for many millions on the public treasury. His notions became still more exalted, and he, finally, thought himself the greatest potentate in Europe.*

"A woman, deprived of most of her pecuniary means by the events of the French Revolution, entirely lost her reason, and was sent to the insane hospital. At first, she kept up an incessant chattering, and, in the paroxysms, she would address some incoherent words to the most inanimate objects, and utter the most deafening cries and vociferations. She thought she was granddaughter to Louis XIV., and claimed her right to the throne. Her imagination soon seemed to realize her desires; for she levied contributions and had the army in her pay. If a stranger visited the hospital, she thought it was in honor of her, and that they could be introduced only by her orders. Her companions in misfortune were duchesses and marquises in her suite, and she gave them her orders with a tone of supreme authority."†

"A patient, confined in a private asylum at Paris, during the paroxysms believed himself to be the Prophet Mahomet; assumed an attitude of command, and the tone of the Most High; his eye kindled, and he walked with a majestic step. One day when cannons were fired in Paris, on account of some events of the Revolution, he persuaded himself that it was in homage of him; he ordered those around to keep silence, and could not restrain his joy."‡

"A very worthy man, and father of a family, lost

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* Pinel, op. cit. p. 92. † Pinel, op. cit. p. 109.
‡ Pinel, op. cit. p. 111.

his fortune, and almost all his resources by the events of the revolution, and, from a state of profound sadness, he soon became insane. The symptoms, far from yielding to the ordinary treatment, and even to the most inhuman means, grew worse, and he was sent to the Bicêtre as incurable. Never was maniac so utterly given over to acts of extravagance. With body erect, and nearly bursting with pride, he believed himself to be the Prophet Mahomet, dealt his blows to the right and left, on all who came in his way, and ordered them to prostrate themselves and do him homage. The whole day was spent in proclaiming pretended decrees of proscription and death; his menaces and maledictions were liberally bestowed on the servants, and the authority of the superintendent he disdained and disregarded. One day, when his wife in tears came to see him, he broke out in the greatest rage against her, and would probably have killed her on the spot, had they not gone to her assistance. Mildness, and the gentlest remonstrance, were out of the question with a maniac who considered other men as atoms of dust."*

"Three maniacs, each of whom believed himself to be, and assumed the title of Louis XIV., were one day disputing, with a little too much energy, their respective rights to the throne. The superintendent approached one of them, and drawing him aside, said with a serious look, 'Why dispute with these people, who are obviously mad? Is it not well known, that you alone ought to be acknowledged to be Louis XIV.?' Flattered with this homage, he retired immediately, giving the others a look of the most disdainful hauteur."†

"A woman, extremely imperious, and accustomed to make her husband obey with even more than docility, remained in bed a part of the morning, and then insisted that he should come, and, on his knees, present her with

* Pinel, op. cit. p. 215. † Pinel, op. cit. p. 220.

drink. She finally believed herself, in the ecstacies of her pride, to be the Virgin Mary."*

"In these patients, the surest indication of approaching cure, is when they begin to perceive the false and ridiculous nature of their pretensions, and become docile under the remonstrances and reasonings of superintendents and physicians?"

"A man in the vigor of age, confined in the Bicêtre, believed himself to be a king, and always spoke with a tone of command and supreme authority. He had received the ordinary treatment at the Hotel-Dieu, where blows and violence only rendered him more furious and dangerous. One day he wrote his wife a most stormy letter, charging her with prolonging his detention, in order that she might enjoy entire liberty. He also threatened her with the whole weight of his vengeance. Before sending the letter, he read it to another convalescent patient, who disapproved of these wild transports of rage, and, in a friendly tone, reproached him with endeavoring to reduce his wife to despair. This wise advice was listened to and received; the letter was not sent, but replaced by another quite moderate, and full of regard. The superintendent, being informed of this docility to friendly remonstrance, saw in it the sign of an approaching favorable change. He hastened to profit by it, went to the maniac's cell, to converse with him, and gradually led him back to the principal subject of his insanity. 'If,' said he to him, 'you are a sovereign, why do you not put an end to your confinement here? why stay here, confounded with maniacs of every description?' He returned, on succeeding days, to converse with him in a tone of benevolence and friendship. He gradually showed him the ridiculous character of his extravagant pretensions, and pointed to another patient who had long believed himself endowed with supreme power, and had become an object

* Pinel, op. cit. p. 303.

of derision. The maniac first wavered; then soon began to mistrust his title of sovereign; and finally recognized his strange alienation. Within fifteen days was this unexpected moral revolution effected; and, after some months' trial, this respectable parent was restored to his family."*

This partial mental alienation proves, that pride is a fundamental quality, connected with a particular organ of the brain.

Seat and external appearance of the organ of Pride, &c.

The proofs I have related, in the history of the discovery of the organ of pride, not appearing to be sufficient to establish the seat and external appearance of this organ, I give some additional facts, that I may not be censured for the gratuitous maintenance of paradoxes. In the following exposition, I am obliged to restrain myself to a very few facts, as I have in respect to the other organs: my object is accomplished, if those I do relate, will enable naturalists themselves to make further observations.

This organ is formed by convolutions of the brain, (xii.) on the median line, directly behind and beneath the summit of the head, and therefore is manifested on the surface of the skull by one elongated protuberance, though there is really one in each hemisphere. (See xii. in the brains, pl. ix. pl. xi. pl. xii. and in the skull, pl. xxx.) It is only when the two hemispheres are a little separated, that the organ appears double on the surface of the skull.

I begin with a case, that strongly resembles that of my beggar. A young man, whose intellect was above mediocrity, had manifested from his earliest infancy, insupportable pride. He constantly maintained, that he was

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* Pinel, op. cit. p. 254.

of too good a family to work, or apply himself to any thing. Nothing could free him of this absurdity; he was even put, for eighteen months, in a house of correction at Haina. A physician in Vienna, otherwise an amiable man, carried his pride so far, that whenever called to a consultation, even with practitioners older than himself, or with public professors, he always took the precedence, both in entering and coming out of the apartment. When any document was to be signed, he insisted on putting his signature first. He had connected himself with the director of the Great Hospital, but solely, as he told me many times afterwards, for the purpose of supplanting him. At Heidelburg, I saw a girl of eighteen, of a remarkable character. Every word and gesture in the least familiar, revolted her. She called on God on every occasion, as if he too took especial interest in her affairs. When she spoke, assurance and presumption were depicted in her features; she carried her head high and a little backwards, and all the movements of her head expressed pride. She was incapable of submission, and when in a passion, she was violent and disposed to proceed to all extremities. Although only the daughter of a quill merchant, she spoke her native language with extraordinary purity, and sought the acquaintance only of persons of superior rank. A count in the army, did not advance as he thought he deserved. He frequently conversed with me on many subjects, and spoke very sensibly, but always took the attitude of command. In these four persons, the organ of pride was very large.

It was also very large in a maniac in Baden, near Radstadt, whose madness consisted in believing himself a major. He had a small head, and the organ of pride was the only one much developed, all the other convolutions of the brain being very small. The left hemisphere, and, consequently, the left side of the head, was much larger than the right. The cranial bones were dense, but not too thick, as he died of phthisis at an advanced age. In the hospital of the poor in Friburgh,

we saw an insane man, who was extremely proud, and who sometimes had fits of real frenzy, when he would have committed murder and arson, if he had not been prevented. He declared, in a vehement and pathetic tone, that he is the stock, whence God created and preserves the world; that he has been crowned by Jesus Christ, and is the young man whom the Queen of Heaven has chosen for her spouse. His attitude is that of an arrogant despot. Deeply inspired with feelings of his high importance, he crosses his arms, and, to give an idea of his astonishing power, he strikes his chest and sides with violence. In general, he stands with one foot placed before the other, the body erect and a little inclined backwards. When I requested him to let me touch his head, he replied, with the most astonishing arrogance, "Ich habe keinen *Hopf*, sondern ein *Haupt*," I have no head, i. e. such as common men possess, but a *Haupt*, a head peculiar to kings and gods. He then turned away, holding us to be totally unworthy of approaching him. We saw, however, very distinctly that he had the organ of pride very prominent. Socrates was not mistaken when he said to Antisthenes, "I see your pride through the holes of your garments;" for in his bust, the organ of pride is extraordinarily large. (Pl. lx. ix. fig. 5.)

We have often had an opportunity of examining the heads of leaders of banditti, and in all we have found this organ exceedingly large. In one whom we saw at Marburgh, and who was thought to be the notorious Picard, we found the organs of fighting, murder, theft and firmness, but particularly that of pride, very large. His manner was proud, haughty and disdainful, and he was considered the most dangerous of all the banditti. Long before, I had observed the organs of murder, firmness and pride, full as large, in another chief of banditti, whom I mentioned when treating of the organ of the carnivorous instinct. Driven to extremities by the whippings inflicted upon him, for the purpose of making him denounce his accomplices, he strangled

himself with his chain. We have observed, that rebel-chiefs, the enemies of authority and the sovereign power, the instigators of revolt, &c., are always proud and ambitious men. At Spandau, we saw two rebel-chiefs, father and son, in both of whom the organs of firmness and pride were largely developed. Many others, who were confined for insubordination, were similarly organized. The organ of pride, and the propensity to rule, is astonishingly large in the skull of the sculptor Cerracchi, (pl. lx. ix. fig. 6,) in my collection. He was guillotined at Paris. In Vienna, where I was his family physician, this man expressed himself in the most revolting terms, against every kind of authority, and especially the Pope. He forgot his art, while dreaming about the means of destroying monarchies. These people would overturn every throne, to become despots themselves; so that organization confirms the invariable lesson of history on the end of revolutions,—*Retire, and make room for me.*

The influence of external circumstances is very sensible on this organ, as well as on others. We generally observe, that the inhabitants of mountains are prouder than those of plains; that they have a stronger love of independence, and are more inclined to revolt. In our travels, we have no where found the organ of pride more generally developed in a very high degree, than among the Swiss. Who, too, has not heard of the inflexible pride of the inhabitants of certain Spanish provinces.

Thus far I have spoken of pride, haughtiness, disposition to rule, self-esteem, arrogance, independence: but to what fundamental quality do all these modifications belong? Before deciding this question, the reader must follow me in the discussion of a very doubtful point. Here, again, I shall rely solely upon facts, and when we have arrived at the point where they leave us, and are obliged to resort to reasoning, I will cheerfully yield my own opinions to the sagacity of the reader, and so much the more willingly too, because it can be attended with no unfavorable result to organology.

On the Instinct that directs Animals in the choice of Dwelling-places, (Aufenthaltssinn.)

Having studied the sentiment of pride, as a primitive quality, and its organ in man, I wished to ascertain if my observations would be confirmed by the lower animals. I therefore examined the heads of such of them as we are accustomed to call proud, such as the race-horse, cock and peacock. In none of these did I find a remarkable development of the cerebral parts, corresponding to the organ of pride in man; but I did find a considerable development of these parts in animals, in which I never should have thought of looking for it; that is, in those which voluntarily remain in the higher regions of the air, living on mountains, and other elevated situations; such as the roe-buck, chamois, wild-goat, and some species of eagles and falcons; and, what struck me most was, that the cerebral parts in question were the more developed, and the elongated prominence the most saliant, in proportion to the greater height of the dwelling-places of animals. The reader may imagine my astonishment at such an observation. That a predilection for physical heights, should, in animals, depend on the same organ as that to which the sentiment of pride, a moral disposition, is referrible in man, will appear, I thought, as improbable and inadmissible to every body else, as it did at first to me. I have laid down the rule, to communicate the progress of my observations, as well as the manner in which they have given rise to my opinions. Opinions that are not founded on fact, if not erroneous, are very likely to be so, and a naturalist ought to be less ashamed of committing an error in his interpretations of facts, than of founding his opinions on reasoning alone. I begin with some details concerning the habitations of animals, and perhaps we may, ultimately, discover some analogy between things apparently very different.

We are mistaken, if we attribute the choice of dwelling-places to the mere will of the animals themselves. Nature has assigned to the wild-goat and the crocodile, their respective places, as she has, to the cedar and willow. The fields and the woods, the valleys and the mountains, infected marshes and human habitations, the south and the north, are designed to be peopled by different species of animals. Of the majority of animals most generally known, there are two varieties; one, inhabiting heights, the other, plains; the one, villages, cities, and gardens, the other, forests, and the banks of rivers. We are acquainted with the domestic and the wild sparrow; the nightingale of the gardens, and the nightingale of woody heights; the gold-finch of the gardens, and the gold-finch of the woods; the hare of the fields, and the hare of the mountains. Whence is it that animals, otherwise so similar, choose habitations so different?

This diversity is still greater in the different species. The partridge, the gelinotte (*Tetrao bonasia, L.*) the ganga, (*Tetrao alchata,*) the lagopede, (*Tetrao lagopus,*) the zizel, (*Arctomys citillus Gm.*) the marmot, the water-rat, the mole, the brown rat, and black rat, the mountain-swallow, bank-swallow, barn-swallow, chimney-swallow,—what a difference in the choice of their abode! And, since it is constant, we cannot attribute it to the will acting at random, but to an invariable law of their nature. But how has nature assigned to each animal its dwelling-place? Nothing is easier, it is said, than to answer this question. The chamois climbs the mountains, the duck dives into the water, because necessity calls them there; because there they find their nourishment.

There can be no doubt of the existence of a harmony between the organization of animals, and the external world; otherwise, nature and its creatures would be in a state of eternal contradiction. If marshes were designed to be the abode of the chamois, while its proper nourishment grew on the tops of mountains, the species would soon have disappeared from the earth. For this

reason, every creature is, and must necessarily be, so organized, as to establish its abode where it finds its nourishment. But nourishment is not the only thing that determines the preference of abode. The different varieties of the same species which I have just mentioned, might live on the same food, which, when forced to it by external circumstances, induces them to live in places where they would not otherwise have lived, if they had had their choice. Besides, the chamois and wild-goat climb far above the region where their nourishment is found. The reason is, that an internal impulse impels them to seek the most precipitous heights of the mountains, as it does the young duck, hardly clear of its shell, without any previous knowledge, to run to the water, without heeding the anxious cries of the hen that hatched it. The lark sings in the air, though nothing prevents him from singing on the ground. The royal eagle watches its prey from the clouds, though it might as well, like the owl, hunt it in the lower regions. Every day we see swallows, pigeons, and rooks, rise into the air for pleasure alone, and describe a thousand circles with no intention of seeking nourishment.

External appearance of the organ of Height in brutes.

In all animals that reside in elevated places, we find in the median line, immediately above the organ of the love of offspring, or between its two bumps when double, an elongated prominence, marked xii., on all the plates, precisely similar to that of pride in man. Let us compare pl. lxv., the skulls of the roe-buck and roe, in which this organ is but slightly prominent, with those of the chamois, (fig. 1,) and wild-goats, (fig. 2, pl. lxxiii.) in which it has its highest degree of development. We see that elevation (xii.) in the roe-buck is much less prominent than in the chamois, in which it is less than in the wild-goat, which always seeks the summits of the highest rocks on the highest mountains. Thus, by the

simple inspection of this region of the head, we may determine with certainty which of the species we examine, dwells in the plains, and which, on the mountains; and the higher the eagle, or any other bird, soars into the air, the more prominent is this region of the skull. In the black rat, (*mus rattus*,) this region is flat; in the brown rat, (*mus decumanus*,) which is fond of climbing into trees, it is prominent. The same difference exists between the skull of the common partridge, (*Tetreo cinereus*,) and that of the mountain kind, (*T. montanus;*) between that of the hare of the fields, and that of the hare of the mountains. I do not know whether this cerebral part undergoes similar modifications in aquatic animals. One thing, however, is certain, that we must admit a primitive organ, whose activity assigns to animals their place of abode. It is certain, too, that a considerable development of this organ inspires animals with a predilection for elevated places. If, then, we can render it probable, that the same cerebral part which inspires animals with a desire for heights, when differently modified and influenced by the simultaneous activity of other organs, produces pride in man, and, consequently, that the predilection for physical heights does not differ essentially from that of moral height, except in its object, we may designate, I say, the result of the action of this organ, as the *instinct of height*, *instinct of elevation;* at least in cases of more than ordinary development. Here, then, the question is naturally presented,—Is there an essential difference between the instinct of physical heights in animals, and the propensity of man to rise to a moral height? Is the difference really so great as to make it ridiculous, to consider both only as gradations of the same sentiment? Is it possible to discover an analogy between the two? Those who maintain the negative, will gain their cause, since they have every reader and hearer in their favor, before they begin. But the opinion of the multitude cannot discourage me; I proceed, therefore, to state the pro and con.

Is there any Analogy between the instinct of Height in animals, and Pride in man.

If the organ of the instinct of height, in brutes, and that of pride, in man, have the same place in the brain and skull, then this fact is in favor of their analogy. I have marked, in truth, in the brain and skull, immediately between and above the organ of love of offspring, a place as yet unknown to me, (iv. pl. ix. and xi.;) and it is above this spot, that I have indicated the organ of pride, (xii.) Notwithstanding all my care, I have never been able to observe any kind of prominence in this place, nor to understand what it is intended for. I have found, however, that, in many skulls, the prominence of pride extends to that of the organ of love of offspring. This happens when the organ of pride is very large. It seems probable, therefore, that the convolution, marked iv. pl. ix. and pl. xi., belongs to the organ of pride. I am still more inclined to believe that this convolution, and that marked xii. constitute a single organ, from the facts, that the convolutions immediately above the organ of propagation, and directly in the median line,* are very large in animals eminently

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* Comparative anatomy presents some very remarkable differences in the seat of the propensity for physical height, as well as in that of the organ of the love of offspring. In man and the ape, for example, the latter organ extends in the posterior lobes to the median line. In birds and most mammifera, this organ is not found on the median line. It occupies the posterior part of the second range of convolutions, counting from the median line. This circumstance, also, produces a variation in the seat of the organ of height. In man, and the ape, there exists a cerebral mass, between the cerebellum or organ of propagation, and the organ of height. In animals that are designed to choose elevated places, the middle convolutions immediately above the cerebellum, are much developed and form an oblong protuberance. In order to make these differences more apparent, I have drawn the brains of a cat and an ape, and the skulls of a cat and a panther. Pl. lxxvii. the convolutions xii. xii. and the elevation xii. are the organ of height. The convolutions ii. ii. and the prominences ii. belong to the organ of the love of offspring.

endowed with the instinct of heights. The brain and skull of the chamois and wild-goat furnish a striking example of this kind. In cases, even where we should suppose that the lower part (iv.) of these convolutions would produce the instinct of physical height, and the upper part (xii.) that of pride, the very near vicinage of these cerebral parts would always lead us to admit an analogy in their functions. It must not be forgotten, that, in man, many organs are more voluminous and complicated than in other animals. The organ of the sense of locality, that of music, and even that of physical love, are more perfect in man, in the same proportion that their functions are so, although the primitive destination remains essentially the same. It would, therefore, be only in conformity with the course of nature, that the organ in question should be so much more voluminous in man, since it is designed to accomplish a much higher end.

In man, even, the action of this organ seems, in some cases, to be confined to the instinct of physical height. I know men, who have a passion for climbing mountains, ascending steeples, &c. Wherever they may go, their first concern is, to scale the neighboring heights; and mountainous countries they prefer to all others. I have found, in all of them that I have examined, a pretty large development of this part of the brain.

And why, too, is this organ more developed on heights, than in plains? I know well enough, that we may be as proud in a valley, as on a mountain, but it is no less true, that pride is much oftener found in elevated situations. If there be not a very strong analogy between the instincts of height and of pride, why are mountaineers more proud and high-spirited, more attached to independence, more inclined to a spirit of domination, than other men? Why do they consider themselves as far above the inhabitants of the valley in moral respects, as, in fact, they are physically higher in their dwelling-places?

Observe children, and even adults, when, in their

sports, they yield to the first sensation and impulse they experience. They stand on tip-toe, get up into chairs, and love to measure their height with that of tall persons, and even to exceed them in this respect. Small, proud women choose a very high head-dress, and wear high-heeled shoes. What tickles the warrior's pride, more than the hair caps and plumed helmets? Generally speaking, whatever elevates and enlarges one's own self-feeling, emanates from the inward sentiment of pride, and by reaction awakens this sentiment in us. It is the custom of all people to place those who command others, in an elevated situation. What would the throne and sovereign power have in common, if man were not here guided by an inward sentiment, of which he is unconscious himself?

It is objected, that children climb up into seats, because they are refused many things, for the simple reason that they are small; and because, too, they have observed the prerogatives enjoyed by large people, or heard them extravagantly praised. I do not believe that this constantly uniform conduct of children is founded on such reflections. I see in it, far more naturally, the first infantile manifestation of pride. Only persuade men, they add, that the lowest place is the most honorable, and every body will prefer it. I allow this; but it will be because man is reasonable enough to prize a place of moral distinction higher, than a merely physical elevation.

All the expressions used to designate pride, or to express our estimation of moral qualities, are taken from physical height. 'He carries his nose up;' 'he is elevated;' 'he bridles up;' 'he struts;' 'he beholds us from the height of his grandeur;' 'he has surmounted every obstacle to his elevation;' 'he has a haughty air, temper, mien and manners, which have made him many enemies,' &c. On the contrary, all expressions used to designate the opposite of pride, and our estimation of moral qualities, are taken from the opposite of physical height. 'The hypocrite crawls;' 'he sinks into the

earth for shame;' 'nothing deserves contempt more than baseness;' 'lower his pride;' 'trample on his credit;' 'God humbles the proud;' 'Rome humbles the pride of Carthage;' 'he stoops to things unworthy of himself;' 'to be prostrated before the majesty of the Supreme Being;' 'the humble stoop;' 'when we wish to be exalted, we should fear, lest we be depressed.'

Piron, wishing to portray the elevated character of Gustavus Vasa, from the influence of blind instinct, mounted a ladder. Thus placed, the thoughts, images, and expressions proper for his picture, crowd upon his mind. Hylas, one day, played a part, ending in these words: 'The great Agamemnon.' To present this idea of grandeur, the actor forcibly drew himself up into a stiff erect position. Engel, in his Mimique, observes, that Hylas should have stood erect without any constraint, in order to express by posture, elevation and nobleness of spirit, and by his features, the serious air of a man of profound reflection; and that, then, his natural language would have given more precisely the idea of the moral grandeur of a sovereign.

Fouquet, celebrated for his profusion, pride, and ambition, placed on his arms and in many parts of his magnificent seat, a squirrel, with this motto—*Quo non ascendam? Whither shall I not rise?*

M. B * * * was always so amply endowed with pride, that, in childhood, he never could get familiar with his companions, nor in adult age, with his equals. In consequence of a wound in the head, in which the organ of pride was involved, and during his long convalescence, the action of this faculty was exalted to such a degree, that he treated his superiors like subordinates, and wrote them letters in a laconic imperative style, ordering them to yield him this or that favor, or distinction. At the same time he was subject to visions, the nature of which, we shall presently see. These facts were communicated to me by his wife. A minuter account of this complaint is contained in the following letter, written by himself, the original of which is in my possession.

"I comply with your wish to be informed of the different circumstances of an accident that happened to me at * * *. I could have made a larger picture of all my visions while sick, had I thought of it at the time, but I tried to forget them, that they might not utterly craze me; though it argues one a little cracked, indeed, to be thinking at all of his visions. But for the facts.

"I had just changed my lodgings. I was dissatisfied with my servant, and, on the day of the accident, I had ordered him to sleep at the * * * chateau. Having retired alone to my chamber, about ten o'clock in the evening, (in December I think it was,) I got ready to lie down, and having undressed, extinguished my fire. In rising from the hearth, I struck the upper and posterior part of my head, against a nail that had been driven in just below the mantel-piece, for the purpose, it seemed, of supporting a cord, by which our predecessors in the place suspended their meat in order to roast it. I fell down senseless into the fire-place, and was found, as I was afterwards told, lying on my left side, with my head and part of my body in the fire-place. My feet, extending in the fall, encountered the table, and overturned it on me. The next morning, when the chamber-maid came in to make my bed, she found me in this situation and senseless. She called for assistance, and I was put in bed, and attended during my sickness, by my friend, M. C * * *. Notwithstanding all their attention, I remained two or three days without regaining my senses, and was given over by the physicians. They thought me dead, and an officer was appointed to command the battalion, that was to pay the funeral honors. At last, on the second and third day, I came to myself, and was told of all that had happened. I wrote to * * *, to inform him that I was not dead. Having recovered my senses, I was attacked with a very severe nervous fever, and was very ill. My mind wandered, and, in the paroxysms of my fever, I exclaimed that I had nails in my head. I imagined that blood came from my ears, though whether it really did or not, I do not know. As

for the visions which I now proceed to relate, I am unable to say, whether they occurred while I was senseless, or after I recovered my senses, and during the paroxysms of the fever.

"It seemed as if I were raised above the clouds, sometimes very high, but ordinarily in the middle regions. I often saw the figure of a man, completely clad in armor of polished iron. In my aerial travels, I saw some very extraordinary things, which I can no longer recollect. I rapidly passed from burning to freezing regions, and sometimes descended upon a kind of terrace, and into deep pits. I walked in prairies, where I saw multitudes of diamonds and very beautiful things, that I wished to collect; and they told me that my hands went through the motions of picking up something.

"Having swallowed, for many weeks, a great many drugs, particularly ether, I entered upon my convalescence, which was, in fact, another disease. Many persons contributed to my restoration: I went into society, and tried to divert my mind by all possible means. At home, I devoted my time to drawing, though my physician objected, on account of my feeble sight. During the three months of my convalescence, I had some very strange, but absurd ideas, which, no doubt, were the sequel of my visions. I wished to fly, and imagined I was making pasteboard wings. However, I never put my absurd idea into execution."

I will add, that during his convalescence, M. B*** always preserved the proud and high-spirited disposition which he previously had. Among other facts also related to me by his wife, I learned that he would have thought it debasing to perform, or suffer his wife to perform, the simplest domestic act. If it were merely to shut a window, or bring a glass of water, his pride revolted at the idea of doing it himself, or suffering his partner to do it; a servant must be called for every thing of this kind.

Now, let the reader decide, whether we are authorized to admit an analogy between physical height,

and moral height or elevation; whether we must admit two organs essentially different, one for the instinct of height, and one for pride, or consider them as belonging to one. But, let me repeat, however this question may be decided, the decision cannot be unfavorable to organology; for, whatever it may be, it is still certain, that the instinct of height, of pride, of love of authority, have their organ in the brain, and that this organ is placed in the region I have indicated. I also leave it to the reader to decide, whether the fundamental quality to which this disposition belongs, should be called the *sense of elevation*, self-esteem, or self-love. Pride, loftiness, hauteur, presumption, thirst for rule, &c. result from the great activity of the same organ. Modesty, want of a good opinion of one's self, humility, meanness, result from its too feeble development.*

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* "It is certain, and must be conceded," says Spurzheim, "that animals which live on mountains, or which are fond of high regions, have one part of the brain more developed than the species of the same genus which live in flat and low countries. This difference is very sensible in roes, hares, cats, rats, &c. Yet it appears to me that this circumstance by no means authorizes the conclusion, that the faculty which leads animals to seek elevated situations, is essentially the same as that which makes man proud and haughty."

"He also supports his opinion by saying, that different faculties which are merely physical in animals, become moral in man, and quotes physical love as an example. Now I think, that all physical faculties common to man and animals, preserve their nature in man, and that the faculty of physical love is, in itself, always the same. It is obvious, however, that this propensity may be accompanied by other sentiments, especially by attachment."

"Gall says, that mountaineers are proud, and particularly attached to their independence and moral liberty. Being attached to mountains does not exclude self-esteem and firmness, which lead to independency. Moreover, I do not think that the inhabitants of Switzerland have more natural pride than the Hungarians. The former, however, struggled for independence, while the latter could not endure the civil liberties which the Emperor Joseph the Second allowed them. The Spaniards are notoriously proud, but show little inclination to be free."

"Gall quotes several examples of proud persons, being particularly fond of climbing upon mountains, and to great elevations. My experience has shown me both proud and humble persons, who felt a peculiar pleasure in going upon towers and other elevated places; but they did so to see the scenery of the surrounding country. This in-

Objection.

"Does the organ of habitation," says Demangeon, "which Spurzheim admits, and Gall does not deny, occupy the same place in the brain of animals that prefer the tops of mountains, of those that live in plains, and those of amphibious and aquatic animals? Gall, who is fond of grafting different fruits on the same stem, finds, in the organ of pride and vanity, the instinct for inhabiting mountains; but I do not see, why the instinct for living in the plain, and that for living in the water, may not equally reside there; else it might be said with more truth than ever, that extremes meet; and it would be no more surprising, than that our physiologist should have identified benevolence and justice in their origin. The ducklings, hatched by a hen, run to the water, as soon as they are hatched, from a primitive instinct, and leave their mother, which is afraid of wetting her feet, to cluck in vain on the edge of the water. Now, do the very opposite instincts of the hen and the duck, solely arise from the difference of their feet, which in the latter are webbed? Sound physiology sanctions no such doctrine; for it teaches, that the bodily parts proper for the execution of an action, are subordinate to a primitive disposition of the life of relation. It is hardly credible, that a single organ, or the same bundle of fibres, should preside over such different, and even opposite tastes and instincts; and I believe that the organ of habitation still contains some dark closet, into which our physiologists have not yet penetrated. It may be, that

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clination then belongs to the organ of locality, as I shall afterwards explain."

"Thus, I separate the instinct which carries animals to physical elevation, from the sentiment which produces self-love and pride; and I consider the first as a modification of the feeling which determines the dwelling-places of animals." ED.

Gall supposes here, too, a negative quality, which causes animals to dwell in low places, and in the water. But such a quality can be no function, unless we admit functions without an organ, which would be contrary to the whole doctrine of the brain. Thus, animals wanting the organ of height can dwell no-where, or must dwell just where chance carries them, which is contrary to observation."

This objection being conceived in the same spirit as that against the carnivorous instinct, I shall reply to it in the same manner. With all his reasonings, Demangeon cannot destroy the fact, that animals that live on heights, have the cerebral part in question, larger than those which live in plains, water, or low places; and this is all I am bound to prove. Does he believe that as many different organs are required, as there are places of habitation? He is at liberty to discover them. In the near-sighted and the far-sighted, the mole and the eagle, the organ of vision is differently modified, but occupies the same place in both. Thus the organ, which, in its largest development, and with certain nervous fibrils, inspires the instinct of height, in another mode of development, and with other nervous fibrils, inspires the instinct for plains or water. In conclusion, I am glad to see Demangeon, as well as other physiologists, beginning to acknowledge that beautiful principle of sound physiology, which I have taken so much trouble to establish, viz. that the executive organs are always governed by the legislative cerebral organs; that the intelligence of the elephant, and the industry of the beaver, do not reside in the trunk, nor in the tail; and, consequently, that the duck and hen do not receive their different instincts from the different structure of their extremities, which are only in harmony with the faculties of their brains.

IX. Vanity, Ambition, Love of Glory, (Eitelkeit, Ruhmsucht, Ehrgeitz.)

History of the Discovery.

While engaged in the insane hospitals, in establishing my discovery of the organ of pride, I met with a woman, who imagined herself to be Queen of France. I expected to find the organ of that sentiment large; but, instead of the long, oval prominence, on the superior, posterior, and middle part of the head, I found a very distinct hollow, and, on each side of it, a pretty large, round prominence. At first, this circumstance embarrassed me. I soon perceived, however, that the character of this woman's insanity differed materially from that of men alienated through pride. The latter were serious, calm, impetuous, elevated, arrogant; and they affected a masculine majesty. Even in the fury of their fits, all their motions and expressions bore the impress of the sentiment of domination, which they imagined themselves to exercise over others. In persons insane through vanity, on the other hand, the whole manner was different. There was, then, a restless frivolity, an incessant talkativeness, the most affected forwardness; eagerness to announce high birth, and inexhaustible riches, promises of favor and honor,—in a word, a mixture of affectation and absurdity. From that moment, I corrected my ideas relative to pride and vanity.

The proud man is imbued with a sense of his own superior merit, and, from the summit of his grandeur, treats all other mortals with contempt or indifference. The vain man attaches the utmost importance to the opinions entertained of him by others, and seeks eagerly to obtain their approbation. The proud man expects that people will come to him and find out his merit. The vain man knocks at every door to attract attention, and supplicates for the smallest portion of honor. The

proud man despises those marks of distinction, which, on the vain, confer the most perfect delight. The proud man is disgusted by indiscreet eulogiums. The vain man inhales, with ecstacy, the incense of flattery, however awkwardly offered. The proud man never descends from his grandeur, even in circumstances of the most urgent necessity. The vain man, to gain his ends, will humble himself, even to crawling. Pride, thirst of domination, are the traits of a very few individuals, while the domain of vanity, self-love, extends, at least to a certain degree, to every member of the human family. This may be sufficient to show that pride and vanity are two very different fundamental qualities, and that we must admit a primitive organ for each.

Natural history of Vanity, of Ambition in man.

Vanity, ambition, love of glory, are modifications of the same fundamental quality, which has received different denominations, according to the importance of the objects with which it is concerned. Woman shows her vanity in dress; the statesman derives his honor from his offices; the soldier, his glory from defending his country. This sentiment is as common, as it is beneficial both to the individual and society; for, it is one of the most powerful, laudable, noble, and disinterested motives to action. How many brilliant deeds, instances of generous devotion, and admirable exertion would the history of our race have never known, without the influence of this sentiment! To excite us to labor and to good deeds, even in early childhood, our parents and instructors can employ no more efficient motive than that of honor, ambition, emulation. And to the generous, noble-hearted man, what recompense can be more flattering, than public marks of distinction and merit, celebrity, and a wide and brilliant reputation?

For my part, I like ambition, and a sense of honor,

in my shoe-maker; for it leads him to make me good shoes; I like the vanity of my gardener, for it procures for me the very nicest fruit. I want no advocate, physician, general, or minister, who is not anxious for glory, and is sensible to no other charm than that of gold. I like the naïve vanity of that young girl; and I predict that, some day, she will be ambitious of being an excellent wife and mother. Correct people's notions of the real value of things, and society will always be better for this pretended weakness of man, than for the apathy and indifference of those philosophers, who affect to despise worldly interests.

However the subject may be viewed by satirists and moralists, I thank nature, for having endowed us all with more or less vanity, self-love. Allowing that my vanity disturbs you; that modesty, on my part, and an exclusive deference for your merits, would put you more at your ease; yet be candid, and say, whether, if you should assume such a character, you would be as happy, as contented with your lot, qualities, and talents? It is very rare for equity or justice, to be remarkably well disposed to appreciate good qualities, or extenuate bad ones. But the divine enchantress, vanity, consoles us for our defects, and for the advantages of our equals. Ever ingenious in the work of self-compensation, she discovers in each one of us some merit, some kind of happiness, which we prefer to every thing else. Where is the man, who, under all these relations, would change his character for that of another?

To all classes of men is this quality allotted. Vanity is the same in forests, villages, and cities. The North American Indians think much of their personal appearance; they devote considerable time, and take infinite pains in decorating themselves in their way, and in preparing and giving durability to the colors, with which they paint themselves, and are constantly occupied in retouching them, in order to appear to advantage. There, vanity seeks admiration in fine cattle, and well-cultivated fields; here, it endeavors to attract the jeal-

ous eyes of others, by dress, magnificent equipages, splendid liveries, titles, &c. &c.

It is vanity, too, as Count Segur has said, which makes no nation, however uncivilized, believe itself inferior to the rest of mankind, or contented with claiming even equality. They all have mutual hatred and contempt for one another. Attached to objects which particularly interest them, and respectively considering their condition as the climax of human felicity, they all pretend to prëeminence. The most of them, each in its kind, set themselves up for a judge and a model of perfection, arrogate to themselves the highest rank, and distribute the lower ranks and degrees of consideration to others, according as they approach their own habits of acting and thinking. One is vain of the personal character, or of the knowledge of some of its members; another, of its wealth, its industry, its antiquity, its population, and power; while they, who have nothing to boast of, are vain of their ignorance, their simplicity, their mountains, their immense forests, their slavery, their poverty, of the absolute despotism even of their tyrants. The savage cherishes his independence of spirit, which can endure no labor, and recognizes no superior. It was proverbially a form of imprecation, much used by the neighboring people of Siberia, that their enemy might be reduced to lead the life of a Tartar, and be mad enough to rear and pasture cattle. Before the reign of Peter the Great, the Russians believed themselves in possession of every thing that conduced to the glory and ornament of nations, and despised, in proportion, their western neighbors of Europe. In China, the map of the world was a flat square, the greater part of which was covered by provinces of this vast empire, while the despised remainder of the human species was left to occupy some obscure corners towards the extremities. Can we, after this, be indignant at seeing a great and ostentatious people complacently take rank of all other people? Ought we, also, to be astonished, that another great and amiable nation daily sings the praise of its arts, its sci-

ences, its culture, its institutions, its national character, its sky even, and considers them as prerogatives, exclusively appertaining to it alone? I like this vanity, also, because it creates a thousand artificial wants, increases the conveniences of life, embellishes our dwellings, and occupies and supports industrious hands. To this, principally, are we indebted for the flourishing state of the arts and sciences. Collections of works of design, sculpture, painting, and natural history; libraries, gardens, monuments, palaces, and even our temples, would never have existed, or been pitiful things, without the inspiration of vanity, or the love of distinction.

Thus it is that luxury and show, far from being the source of the corruption and ruin of nations, become the moving spring and support of the arts and sciences—the soul of commerce—the agent of national grandeur and opulence.

Finally; it is the same sentiment still—vanity—which, though they suspect it not, opens the hands of the rich, and scatters their bounties on the poor and wretched. It is a fine precept, no doubt, that the left hand should not know what the right hand giveth; but it is requiring too much of human virtue, while we desire the alleviation of human misery. Publish donations, benefactions, and endowments, and you add a powerful motive to charity,—you command it—you wring it from insensibility and avarice. Considering vanity in this light, where is the censor, who would wage war against it? True, indeed, vanity is frequently the accompaniment of mediocrity, the sign of silliness, and bestows on its possessor a purchased title. He thinks himself in credit, because he is admitted, with the crowd, into the houses of the great: he sets an exaggerated value on his smallest qualities; and his self-love excites pity, and often ridicule. But why should we be jealous of the little enjoyments of an inferior being? And what are its slight evils, compared with its beautiful results, when acting in combination with superior qualities and talents?

Vanity, however, is ever inexcusable, when it becomes

the source of envy, jealousy and calumny; when it endeavors to encroach on the merit of another; when it delights in dimming the virtues, and magnifying the defects of those who displease us; when it is ashamed of benefits received; when it sows the seeds of discord, and engenders disquiet and hatred; when it rejects advice, and blinds a man to his own weakness.

It is unnecessary here to prove, that self-love, vanity, and ambition exist in different degrees in different individuals. Observe children; while some are insensible to all humiliations, others are mortified by the slightest reprimand. Look at criminals exposed in the iron collar; and you will see that, while some are overwhelmed with shame, others look on the spectators with every expression of disdain, indifference and impudence,—a conclusive proof, that punishments equal in law, do, nevertheless, vary in intensity, according as they are applied to different individuals; and that the more hardened in crime are, ordinarily, the least punished.

It is the habit to charge the fair sex with more vanity, in trifles, than men. Women know very well, that the toilet heightens the effects of their charms, and, to men's eyes, gives a relief to their other good qualities. Thus this amiable weakness testifies in favor of their desire to render themselves worthy of our approbation. But when I see that swarm of coxcombs and fops, the slaves of the most extravagant fashions; when I see men crowding the public walks, some on horseback, and some in elegant carriages, and coveting the admiring gaze of the idle; when I see the soldier with head erect, strutting along, when seen by women; when I see the pains and manœuvres taken by insignificant men to obtain a title, or a cordon,—then the question of the relative degree of vanity in man, and woman, seems to me decided.

From all these considerations, it is to be inferred, that the sentiment of self-love, vanity, ambition, is a fundamental quality, inherent in the human species, and, consequently, founded on a primitive organ of the brain.

Vanity, Love of Approbation in Brutes.

Brutes, too, are fond of praise and approbation. With what fulness of delight does the dog receive our caresses and praises! how sensible is the horse to marks of affection, and how ardent to outstrip his rivals in the race! Every one knows that, in the south of France, they decorate the mules with bouquets when they travel well. The most painful punishment that can be inflicted on them, is to deprive them of their bouquet, and tie them to the back of the carriage. I have a female ape, which, whenever they give her a handkerchief, throws it over her, and takes a wonderful pleasure in seeing it drag behind, like the train of a court robe. One of my bitches is never happier, than when she is carrying my slippers in her mouth. Charmed with this honorable burden, she bridles up, and wriggles her whole body; and the more I exclaim, "fine Stella, fine Stella!" the more animated are her movements, and she passes from one to another, to obtain a tribute of admiration. She might have been likened to a country damsel, in a new gown, on her way to church, wriggling to and fro, with head up, neck stiff, and chest protruded, to draw upon herself the envious looks of her companions. This same bitch, that had always been very lively and fawning, became suddenly afflicted with a sullen sadness, and, in spite of all I could do to enliven her, she continued lying in her corner. After two years of melancholy, she suddenly resumed her former gaiety, and began to caress me with her ordinary liveliness and affection. In the course of the same day, I learned that a squirrel, which I had in the house for two years, had been killed. Never was unquiet, vain and jealous courtier, more deeply wounded, than was this poor brute, by the presence of the strange animal. Birds are just as much delighted with being caressed by their master. They turn from one side to the other, approach him, strike their wings, and express their pleasure by low and gentle tones.

Alienation of Vanity.

In health even, the vain-glorious man deludes himself with the idea of possessing qualities he does not possess: in his eyes, nothing is more important to the world, than himself; in alienation, therefore, the function must be so much the more disordered. In the account of its discovery, I have given two cases, which sufficiently prove, that the sentiment of vanity may be in a state of excitation independently of other qualities. Every insane hospital furnishes examples of this kind. I attended, not long since, a very worthy girl, who had always prized very highly the benevolence of her mistress, a lady of high rank. In her alienation, besides certain fixed ideas relative to amorous intrigues, she imagined herself to be immensely rich, and of a very distinguished rank. She began by giving away her wardrobe; then she went into shops, and purchased goods fit only for princesses.

From all I have said, it follows, that vanity, ambition, love of glory, is a sentiment which must have its primitive organ in the brain.

Seat of the organ of Vanity and External Appearance of this organ.

This organ is formed by the convolutions of the brain marked xi. pl. viii. pl. ix. and is by the side of the organ of height. It is manifested in the cranium by two large prominences, projecting like the segment of a sphere, situated by the side of the oval, elongated prominence of the organ of height. These prominences are on the parietal bones, at about one-third the distance between the parietal and the temporo-parietal suture, reckoning from the former. Hence it is, that the head of vain people is shorter from the forehead to this organ, (pl. xlviii.)

than that of those, in whom the organ is very small. Since the discovery of this organ, the observations I have had an opportunity of making, in insane hospitals, as well as in society at large, have established the form and seat, which I have here given to it. They took us once to see a patient, whom they considered to be mad from pride; but his loquacity, costume, gestures, proved that he was insane from vanity, not pride; and we found that he had the two prominences, which I have mentioned as indicating the organ of vanity, and nothing of that, which indicates the organ of pride. I once examined, with Esquirol, at the Sulpêtriere, the head of a woman, who believed herself Queen of France. This head had precisely the same protuberances that I found at Vienna, on the head of a maniac that also believed herself the Queen of France, and whom I have mentioned in the history of the discovery of the organ of vanity.

I have often looked at apes with astonishment: I have previously spoken of their propensity for dress; and persons, who have had an opportunity of observing a great number, will have remarked, with me, how very sensible they are to every kind of derision and mockery. When they are not of a species decidedly vicious, like the baboons and apes, whose head is flattened, but are like the orang-outangs and monkeys, with a considerably prominent forehead, I advance boldly towards them to caress them. Ordinarily, they receive me with the utmost mildness, and utter sounds of joy, tenderly embracing and kissing me. But if they perceive one mocking them, or unable to conceal a smile, they show their teeth, leap upon him, and bite and slap him with admirable agility. I have hardly been able to explain the conduct of these monkeys. They have the organ of vanity very distinctly shaped, like two segments of a sphere.

Objection.

"Can we conceive of an organ of vanity, which is concerned in the exercise of all the faculties, even in crime and cruelty, in robbers, banditti, and savages, in the most useful, as well as the most frivolous employments? In this age of events of every description, how many men have we seen, boasting of their ingratitude and treachery towards the authors of their fortune, to raise the idea of their importance in the world, where, as Boileau says, "A fool will always find a greater one to admire him." Vanity, like attention, reflection, imagination, and judgment, is an attribute common to many faculties. To assign to it a special organ, we shall have to attribute to it the functions of all the others, or maintain that we may boast of what we can neither have feeling nor thought of; since vanity may arise from every thing, and that, upon ultimate analysis, vanity is only the manifestation of a judgment, false or erroneous in some respects. It is never the failing of a judicious, circumspect mind, though it may be, of one of partial talents; because the combination of many faculties is requisite to awaken circumspection and rectify the judgment, but not for the exercise of particular talents or of mere genius. It needs some ingenuity to discover the points of resemblance, which determined Gall to confound, in the same organ, vanity and the instinct which leads animals to choose elevated places for their habitation; while in the human species, hauteur and meanness, are so often found by the side of each other, in the same head, as Voltaire has very strongly expressed it, in speaking of the great, who were going to the court at Versailles.

> Ils s'en vont à la cour essayer des mépris
> Qu' ils viennent au galop nous rendre dans Paris.*

* They go to court, to endure the contempt, which they gallop back, to bestow on us in Paris.

"Gall, in his work, flatters many human weaknesses, and especially that of vanity, which he almost credits with the majority of our good deeds; while, in fact, based as it is upon egotism, it corrupts all the sources of good, or exposes it to ridicule. One thing, hard to conceive, in this combination in the same organ, of the physical instinct of height with vanity, is, that the vain are not always found living on the house-top, in high towers and on mountains, and that modest, rational people are found somewhere else besides in plains, at the base of mountains, in caves and ground-floors."

Reply.

The last paragraph of this objection, where Demangeon makes an effort at wit, deserves no answer. He invariably confounds vanity, ambition, love of honor, and glory, with pride, loftiness of spirit, and the sentiment of elevation. Demangeon is probably the first moralist who has taught that ambition, love of glory, of fair fame, of great reputation, are not only barren of noble deeds, but that they even corrupt the sources of good. Demangeon thinks my ideas on the fundamental qualities and faculties of man, are not sufficiently pure to serve for the edifice of a new philosophy. Yet here he draws his arguments from this very philosophy; for the distinction I have established between the fundamental powers and their common attributes, constitutes its most essential part. I do indeed maintain, that the vain man is vain of every thing—of the beauty of his person, his achievements in running, of the strength of his limbs, of his feats in eating; yet does it follow from this, that vanity is an attribute of his beauty, feet, muscles, or stomach? In the same manner, too, the vain man is vain of his skill in stealing, of his courage in killing, of his birth, and of his fortune, without our being obliged to suppose that vanity is a common attribute of birth, fortune, &c., as attention, reflection, judgment, memory,

imagination are common attributes of the intellectual faculties. Though vanity is sometimes the accompaniment of mediocrity, it also is often found in acute, circumspect minds, and accompanies the most benevolent sentiments—which furnish just titles to vanity. Finally; it appears, that the passage I cited from the work of C. G. Leroy, in treating of the natural history of pride, puts Demangeon in mind of Voltaire's verses, which prove that a vain and boasting valet-de-chambre preserves the faculty of crawling in the presence of his master.

X. Circumspection, Foresight, (Behutsamkeit, Vorsicht, Vorsechtigkeit.)

History of the Discovery.

At Vienna, I was acquainted with a prelate of excellent sense, and considerable intellect. Some persons had an aversion to him, because, through fear of compromising himself, he infused into his discourses interminable reflections, and delivered them with insupportable slowness. In conversation, it was very difficult to bring him to a conclusion. He was continually pausing in the middle of his sentences, and repeating the beginning of them two or three times before proceeding farther. A thousand times he exhausted my patience. Never, in his life, did he happen, by any accident, to give way to the natural flow of his ideas, but would constantly recur to what he had already said, and consult with himself whether he could not amend it in some point. He acted just as he talked. He prepared, with infinite precautions, for the most insignificant undertakings, and every connection was subjected to the most rigorous examination before forming it. This case alone, however, would not have arrested my attention; but this prelate happened to be connected, in public affairs, with a Councillor of the Regency, whose eternal irresolution had procured for him the nickname of *Cacadubio*. At the

examinations of the public schools, these two individuals sat by the side of each other, and my seat was directly behind theirs; so that I had an excellent opportunity of observing their heads. What particularly struck me was, that each head was very broad in the upper, lateral, and hind parts. This extraordinary breadth, coinciding with the peculiar character of these two men, whose qualities and faculties were very different, and who resembled each other, only in their circumspection, and in the conformation of their head, suggested to me the idea, that irresolution, indecision, and circumspection, might be connected with a large development of certain parts of the brain. In a very short time, my reflections on this quality, and the new facts that were presented, converted my presumptions into certainty.

Natural History of Circumspection in Man.

It was necessary that man and brutes should be endowed with a faculty to foresee certain events, to give them a presentiment of certain circumstances, and prompt them to provide against danger. Without such a disposition, they would have lived only for the present, and been incapable of taking any measures for the future. Still, this disposition has been very unequally dispensed to the different individuals of our species. In my own family, several of my brothers and sisters were, from infancy, excessively short-sighted and fickle; while the rest, at an early age, evinced a remarkably cautious and considerate disposition. I have had opportunities of observing the same difference in my schoolfellows, friends, and acquaintances, and I pursued my observations in a great number of families, of the highest and lowest condition. I invariably found two classes of persons; one, obnoxious to the reproach of fickleness, short-sightedness, and want of circumspection; and the other, having the credit of foresight, and of a firm, con-

siderate and circumspect character. People of the former class, are frequently of a gay, careless disposition, and engrossed entirely with the present; they yield themselves unreservedly to the impulses of feeling, adopt rash resolutions, and enter upon hazardous enterprises without deliberation or advice. In domestic life, inconveniences and even misfortunes are the consequence of their want of precaution. Here, they are hurting themselves against a table in the dark, or breaking plates and dishes, owing to the want of a little precaution, in arranging them; there, a child falls into the water while playing in the garden, because they have neglected to surround their ponds with a railing. They lose the money they lend, by omitting to take proper security; riding on a slippery path, quite insensible to the dangers around them, their horse falls, and they lose their lives. A rat or cat overturns the candle they have left burning, and sets their houses on fire. Let a general, thus organized, be active, ardent, and intrepid, and you will see him, like Pyrrhus, heedlessly exposing himself, as if he were the humblest soldier; or, a mere adventurer, engaging in his enterprise without any system, from mere heedlessness and want of reflection.

Persons of the second class are constantly on their guard; they know that it is more difficult to sustain than to acquire reputation, and, consequently, every new undertaking should be prosecuted with as much care as if they were making their first efforts for distinction. They anticipate all possible dangers, all the fortunate and unfortunate events in their enterprises; they ask advice of all, and then even are still undecided. They hold to the adage, that, of a hundred misfortunes that befal us, ninety-nine arise from our own fault. Such persons never break any thing, and they may pass their lives in pruning trees, or in working with edge-tools, without once cutting themselves. If they see a vessel placed near the edge of the table, their nerves shrink; large sums of money they are never guilty of losing. Finally, they are a standing subject of criticism to less

considerate people, who look on their forebodings as extravagant, and their precautions as trifling and absurd.

An excessive endowment of this quality in persons exposed to general observation, and surrounded by perilous circumstances, and tormented by distrust and suspicion, leads them to take a thousand precautions, surround themselves with guards, and carry their circumspection and suspicions so far as to hide away, to sleep in remote, inaccessible chambers, and constantly change them, like Aristippus, the tyrant of Argos, and Louis XI., a tyrant of France.

The general inference to be drawn, from the approximation of these two classes of characters, is, that they must, necessarily, be attributed to a primitive organization.

Circumspection in a state of Disease.

The numerous cases, where man is deranged in every thing relative to circumspection, while he enjoys perfect health and soundness in all his other moral and intellectual powers, prove, that it should be considered a fundamental quality, independent of the others. In Vienna, I attended two fathers of families, in easy circumstances, who, nevertheless, were tormented, night and day, with the apprehension that their wives and children would come to want. All my own, and their friends' assurances, were insufficient to persuade them that their fears were entirely chimerical; yet they were managing their affairs very nearly the same as before they were diseased. After recovery, they were afraid to hear their condition mentioned, through terror of a relapse. Before their malady, they were well known to be of a gloomy disposition, always looking on the dark side of things.

"Melancholy," says Pinel, "may depend upon a natural disposition, strengthened by age, and exasperated by the various circumstances of human life; but we of-

ten see persons, of a gay and lively character, fall into a state of dull moroseness, in consequence of some adversities, seek to be alone, and finally lose their appetite and sleep. They become more and more suspicious, and, in the end, imagine themselves constantly surrounded by snares and plots, contrived with the blackest perfidy. Some of those melancholic patients are so strongly impressed with the idea, that they are persecuted by invisible enemies, that they are in a state of constant anxiety, and, in the night, imagine they hear hollow sounds proceeding from secret machinations, whose victim they constantly think they are destined to be. One of them, who had formerly heard electricity spoken of, and had read some books on the subject, thought that her enemies, who were bent on killing her, could exert over her a deadly influence at great distances, and believed she could see electric currents, which threatened her with the greatest possible dangers. Other women see supernatural beings, whom their feeble imagination converts into reality, by attributing to them the most sinister intentions. A woman, about twenty-five years old, of a strong constitution, and married to a feeble, delicate man, suffered some severe hysterical attacks, and was subject to the most alarming nocturnal visions. She was fully convinced that a beggar, whom she had one day repulsed, and who had threatened to bewitch her, had really executed his terrible purpose. She imagined herself possessed by a demon, who assumed a variety of forms, and who, at one time, would sing like birds; at another, give utterance to most doleful sounds; and again, to piercing cries, that made her quake with terror. She remained several months in bed, unmoved by all the advice we could give her, and by all the consolations of friendship. The curate of the place, a man of enlightened understanding, and of mild and persuasive character, gained some ascendancy over her mind, and succeeded in making her leave her bed, and engage in domestic occupations, in digging her garden, and in other salutary kinds of bodily exercise. All this was fol-

lowed by the happiest effects, and a cure which lasted three years; but at this period, the good curate died, and he was succeeded by a superstitious, narrow-minded ex-monk, who never doubted that she really was possessed of a devil. The consequences of such absurd prejudices, may easily be conjectured."*

"A very distinguished military officer, after fifty years of active service in the cavalry, spent his latter years in a very different condition, in all the enjoyments of an easy, comfortable life, in an agreeable country. The organs of respiration and digestion soon felt the effects of this inactivity, in addition to the enfeeblement produced by age, and the result was a periodical and very abundant secretion of mucus. He became subject to various nervous affections, such as, spasms in his limbs, twitchings in his sleep, frightful dreams, and sometimes fits of heat in his feet and hands. The disorder soon extended to his moral powers, and he began by experiencing the most vivid emotions, from the most trifling causes. If, for example, he heard any disease spoken of, he immediately believed himself attacked with it. Was any one mentioned by his friends as deranged in mind, he imagined himself insane, and retired to his chamber full of melancholy thoughts and disquietudes; every thing became for him a subject of fear and alarm. If he entered into a house, he was afraid the floor would fall, and precipitate him amidst its ruins. He could not pass a bridge without terror, unless impelled by a sense of honor for the purpose of fighting."

"A very rich, middle-aged man," continues Pinel, "became morose and subject to the most pusillanimous fears, so that he could scarcely get a few moments' repose, not lying down till four or five o'clock in the morning. He passed the night in a state of constant fear; imagined he heard a voice speaking in a low tone; carefully shut his door; a moment after, feared that he

* Pinel, op. cit. p. 115.

had not closed it tight, and continually returned, and continually discovered his mistake. Another idea took possession of his mind; he would rise from his bed to examine his papers; he would separate them one after another; collect them again; believe that he had forgotten something; and be afraid of the very dust on the furniture; he would evince the greatest instability in his thoughts and intentions; would wish and not wish; constantly tormented by suspicion and gloom; he even feared to breathe the external air, and always kept himself within doors."*

"A young person, without any known cause, became gloomy and morose, and suspected all around her of wishing to poison her. The same fear followed her, after she had quit the paternal roof, and was staying with one of her aunts. Her suspicions were so strong, that she refused all kinds of nourishment."†

I have elsewhere spoken of a very rich man, of distinguished talents, and perfectly sound in every other respect, who was plunged into the deepest despair, whenever the conversation turned on any topic connected with his fortune. He saw nothing but misfortunes and disasters; he often shed bitter tears, and thought of destroying himself. At the time of the entrance of Louis XVIII. into Paris, he had an air-gun in his house. Some wretch, he said to himself, may fire on the king; the crime will give rise to domiciliary visits; they will find the gun in my house; and will believe me the author of the deed. He broke the weapon in pieces, and threw it away. Still new perplexities arose. Some years hence, in clearing out the dirt, they will find these broken bits; all the accidents that have taken place, all the crimes that have been committed, by means of air-guns, will be imputed to me. He could rest no longer till he had collected all the pieces he had thrown away. Subsequently, he broke up his pocket-pistols, enveloped

* Pinel, op. cit. p. 293. † Pinel, op. cit. p. 294.

the fragments in some paper, and went and threw them into a remote street. Still more troubles. Might not my address be written on this paper? If they find it, what horrible suspicions will be excited against me!

Seat and external appearance of the organ of Circumspection.

The convolutions marked x., pl. viii., pl. ix., pl. x., constitute the surface or final expansion of this organ, on the two hemispheres of the brain. A large development of these convolutions, raises the superior-posterior outer portion of the parietal bone into a lateral prominence, so that, to the eye, or the touch, the head presents a very broad surface in its superior-posterior lateral region. On the contrary, the head will be very narrow in this region, when the organ is little or moderately developed. This last shape is met with in inconsiderate, precipitate, heedless men, and very generally in beggars and people who voluntarily engage in doubtful enterprises. Compare pl. lxxv., a type of circumspection, with pl. lxxvi., a model of heedlessness.

Let those who are desirous of ascertaining the meaning of this form of the head, look with an observing eye into families, schools, and society. Whenever they meet with these two different forms of organization, and obtain information relative to the circumspection of these persons, they will find my discovery confirmed.

In Vienna, I was the physician of two bankers, who had the reputation of managing their affairs with extreme circumspection; they never, in fact, engaged in a commercial operation, without exposing and considering every possible chance. Both had the region of the head in question very broad. They were also capable of giving excellent counsel, as I have always observed of men endowed with a favorable development of this organ. These two men contributed very much to fix my attention on this organization, and the disposition

resulting from it. Since that, when examining men engaged in extensive business, I have always been favorably impressed with their talents, when I saw this organ well developed. Excepting those urgent cases, where a bold stroke is necessary, the results of their labors will bear the mark of precaution and foresight. Although they may be sometimes slow in the execution, still their plans are based on a broad and permanent foundation; while the opposite organization often accomplishes wonders which soon come to nothing, because the inconsiderate man has not even a presentiment of the caprices of fortune.

I have generally found but a small development of the organ of circumspection in military men, who have no other merit than that of performing coups de main, and who are only excellent partizans. In all military leaders, on the contrary, who acquired the renown of great generals, by actions that were deliberately and cautiously prepared for, and performed with coolness, I have observed the head broad and square at its upper and posterior region.

For the same reason, the serpent is the symbol of the art of medicine. It is possible to be a good operator without remarkable circumspection; but I have never yet met with a really skilful and successful practitioner without a very marked endowment of this quality. On the other hand, patients thus endowed, would frequently weary the physician's patience, if he was not aware of the source of their eternal disquietude. For the most trifling indisposition, how many questions are asked, and questions too always the same! for the slightest accident, how many sinister prognostications are entertained! Does the physician call often? "Bad sign that." Does he not call often? "See how he leaves his poor patient to suffer and die." Does the physician listen to his complaints with a serious air? He draws from it the most fatal horoscope. Does he appear calm, and rather anxious to leave? They charge him with inattention and indifference. Such patients are generally furnished

with too strong a dose of circumspection, unless the absolute want of all occupation fixes their whole attention on the state of their health. I was inquired of, relative to a young woman. As her hair was thin, I could perceive without any previous examination, that her organ of circumspection was very large; I therefore said, that she was circumspect and prudent to an excessive degree. Instantly, her mother began mentioning so many facts corroborative of my opinion, that I thought she would never be done. If the young lady coughed a little—"O, she was dying of a disease of the chest!" If her eyes happened to smart—"she was going to be blind, and one day, instead of being a support to her mother, she should only be a charge. Who would take care of her unfortunate mother in her old age?" If a payment is not made—"how shall we live; we must sell every thing, borrow money, the interest will absorb our income, and we shall finally die in the most miserable condition."

The two patients, who, though in easy circumstances, were afraid of dying of hunger, had both an extremely broad head. The patient who broke up his air-gun and pistols, had not only a very broad head, but on each parietal bone, a prominence projecting out like the segment of a sphere, denoting an extraordinary development of the subjacent cerebral part. Most melancholic patients present this organization, which, in good health, however, is not prejudicial to calmness and contentment of mind. As these too patients, before they were cured, were singularly tormented by a propensity to suicide, and as the third whom I never could cure, is still often on the point of throwing himself out of the window, I will add some remarks on one of the causes of relapses, or periodicity. This examination will be so much the more interesting, inasmuch as it will explain many phenomena, that are as common in health, as in disease, and particularly in mental alienations.

Some additional Considerations on Suicide, and on one of the Causes of its Relapses and its Periodicity.

I have already spoken of suicide, simple and complicated, while treating of innate dispositions. The faithful picture which I there drew from repeated observations, must have given to readers a very different idea of the matter from that too generally entertained. It is pretended, that they are particularly susceptible of melancholy attacks who know not how to connect useful occupations with those that are calculated merely for pleasure; who are solely devoted to sensual gratifications; who, by reason of their own emptiness, cannot live within themselves; and who, after exhausting every kind of enjoyment, die of ennui, for want of fresh aliment. Exposed to this disease too, it is also added, and much more so perhaps than any others, are those young men of a warm and exalted imagination, and a romantic turn of mind, filled with those wild illusions which some philosophers and novelists have been pleased to represent as realities. Carried away with this ideal happiness, they search every where for it; and, after trying in vain to find it, and being disabused of their chimerical fancies, life becomes insupportable.

Undoubtedly, every thing that produces a distaste for life, or reduces a man to extreme despair, may become a cause of suicide. Loss of fortune, or of honor; the prospect of a cruel or ignominious death; the destruction of domestic happiness, jealousy, inability to obtain revenge, which turns one's own wrath against himself; want of strength to support physical or moral ills, accompanied with the belief of annihilation after death, or of a happier future; sometimes even the contagion of other examples of suicide; very often a miserable hereditary constitution, and many other circumstances, may determine an individual to take away his own life. A complete treatise on suicide, therefore, under all its re-

lations, would require a work on purpose, and necessarily lead to numerous physiological, pathological and moral discussions.* I must limit myself to some reflections, upon that kind of suicide which is the sequel of disease of a particular mental alienation, which is itself most often the result of organization,—of a particular disposition.

I have demonstrated that, often in a state of health, a super-irritation, or even an excessive degree of the natural activity of the organ of circumspection, leads to pusillanimity, indecision, ennui, disquiet, discontent, &c. Is it astonishing, then, that in case of general indisposition of super-irritation, or peculiar nervous excitability, the organ of circumspection should perform its part in the fulness of its vigor, fill the patient's mind with sinister forebodings, and represent the earth as the abode of desolation; finally, that it should engender the propensity to self-destruction?

The state of the disease as I have depicted it, (vol. i.) and which ordinarily precedes this kind of suicide, is alone sufficient to prove that the organ of circumspection is at its very highest degree of excitement, and that it, finally, interferes with the action of the other cerebral parts. I have a list of eleven hundred and eighty individuals, who killed themselves between 1784, and 1798, in the Saxon states, without including Upper and Lower Lusatia. Of this number, five hundred and twenty-six were melancholic, presenting manifest signs of a gloomy, anxious temper. What are we to think of the moral condition of the most of the rest? How often has this treacherous disease been acting silently, and how often have its symptoms been overlooked. They whom I have attended, though apparently in health, were all, timid, suspicious, morose, melancholic, and sometimes, though rarely, a prey to excessive gaiety. Some,

* Since the publication of my large work, this labor has been performed by M. Falret, pupil of M. Esquirol, on *Hypocondria* and *Suicide*. 1822, Paris.

by their petty disquiets, were the annoyance of all around them: they imagined that every body despised them; complained continually that they were neglected, or treated unjustly; while many looked as usual, and disdained to communicate their desperate situation to others. This unquiet temper, extravagant whims, and treacherous silence, ordinarily characterise the most dangerous cases, and, at the same time, reveal to the friends a knowledge of their unfortunate condition. Even after the fatal blow has been given, we are still asked, where they are not familiar with this singular partial alienation, whether the suicide is not rather the result of some immorality, than of a derangement of the mental faculties. Against this latter opinion, they will bring forward the preparations begun long before; the manner in which they eluded the attention or surveillance of their friends; the rational, well-planned measures for accomplishing their purpose; the sudden execution of their project, oftentimes directly after some kind of recreation, in which they seemed to take quite an active part,—and testamentary dispositions, made with a full knowledge of the cause, &c. &c.

The causes ordinarily charged with determining suicide, are only occasional; the storm has been brewing long before. Jealousy, unsuccessful love, loss of property, the clamors of creditors, the tortures of conscience, and all other motives, have, generally speaking, only given the last thrust at an edifice, whose ruin has been long impending. Besides the melancholic cases cited above, where there was a violent impulse to self-destruction, and when the organ of circumspection was very large, I recollect some other examples. The woman, for instance, who tried so often to take away life, and who had strength of religious principle enough to throw away from her, the key of the bed-chamber of her husband and children, and thus deprive herself of the power of hurting them; the young lady, seventeen years old, beautiful, rich, well educated, and on the eve of a brilliant marriage, but always melancholic, and complain-

ing, for a long while before, of an obstinate pain in the middle of her forehead, always appearing to be discontented with her lot, and always protesting that she was very happy, and who finally went up into the fifth story of the house, and precipitated herself upon the pavement, without her design being even suspected; and eight other self-destroyers, whose skulls are in my cabinet, soldiers, young women, artisans, clerks, &c. In all these, there is a large development of the organ of circumspection, producing a very distinct prominence in the above-mentioned region. At this moment I know a very well-informed, well-educated young lady, who, when only four or six years old, thought of destroying herself, whenever her parents shut her up to punish her. She was always expecting to die. To be loved, or to have friends, appeared to her to be a great misfortune, since her approaching death would soon separate her from them. She had the organ of circumspection very large.

This ought to be sufficient to explode the too common idea, that suicide is oftener an act of cowardice, or courage, or heroism, or inconsiderateness, or corrupt manners, or total forgetfulness of duty towards God and man. On the contrary, the result of these observations is, that a disordered and exalted activity of circumspection must be reckoned among the most powerful and frequent causes of melancholy, and particularly of that kind which determines the propensity to suicide.

Undoubtedly, we shall meet with heads of those who have been led to commit suicide by mental alienation, in which there is but a moderate development of the organ of circumspection; but it does not follow, that this may not have been painfully affected. The manner in which other parts of the body are organized, generally enables us to see to what diseases they are predisposed; still, we know, that a certain combination of circumstances may act upon these parts in a sense entirely contrary to the natural disposition. The haughty man, in whom the organ of pride greatly predominates

over all the rest, will, in case of partial alienation, dwell on ideas relative to pride, rather than to any other sentiment. I have mentioned some patients of this kind, who, in the intervals, or when in health, were models of submission and modesty. Have I not also mentioned many cases of persons, who, in a fit of insanity, or drunkenness, or fever, would make verses though previously they had not the least suspicion of possessing such a talent?

I am well aware, that the theory which fixes the origin of melancholy in a disorder of the organ of circumspection, appears to be a gross extravagance to those who, in their study of mental derangements, follow the old routine. Indeed, how could they attribute any partial alienation whatever, to a cerebral part, while they deny that the moral qualities and faculties are the proper functions of these same cerebral parts? And since they do not yet know what partial mental alienation is, how could they have any precise ideas of suicidal melancholy, or propensity to suicide, which is the most imperious, while no derangement is observed in the other qualities and faculties? But since I have demonstrated, that each fundamental quality or faculty is necessarily connected with a particular organ, and that all mental alienations have their immediate seat in the brain; since, in this volume, I have traced the partial alienations of the affective qualities to their respective organs,*—erotic mania to the organ of propagation; a quarrelsome, vicious disposition, to the organ of self-defence; the murdering impulse, to the carnivorous instinct, and so on with the rest,—it may now be easily conceived, that melancholy or distaste for life also, and finally the propensity to suicide, originates in a particular organ.

Considering this as established, I now ask, with what

* At the end of the exposition of the fundamental powers, I shall answer the objections to the doctrine, that partial alienations are owing to derangement of particular cerebral parts.

organ we can reasonably connect the propensity to suicide? It certainly is among the number of the propensities or sentiments. Would you confound these unfortunate people with those who have been made mad by pleasure, or pride, or vanity? Would you refer the propensity to suicide, and those to theft, to quarreling, and to cheating, which have become involuntary and irresistible by alienation, all to the same origin? Would you explain this propensity on the theory of a total derangement of the brain, of a universal commotion of the affective qualities? How then can you conceive of the soundness of many of these same qualities at the same time, which is a matter of daily experience? True, it is with this partial madness, as with every other kind. After existing a long time in the germ, the whole brain begins to suffer; the derangement of all the functions is more and more perceptible, and, finally, the organic lesions that are successively produced, become general. This was proved in the third volume, while treating of the influence of the brain on the form and texture of the cranial bones in disease. After all these reasons, which are founded no less on observation, than on general theory, we are obliged to admit, that the propensity to suicide, when the effect of disease, has its source in the organ of circumspection.

The question now comes up, which of the two sexes must be charged with most readily yielding to the fatal propensity to suicide. Women, in point of intellect, are ordinarily inferior to men; they are endowed with more excitability and sensibility, and they are also, oftener than men, the victims of bad treatment and desertion, a prey to jealousy and wretchedness. Still, the number of suicides is generally much greater among men than women. In 1805, one hundred and sixty-four men, and twenty-four women, committed suicide, in Paris. In 1806, over one hundred and twenty men, and forty women; in 1807, over ninety-eight men, and forty-nine women, making one hundred and thirteen women, and three hundred and eighty-two men, within the space of three

years. In ninety-five cases of suicide in Boston, or near that city, nineteen only, were of women. On the frontiers of Brandenburgh, out of forty-five voluntary deaths, thirty-two were of men, and thirteen of women. Brosson fixes the proportion of men to women, relative to suicide, as five to one. According to the observations of Esquirol and Falret, the propensity to suicide is very nearly three times more frequent in men than in women. But the mere census of cases of suicide, though carefully made, is hardly capable, in any respect, of giving a just idea of the natural history of suicide. It is always very difficult, and frequently impossible, unless the patients have been attended by physicians, to obtain exact information respecting the moral condition of people who put an end to their existence. We wish to know, in how many the suicide was the sequel of a mental malady, of the alienation in question? in how many, it was determined suddenly by momentary despair? and finally, in how many, it would be right to attribute it to a deliberate and culpable immorality?

Circumstances being equal, even in case of organic disposition, women seem to overcome this terrible propensity oftener than men. I know many families, where the propensity to suicide is hereditary, and, almost always, the number of suicidal men exceeds that of women. There is even now a family in Vienna, in which two brothers blew out their brains, many years ago. The three sisters, all married, and mothers of many children, have hitherto resisted, though excessively agitated at their monthly periods, and even during pregnancy. At those same periods, they feel it absolutely necessary that they should be watched till some days after, when they are freed from all temptation. In another family, the grandfather, father, and son have committed suicide, while there is only one sister of the last, that has made a single attempt. Are women less impatient under their troubles—more accustomed to suffer and be resigned? Are they oftener restrained by religious principles, or by regard for their children? Or, are they less

subject to attacks of this malady than men; and if so, from what reason? I doubt whether it can be attributed to feebleness of constitution, to mildness of disposition, or their timidity; for their feebleness of constitution would rather induce them to yield, than to resist; and we can hardly allow so much to their mildness and timidity.

Spring appears to exert a more fatal influence on this propensity, than winter. There are certain constitutions of time, that determine it and render it epidemic, —a fact well known to every physician; but every body does not observe, that this material cause must not be confounded with other external causes of a purely moral description.

We know also, that the propensity to suicide is transmitted from parents to children. In this case, the cause is as material and as little to do with the will, as if it were an accidental disease. The Sieur Ganthier, the owner of various houses, built without the barriers of Paris, to be used as entrepots of goods, left seven children, and a fortune of about two millions to be divided among them. All remained at Paris, or in the neighborhood, and preserved their patrimony; some even increased it by commercial speculations. None of them met with any real misfortunes, but all enjoyed good health, a competency, and general esteem. All, however, were possessed with the rage for suicide, and all seven succumbed to it within the space of thirty or forty years. Some hanged, some drowned themselves, and others blew out their brains. One of the two first had invited sixteen persons to dine with him one Sunday. The company collected, the dinner was served, and the guests were at the table. The master of the house was called, but did not answer,—he was found hanging in the garret. Scarcely an hour before, he had been quietly giving orders to the servants, and chatting with his friends. The last, the owner of a house in the rue de Richelieu, having raised his house two stories, became frightened at the expense, imagined himself ruined, and was anx-

ious to kill himself. Thrice they prevented him, but soon after found him dead, shot by a pistol. The estate, after all the debts were paid, amounted to three hundred thousand francs; and he might have been forty-five years old at the time of his death.

In the family of M. N***, the great-grandfather, the grandfather, and the father committed suicide.

In another family, the grandmother, her sister, and the mother, put an end to their lives. The daughter of the last has been on the point of jumping from the window, and the son hanged himself.

Examples of this fatal hereditary disposition are not rare. As in gout, the grandfather, grandson, and great-grandson may suffer horribly from it, while the son will not experience the slightest attack.

"An astonishing and terrible circumstance of suicidal melancholy," says Falret, page 6, "is, that of all kinds of madness, it is most susceptible of hereditary transmission. I have witnessed a great many times the fatal effects of this predisposition. I saw, at the Salpêtriere, a girl who made three attempts to drown herself; her sister was drowned some years before. I saw a mother, and grand-daughter attacked with the suicidal melancholy, and the grandmother of the latter, is at Charenton, for the same cause. Among the patients of a higher class, I have seen an uncle and niece, a mother and daughter affected with this same disease.

"An individual committed suicide in a house in Paris; his brother, who came to assist at his funeral, cried out, on seeing the body—'What fatality! My father and uncle both destroyed themselves; my brother has imitated their example; and twenty times, during my journey hither, I thought of throwing myself into the Seine.'

"A similar confession was made by a young officer, who came to see his brother, laboring under melancholy with distaste of life.

"Rush, in his work, on 'Diseases of the Mind,' relates a very remarkable case of this kind.

"Captains C. L. and J. L. were twin brothers, and so

great was the similarity in their countenances and appearance, that it was extremely difficult for strangers to know them apart. Even their friends were often deceived by them. Their habits and manners were likewise similar. Many ludicrous stories are told of people mistaking one for the other.

"They both entered the American revolutionary army at the same time. Both held similar commissions, and both served with honor during the war. They were cheerful, sociable, and in every respect gentlemen. They were happy in their families, having amiable wives and children, and they were both independent in their property. Some time after the close of the war, captain J. removed to the state of Vermont, while captain C. remained in Greenfield, in the vicinity of Deerfield, and two hundred miles from his brother. Within the course of three years, they have both been subject to turns of partial derangement, but by no means rising into mania, nor sinking into melancholy. They appeared to be hurried and confused in their manners, but were constantly able to attend to their business. About two years ago, captain J., on his return from the general assembly of Vermont, of which he was a member, was found in his chamber, early in the morning, with his throat cut, by his own hand, from ear to ear, shortly after which he expired. He had been melancholy a few days previous to this fatal catastrophe, and had complained of indisposition the evening previous to the event.

"About ten days ago, captain C., of Greenfield, discovered signs of melancholy, and expressed a fear that he should destroy himself. Early in the morning of June 5th, he got up, and proposed to his wife to take a ride with him. He shaved himself as usual, wiped his razor, and stepped into an adjoining room, as his wife supposed, to put it up. Shortly after she heard a noise, like water or blood running upon the floor. She hurried into the room, but was too late to save him. He had cut his throat with his razor, and soon afterwards expired.

"The mother of these two gentlemen, an aged lady, and their two sisters, the only survivors of their family, have been subject, for several years, to the same complaint."

"Voltaire, in his *Questions Philosophiques*, speaks of a man of serious turn, mature age, and regular demeanor, who killed himself Oct. 7th, 1769; his father and his brother having committed suicide at the same age as his.

"The following case, which I have compiled from documents, used by Professor Lordat in his account of Barther's doctrines, is well calculated to show the influence of hereditary predisposition, in the production of ennui and distaste of life.

The celebrated Barther, whose life was devoted to study, and to the preservation of an ambitious career, was not happy in his old age, though possessing all the elements of happiness. His difficult temper, which was a perfect torment to all who served him, rendered him a burden to himself. He employed all the resources of his mind, in making himself miserable. One day, when he was complaining of the dog's life he led, M. Lordat, his friend and pupil, then a distinguished Professor in the school at Montpelier, reminded him of his reasons for being thankful for his lot. True, he replied; but my disposition destroys it all. If he had a letter to write, there was no rest till it was done; and if the impress of the seal were not perfectly clear and neat, a half day's uneasiness was the result. Will it be believed, that while his *Discours du génie d' Hippocrate*, was printing, he passed a whole night of sleeplessness and vexation, because, after the first sheet was worked off, he discovered, that, in the first *e*, of the word *Genie*, in the frontispiece, the upper horizontal line was broken. What tormented him, however, more than any thing else, was, every thing that seemed calculated to dim the lustre of his glory. He became more and more irritable, jealous, and mistrustful; and concerned himself in all his household affairs. In 1804, he lost his house-keeper, who had served him more than forty years, and was enthu-

siastically attached to him. Her death made him feel extremely desolate. Among his papers, was found one of a sad but touching nature, which he had written for the purpose of alleviating the pain caused by the loss of Mary. One year after her death, this great physician observed, with tears in his eyes, that he had no wish to imitate the courage of his father, who, at ninety years of age, starved himself to death, in consequence of losing his second wife.

History of a whole Family, that committed Suicide.

M. M* * *, dyer, of sound parents, but of a very taciturn humor, was married to a healthy woman, and had five sons and a daughter. The eldest of the sons established himself in business at Montauban, was married, and had children. His family and associates, knowing that he had made many attempts to kill himself, kept watch over him; but, at last, he threw himself from the third story into the barn-yard, and was killed on the spot. He was forty years old; his manners were pleasing, his business prosperous, and melancholy disposition seemed to be the only cause of his tragical end. The second son, who was of a sanguine-bilious temperament, and rather taciturn, was also in business. He married, had some domestic trouble, and was accounted jealous. He lost part of his fortune at play, and strangled himself in his store, at thirty-five years of age. The third, of a bilious temperament, threw himself from the window into his garden, but did not injure himself; he said he was trying to fly. The fourth, tried one day to fire a pistol down his throat, but was prevented. The fifth, is of a bilious, melancholic temperament, very quiet and devoted to business. The sister, who is married, and has children, shows no sign which would lead us to suspect the existence of her brother's malady; but one of her cousins has committed suicide. He was of a bilious temperament, and had domestic troubles; his

wife often reproached him with losing money at play. One morning he left home, walked several hours on the banks of the Lot, and finally jumped into the river."

Let me offer one reflection, relative to certain irresistible propensities. I have already shown, several times, that this irresistibility often occurs when the other qualities or faculties are sound, and then it constitutes a real partial mania. If such an irresistible impulse often accompanies the manifestation of a propensity, which threatens and accomplishes the death of the individual, how can we refuse to acknowledge a similar irresistibility in regard to other propensities? Has the cause of morality so little intrinsic worth, that we are obliged to call in the aid of falsehood and error, to render it pleasing to men? When will these hypocritical declaimers cease to confound the deplorable effects of insanity with crime?

On the Causes of the Periodicity of certain Pathological Phenomena, particularly Mental Alienations, and Suicidal Melancholy.

The propensity to suicide, like other alienations, is under the influence of a periodicity, which renders a knowledge of its true conditions, in many cases, singularly doubtful, and the result of treatment always very uncertain. The patient may present signs of a perfect cure; he no longer evinces any of that jealous mistrust, those imaginary fears, or gloomy temper; on the contrary, he appears to participate in the enjoyments of life, and acknowledges the former derangement of his thoughts and feelings; when, suddenly, this treacherous propensity breaks out afresh, with redoubled force, and impels him to his own destruction.

We know, that one of the most powerful and frequent causes of these relapses, is the return of certain seasons.

Another, no less powerful cause, is the period of menstruation; and I now proceed to speak of this great phe-

nomenon in the human constitution. After so many labors on the part of physiologists, who would believe, that it could still become the object of new observations of the highest interest to medicine, morality, and jurisprudence?

Toutes les femmes bien constituées sont, en général, sujettes dans l'espace de vingt-huit jours, à leur évacuation critique, qui dure avec plus ou moins d'abondance, un jour, deux jours, le plus souvent trois à cinq jours, et chez quelques-unes huit jours. Comme les mois sont composés de trente à trente-un jours, et que l'ensemble de la menstruation et des jours libres comprend une période de vingt-huit jours seulement, il s'ensuit que l'époque de chaque menstruation doit avancer, chaque mois, de deux à trois jours, et que les femmes sont réglées, dans une année, treize fois. Beaucoup de femmes vous disent que leurs règles reparaissent toujours à la même date du mois. Si cela arrive quelquefois de suite, la nature reprend bientôt ses droits, et le dérangement sera d'autant plus grand. D'autres femmes, quand elles s'aperçoivent de la différence de ces deux ou trois jours, se plaignent qu'elles sont réglées deux ou trois jours trop tôt. Un petit nombre de femmes savent qu'il faut compter les quatre semaines, y compris les jours de la menstruation. Ainsi les femmes auxquelles les règles durent huit jours, quoique trois semaines après la cessation elles recommencent, ont également les règles dans l'intervalle de vingt-huit jours. Comme je n'ai pas l'intention de faire un traité complet sur la menstruation, je passe les irrégularités qui ont lieu dans les femmes, soit trop faibles, soit trop fortes, ou par suite d'événemens accidentels.

Mais je demande: Les femmes sont-elles réglées indifféremment dans tous les temps, ou sont-elles sous l'influence d'une loi déterminée? Et les hommes sont-ils privilégiés de la nature, et exempts de toute évacuation critique dans l'état habituel de santé; ou sont-ils sous l'influence de la même loi générale? Voici ce que j'ai observé relativement à ces questions.

Exerçant la médecine à Vienne, je me suis bientôt aperçu que pendant un certain laps de temps, presqu'aucune femme n'était réglée, et que dans un autre temps un grand nombre l'étaient à-la-fois. Comme cette circonstance se présenta très souvent, elle dut nécessairement frapper mon attention, et me faire naître l'idée que cette espèce d'évacuation périodique pourrait bien être subordonnée à une loi déterminée. Je tins un journal où je marquai les époques d'un nombre considérable de femmes pendant plusieurs années. Le résultat fut que les femmes sont divisées en deux grandes classes. Chaque grande classe a une période différente pour la menstruation. Les femmes de la même classe sont toutes réglées dans un espace de huit jours. Ces huit jours passés, suit un intervalle de dix à douze jours, où l'on ne rencontre que très peu de femmes réglées. Après ces dix jours commence l'époque assignée à la seconde grande classe, dont tous les individus seront réglés dans l'espace aussi de huit jours. Supposons qu'une femme de cette classe commence à être réglée le premier du mois, elle aura fini le 8, en cas que ses règles lui durent huit jours. Une autre, dont les règles ne durent que trois jours, aura fini le 3; ou en cas qu'elle n'ait commencé que le 5 du mois, elle aura également fini le 8, et ainsi des autres, de manière que les femmes, tant qu'elles sont dans un état régulier de santé, ont vingt-un, ou vingt-cinq, ou vingt-six jours d'intervalle. Voici, telles qu'elles ont eu lieu, les époques de deux femmes, dont chacune appartient à une classe différente: 1818, janvier 19, 3; février 16, 1, 29; mars 14, 28; avril 10, 25; mai 8, 23; juin 5, 30, 19; juillet 26, 17; août 21, 13; septembre 18, 9; octobre 16, 8; novembre 14, 5; décembre 12, 2. On voit que chacune a été réglée treize fois; et que celle qui avait commencé le 3 janvier, le sera, pour la quatorzième fois, au dernier de décembre.

Il y a toujours des femmes qui, pour causes accidentelles, sont réglées hors de ces deux grandes périodes; mais après un ou deux mois, elles rentrent ordinairement

dans la classe à laquelle elles appartiennent. Les femmes valétudinaires, les jeunes personnes qui ne sont pas encore tout-à-fait formées, les femmes qui sont sur leur retour sont le plus sujettes à ces irrégularités.

Si les règles ont été suspendues, soit par une maladie, soit par la grossesse, ou par l'allaitement, elles reparaissent à la même époque où la femme aurait été réglée, si elle eût toujours continué de l'être. Quand, chez certaines femmes, surtout chez celles qui sont sur le point de perdre, les règles continuent pendant plusieurs semaines, elles deviennent toujours plus abondantes au temps de l'époque accoutumée.

Pourquoi toutes les femmes sont-elles rangées, pour leurs règles, en deux classes, et pourquoi telle femme appartient-elle à cette classe, et telle autre à l'autre classe? Je n'ai pu acquérir encore à ce sujet le moindre éclaircissement. Les filles et les mères, les sœurs, les brunes et les blondes, les délicates et celles qui sont fortement constituées, sont pêle-mêle du nombre de l'une et de l'autre grande division.

Pendant mes voyages, j'ai continué mon journal; et ce qui m'a le plus frappé, c'est que les deux époques coïncident dans tous les pays, au moins en Europe. A la même époque où les femmes étaient réglées à Vienne, à Berlin, à Hambourg, à Amsterdam, elles l'étaient aussi à Berne, à Copenhague, à Paris, etc. Et ce qui me fait croire que c'est le même cas pour toute la terre, c'est que les espèces de singes qui sont sujettes à cet écoulement périodique, le sont en même temps que les femmes.

Par conséquent, la cause de l'époque de la menstruation n'existe pas dans l'individu; elle est universelle; c'est une loi de la nature qui gouverne tous les êtres subordonnés à ce phénomène. La lune n'y est pour rien: car, dans cette supposition, comment les deux grandes époques pourraient elles avoir lieu? Les époques elles-mêmes coïncident avec toutes les phases de la lune. Souvent, au printemps, toutes les femmes avancent tout d'un coup; à l'automne, souvent elles retardent de même

de quelques jours encore par une influence générale, tandis que chacune accuse pour son compte une cause particulière.

Voyons maintenant jusqu'à quel point les hommes sont sous l'empire de la même loi. Les hommes aussi sont sujets à un dérangement critique, qui coïncide toujours avec l'époque de la menstruation des femmes. Les individus jeunes et robustes ne s'en aperçoivent pas facilement, à moins qu'ils ne s'observant avec une attention particulière. Mais les hommes d'une constitution faible, fatigués par des souffrances habituelles ou par des maladies, ou doués d'une grande irritabilité, ou ceux qui ont passé l'âge de la vigueur, éprouvent dans l'espace de quatre semaines, pendant un, deux, trois jours, un certain malaise dont ils ne sauraient se rendre compte : ils sont enclins à une espèce de mélancolie, de mécontentement ; ils sont de mauvaise humeur, peu dispos au travail ; les idées naissent et se coordonnent difficilement ; le teint devient terne, l'haleine forte ; quelquefois les urines se troublent, la digestion se fait plus difficilement. Ceux qui sont tourmentés par les hémorrhoïdes, le sont davantage, ou seulement dans cette même époque. Tous ces accidens disparaissent après un, deux, trois jours, sans qu'on y ait contribué en la moindre chose.

Je serais tenté de conclure de ce fait, que l'évacuation menstruelle, chez les femmes, n'a pas seulement pour but de les préparer à la conception, mais aussi de les débarrasser de certaines humeurs hétérogènes, qui s'accumulent pendant l'espace de quatre semaines. Cette idée reçoit un degré de plus de probabilité par l'observation de M. Frédéric Cuvier. Ce savant naturaliste s'est aperçu que les femelles des animaux, au Jardin du Roi, éprouvent tous les mois, pendant quelques jours, une certaine effervescence, une évacuation critique par les parties sexuelles, quoiqu'elles n'entrent pas assez en chaleur pour désirer ou pour admettre le mâle. Il trouve cette découverte confirmée depuis plusieurs années. Je ne sais pas si ces fausses chaleurs des fe-

melles de ces animaux sont aussi en rapport avec la menstruation des femmes et des singes femelles.

Quel avantage résulte-t-il de ces observations pour le médecin, pour le moraliste et pour le jurisconsulte?

L'accouchement a ordinairement lieu pendant les jours où la femme serait réglée pour la dixième fois, s'il n'y avait pas eu d'interruption. Les accoucheurs ont toujours observé que, dans certains temps du mois, les accouchemens sont très fréquens, tandis que dans d'autres temps ils sont rares.

Les fausses-couches ne sont guère à craindre que pendant le terme d'une époque. C'est alors qu'au moindre indice il faut employer tous les moyens pour les prévenir. Il est entendu qu'une violence quelconque peut faire exception à cette règle.

C'est encore à cette même époque que les femmes enceintes souffrent plus qu'à l'ordinaire, des inconvéniens de la grossesse. Les malaises, les maux de tête, les maux de reins, les étouffemens, la pesanteur, les chaleurs, accompagnés de fièvre, toutes sortes de mouvemens nerveux, les fleurs blanches, etc., etc., sont autant d'accidens qui, laissés à la nature seule, disparaissent après le temps accoutumé de la menstruation, pour se renouveler à une époque suivante. Ce sont ces mêmes symptômes qui en imposent si souvent aux médecins et aux jeunes femmes sans expérience. On veut intervenir, par toutes sortes de moyens; par des saignées, par des sangsues; on ordonne de soidisant calmans; et on se flatte d'avoir opéré le soulagement, qui n'est dû qu'à la nature. Outre qu'on se verrait dans la nécessité de répéter, presque à chaque époque, la même traitement, on dérange l'ordre naturel de la grossesse, on prive l'enfant de la partie la plus substantielle de sa nourriture, on affaiblit la mère, on la dispose aux pertes de sang et aux fausses-couches.

Je suis appelé auprès d'une jeune personne ou d'une femme, qui a des attaques de nerfs bien plus fortes que de coutume; qui crache du sang avec une grande agitation, sans qu'antérieurement il se soit manifesté aucune

trace de maladie des poumons. Je sais, d'après mon journal, que c'est l'instant où l'une grandes époques va commencer, et je rassure ma malade ; je lui présage la prochaine éruption de ses règles ; et demain, ou après-demain, ma prédiction se trouve accomplie.

Les règles ont été supprimées par une cause quelconque. Les maux qui en résultent deviennent urgens ; on pallie, tant que les circonstances le permettent, par des calmans, des saignées, les sangsues, des bains, etc. ; mais on n'obtient pas le retour des règles. Le médecin observateur qui s'est familiarisé avec la marche régulière de la nature, sait que tous les moyens tentés à contre-temps restent sans effets ; il sait qu'il ne pourra réussir que quand la nature elle-même réunira ses efforts à ceux du médecin. Il attend l'approche de la grande époque, à laquelle sa malade appartient ; et il obtient, par des moyens très simples et très doux, ce que plutôt, il n'aurait pu obtenir en employant les moyens les plus actifs.

C'est aussi à ces mêmes époques que l'irritabilité, l'excitabilité, la sensibilité des femmes et des hommes, sont infiniment plus actives et plus exaltées que dans l'état de santé. Les uns et les autres, à l'approche de cette évacuation critique, sont susceptibles à l'excès. De là, des scènes et des querelles domestiques, les souvenirs les plus fâcheux, les caprices les plus inexplicables, etc. Il faut être philosophe, ou connaître à fond la cause matérielle de cette conduite extraordinaire, en prévoir la fin prochaine, pour la supporter avec une charitable patience.

Maintenant, je puis me faire entendre sur cette question importante : Pourquoi certaines causes de maladie, mêmes des causes organiques, persistent-elles souvent, sans produire aucun mal ; et pourquoi, dans d'autres momens, ces mêmes causes déterminent-elles les symptômes les plus alarmans ?

J'ai cité plusieurs exemples qui prouvent que cet accroissment des accidens se fait presque toujours remarquer à l'approche de l'époque critique. J'ai parlé d'un

homme qui, à l'âge de six ans, s'était brisé l'os frontal; qui depuis ce temps était sujet tous les mois, pendant quelques jours, à des accès de fureur. Un autre homme se sentait aussi tous les mois, pendant quelques jours, un penchant violent à commettre un homicide; et pour s'empêcher de se livrer à cet acte malheureux, il se sauvait toujours auprès d'un de ses amis, afin de se faire enfermer pendant toute la durée de ce penchant désordonné. On se rappelle ce soldat qui, par suite de violens chagrins, éprouva également tous les mois, pendant quelques jours, une impulsion irrésistible à tuer quelqu'un, et qui, averti par les premiers mouvemens de cette fureur, se fit enchaîner pour se soustraire à ce crime. J'ai déjà aussi parlé d'un certain Hallerau, qui croyait avoir un démon à son service. Pendant sa jeunesse, le démon ne l'avait jamais abandonné; mais dans un âge plus avancé, le démon n'était plus à ses ordres que pendant quelques jours chaque mois.

De pareilles visions périodiques s'expliquent par le surcroît d'excitabilité, qui imprime à toutes les fonctions un caractère d'exaltation, et qui, après l'époque critique, laisse souvent un affaissement et un abattement d'autant plus sensibles, que l'excitation a été plus énergique et plus durable. C'est ainsi qu'on comprend tous les accidens des soi-disant lunatiques, les vertiges et les étourdissemens, les gonflemens et les injections périodiques des vaisseaux capillaires chez des hommes et des femmes affectés d'hémorrhoïdes ou irrégularité de la menstruation, les accès périodiques de certaines aliénations mentales, les attaques périodiques d'épilepsie et d'apoplexie, etc.

En traitant de l'infanticide, j'ai déjà rappellé l'attention de mes lecteurs sur ce même objet. J'ai fait sentir combien, dans certains cas, ce déplorable état de l'âme peut influer sur les actions d'une femme malheureuse, au moment d'un accouchement douloureux, qui est en même temps celui de cette excessive irritabilité.

Cette même époque devient souvent aussi funeste aux aliénés convalescens, surtout à ceux qui sont obsédés

par le penchant au suicide. A peine ont-ils passé quelques semaines ou quelques mois dans un véritable contentement, et même dans une franche gaîte, que tout leur être se trouve de nouveau bouleversé; les idées et les sentimens se troublent; les angoisses et le désespoir s'emparent de leur âme. C'est-là le moment où ils ont le plus besoin d'être surveillés avec une attention très sévère; car ainsi préparés, il ne faut plus qu'un léger ébranlement pour déterminer le coup fatal. De-là, les tentatives si souvent réitérées du suicide, après des guérisons apparentes. Mais le médecin, qui connait la marche perfide de cette maladie, ne se sépare de son malade que lorsqu'il a la certitude que celui-ci n'a plus eu la moindre atteinte de ces symptômes pendant plusieurs époques de cette singulière excitabilité.

S'il était donné à l'homme de pénétrer dans l'intérieur de ses semblables, on trouverait peut-être confirmée la triste observation que souvent les crimes les plus extravagans ont leur source dans l'influence d'une pareille circonstance. Lorsque des individus, qui ont toujours été sujets à certaines lubies, au qui depuis long-temps ont été marqués d'une légère teinte de folie, commettent des crimes sans aucun motif d'intérêt; lorsque ces mêmes individus sont étrangement étonnés d'eux-mêmes, et qu'ils sont terrassés immédiatement après leur malheureuse action: je crois alors qu'on peut raisonnablement présumer qu'un semblable dérangement de leur âme y a beaucoup contribué.

Organ of Circumspection.—Continuation.

Natural History of Circumspection in Brutes, and its external appearance in them.

How can those philosophers, who consider the lower animals such limited beings, as to be no better than automata, explain the fact, that these same beings always make use of the most suitable, though varied means of

preserving their existence? The fox, after scenting the wild-boars, tries, before undertaking to seize one of the young, to leap into a tree with a load nearly equal to the weight of one of these creatures, so as to be sure to be able to escape the pursuit of the sow. When he happens to lose his prey in leaping, he measures distances, and practises himself in leaping over them, in order that he may be more successful another time. The bustard, the wild-goose, the linnet, the starling, and the ape, place sentinels. The pigeon, on returning, towards evening, from its excursions, describes large circles in the air, around the dove-cote, for some time before going in, for the purpose of ascertaining whether there is any thing to fear from birds of prey or martins, as well as to give the signal of return to other pigeons, which might have been forgotten in the fields. The butcher-bird, (Lanius collurio, Gru,) transfixes the insects it cannot eat the same day, on the spines of bushes, that it may keep them for the morrow.

Shall we content ourselves with referring to general instinct, to explain these phenomena? But what is this internal impulse, this instinct, if it be not the result of the activity of a particular organ? In man, we attribute precisely analogous acts, to foresight, to reflection. But how are we authorized to admit different causes for the same effects? I have carefully examined the heads of animals, and in all that are remarkable for their circumspection, I have found the cerebral part corresponding to the organ of circumspection in man, and the corresponding part of the skull, well developed. For this reason, the Swabian peasants, in dangerous roads, trust the guidance of their carriage to that one of their horses or oxen which has the broadest forehead.*

What is the organic cause of some species seeking

*The part which we call *forehead* in horses and oxen, is, by no means, the same region of the head that bears this name, in man. The forehead of these animals corresponds to the upper part of the head in our species.

their nourishment by day, while others go out only by night? We answer, that the latter have generally a broader head than the former. The otter and pole-cat have this region very broad. The owls, even those species that see as well by day as by night, such as the *Stryx-bubo*, Stryx otus, and S. brachytos, all have a much broader head than diurnal birds, which also live on animal food, such as the great vulture and many species of eagles and falcons. The pigeon, which is much larger than the small kind of owl, has a narrower head. The goat-sucker, which flies only in the twilight, though smaller than the cuckoo, has a broader head. It is probable, therefore, that a large development of the organ of circumspection determines animals to seek for food by night rather than by day.

Again; what is the organic cause, why animals are inspired with the thought of placing sentinels and setting watchers? We answer, that it is by means of the organ of circumspection, that nature has revealed to them this ingenious precaution. All these animals have the part belonging to circumspection very large, and the corresponding region of the cranium very broad. The heads of the wild-goose and bustard are broader in this region than the swan's; the head of the roe-buck is broader than the common goat's and buck's; and that of the chamois, is still broader than the roe-buck's. The head of the spoon-bill, (*Platalea*,) is remarkably broad in this region; and so circumspect is this bird, that hunters rarely get near enough to it to shoot it. The sparrow of our gardens and houses, which, although very bold, instantly recognizes and avoids all the snares that man can devise, also has a very broad head, and much broader than other larger birds, that are less circumspect.

Nature makes use of a contrivance that has always attracted my admiration. She seems to attach more importance to the preservation of females, than males; and, therefore, the former are endowed with a much higher degree of circumspection than the latter. I have killed

twenty squirrels, without there being a single female among them, though it was not in the season when they are retained by the attentions their young require. In the course of three years, I caught in my garden forty-four cats, among which, there were but five females. During one winter, there were killed, in two counties of Virginia, five hundred bears, among which were found only two females. Lieut. General Count Girardin, captain of the royal hunting establishment, has made a report of the wolves killed in sixty-one departments of the kingdom, from Jan. 1st, 1816, to July 1st, 1817. It apppears, from this report, that there were killed, in that time, eighteen hundred and ninety-four males, and five hundred and twenty-two females.* Among the chamois, the leader is always a female; and there is no doubt that she is distinguished from all the rest, by a higher degree of circumspection.† It is only among species, where it is

* I am well aware, that this difference will be explained by saying, that more males are born than females; but, admitting this to be ascertained as completely as they maintain, though this is impossible, it does not explain the disproportion between the number of males, and that of females, that are destroyed.

As a great many children are devoured by wolves, in several provinces of France, I may be indulged in a few reflections. Have not the game-keepers a particular interest in sparing the young wolves, and particularly the females, so that they may be preserved for the great hunts? Secondly, it is thought that the most efficacious measures have been taken against the multiplication of wolves, by promising rewards. Yet His Excellency, M. Lainé, Minister of the Interior, has just published an order, relative to the destruction of wolves, and offers a reward of eighteen francs for a pregnant wolf; fifteen for one not so; twelve for a male wolf; and six for a young one. The experience of so many years might have demonstrated the inefficacy of such means. In fact, to expect these people to destroy all the wolves, would be to require them to renounce an annual income. Instead of rewarding them, it would be more for the interest of humanity, after giving each game-keeper a limited time for destroying all the wolves in his canton, to require him to make strict amends for each of those animals, found on the territory, allotted to his surveillance. It is just so, too, in countries where the hamsters make great ravages certain years.

† Females accumulate less provision than the males, and burrow deeper—a new proof of their greater circumspection. The result is, that, it being much more difficult, and less profitable to find them, the people who are charged with the destruction of these animals, destroy only the males.

absolutely necessary to oppose strength and courage to an enemy, as among wild bulls and horses, that the guidance of the troop is trusted to the most brave and vigorous male. I shall always recollect with pleasure, a female mongrel produced from a gold-finch and yellow thistle-finch, which was confined with other birds in a large aviary. She once suffered herself to be taken in a little cage I had placed near there, but I never was able to make her enter the cage again. The other birds would enter it and eat there, and suffer themselves to be caught as often as I pleased. I tried to force her in by hunger, by putting food only in this cage, but then she would watch her companions, and when one came out of the cage with a seed in its bill, she would give chase to it, until the seed was dropped; when she would catch it up with the greatest avidity; and thus she fed herself for many months. In order to catch her, I was obliged to open the aviary and make her fly into the room. Her head is much broader than that of any other among all my gold-finches and canaries, or my other mongrels.

From all that has been said concerning the organ of circumspection, it follows, that in health as well as disease, we have proofs that in man, and the lower animals, circumspection, or foresight, must be admitted to be a fundamental, primitive quality, and the organ performing this function is placed in the region of the brain and cranium that I have mentioned.

Conclusion.

All the qualities treated of, thus far, I have demonstrated to be fundamental, each of which is manifested by means of a particular organ, whose seat I have indicated and proved, by a multitude of proofs of every description. The characteristic signs, established previous to this exposition of the organs and their functions, as essential to primitive qualities and faculties, are collected together wholly, or in part, in each instance.

They are neither developed, nor do they decay, all at the same period.

Each of the qualities here treated of, may, in the same individual, be more or less active than the rest.

Each may be alone active, while the rest are paralyzed; and each may be paralyzed, while all the rest remain sound.

The most of these qualities are differently manifested, in the two sexes.

While they all exist together in man, they are dispersed and isolated in the different species of animals.

Each of these fundamental qualities, therefore, becomes a new proof of the propositions I have laid down, as indispensable principles of the physiology of the brain, viz.

All our dispositions are innate.

Their manifestation requires material conditions.

The brain is the organ of all the qualities and faculties of the mind.

The brain is composed of as many organs, as there are qualities and faculties essentially different.

In a state of health, until old age, we can ascertain, upon the surface of the skull and head, the degree of development of an organ, and the degree of activity of its function.

Such are the principles which have been proved by reasoning, and demonstrated by particular facts,—an undeniable characteristic of the truth of a doctrine.

Finally, it is also proved, that all the affective qualities, propensities, and sentiments, have their organs in the brain.

As the total of all these qualities constitutes what is called, *appetitive qualities*, we see why those, who had some idea of the plurality of the organs, could never find one general organ for the general appetitive faculty or quality; so that the charge which I have preferred against the philosophers, on this point, is found to be justified.

In the brutes, each of these qualities is a particular

instinct; it is, therefore, impossible to explain their actions, by instinct, in general, or to find a single general organ of instinct.

According to the degree of energy with which these faculties are manifested, we shall have a result, designated by the various names of *dispositions, inclination, propensity, desire, want, passion;* that is, each fundamental or primitive quality is susceptible of these different degrees of manifestation. Consequently, we must admit as many dispositions, inclinations, propensities, desires, wants, and passions, as there are fundamental or primitive qualities, and, at the same time, it follows, that we shall seek in vain for any other organs of the inclinations, propensities, desires, wants, and passions, than those which preside over the fundamental qualities. These considerations utterly destroy all the reveries of philosophers and physiologists, concerning the instincts, propensities, and passions. These propositions will be made to appear still more clear and conclusive towards the end of this work, where I shall expound the general features of a philosophy that naturally flows from the physiology of the brain.

The ten fundamental qualities, thus far proved and treated of, in detail, do not belong to man alone, but equally exist in the different species of animals. I have, therefore, treated of man, in respect to those qualities only, which he possesses in common with the lower animals; but, as these qualities are dispersed among the brutes, no one of which possesses them all, man, in this point of view, is necessarily the most perfect animal. Each of these qualities is a fragment of its essence—a part of his moral character. Thus, by degrees, we are let into a knowledge of the composition of man. Those who have followed thus far, must certainly be convinced, that it is only by studying man in each of his parts, that we can arrive at a clear and complete knowledge of his whole moral and intellectual being.

We shall carry this same analysis through the intellectual faculties, and conclude our account of the organs

and their functions, with that of the sentiments and faculties which belong exclusively to man; which place him above every other animal—which give him reason, a presentiment of his Creator, and, in one word, the character of humanity.

Determination of the Fundamental Powers of the Primitive Qualities and Faculties, and of the Seat of their Organs.

The organs of the qualities which I have been describing, have their seat in the inferior-posterior, and superior-posterior, lateral parts of the brain, or head. Since all these qualities are common to animals, it follows that man, if his brain were composed of these organs exclusively, would be, both in respect to his organization, and to his qualities, or faculties, nearly on a level with a great many species of animals. We shall now proceed to examine the qualities and faculties of the cerebral parts, situated in the inferior-anterior and superior-anterior region of the brain. These are the cerebral parts, which give to the head of man its characteristic form, and render it essentially different from that of every other creature. Many of these parts belong exclusively to him, and imprint upon him his own proper character of humanity.

These organs are situated beneath the frontal bone, which I divide into five regions; the inferior-anterior, extending to the middle of the forehead; the superior-anterior, extending from the middle of the forehead to the beginning of the hair; the anterior-superior, extending from the beginning of the hair to the middle of the upper part of the frontal bone; the posterior-superior, extending from the middle of the upper part of the frontal bone to the fronto-parietal suture; the lateral region, extending from the fronto-parietal suture and the anterior margin of the great wings of the sphenoid bone, comprising, in fact, the anterior part of the temples.

Following the natural order, I shall first treat of the organs that are situated in the inferior-anterior region, and partly in the lateral-inferior region. The organs of the most essential qualities and faculties, being always nearest to the median line, they naturally present themselves first, and those that are the farthest from the median line, or occupy the temporal region, will come last.

XI. Memory of Things; Memory of Facts; Sense of Things; Educability; Perfectibility, (*Sachgedæchtniss, Erzichungs-fæhigkeit.*)

History of the Discovery.

After I had discovered an external mark, by means of which I could know whether persons had a talent for learning by heart, I was not long in perceiving that this sign by no means indicated every kind of memory. Among my school-fellows, were some who easily remembered words which they did not understand; while others, who had not this talent, had a peculiarly strong memory of facts and events. Some had a remarkable talent for remembering places, for finding their way, and leading us through strange paths; some would repeat, without a single mistake, a piece of music they had heard but once or twice before; while others excelled in remembering numbers, dates, &c.; but no one possessed all these talents combined in himself. Subsequently, I learned that others had made the same observation before me, and had distinguished three kinds of memory—memory of things, memory of places, and memory of words. The memory of things was called, *memoria realis*, the faculty of remembering things, or facts; the memory of words was called *memoria verbalis*, the faculty of remembering words, and names, and learning long passages by heart, without, perhaps, understanding their meaning; the memory of places was called, *memoria localis*, the faculty of remembering places, re-

tracing paths, and finding one's way. They had observed, too, that each of these memories could exist without the other. Still, however, nearly all philosophers have continued to consider memory as one single, indivisible faculty of the mind.

It is more than thirty years, since I taught this variety of memories, and nearly as long since I proved that memory cannot be considered as a primitive faculty of the mind; that it is only a general attribute of every fundamental faculty; that there must be as many different memories as there are essentially distinct faculties; and, consequently, that there cannot be one single and primitive organ of memory. The memory of music has its organ in the organ of music; the memory of figures, in the organ of calculation; the memory of places, in the organ of the sense of locality, or of the relations of places, and so on; or, to modify these expressions, the memory of music is an attribute of the sense of the relations of tones; the memory of figures is an attribute of the sense of calculation; and the memory of places is an attribute of the sense of the relations of space, &c.

Old, however, as this doctrine is, and disseminated as it has been by mine and Spurzheim's lectures, and the writings of my hearers, there are still philosophers, and even physicians, whose ideas on this subject are wrapped in obscurity. Yet these are the very men, ignorant as they are of the first elements of the physiology of the brain, who presume to arrogate the right of passing final judgment upon it. Villermay, in his *Essai sur les maladies de la memoir*, has adopted all the errors of physiologists. "In men of a melancholic and bilious temperament," says he, "we observe a remarkable memory. In lymphatic, sluggish, dull men, on the contrary, we find very little power of memory. The emperor Claudius, who was one of the most stupid men in the world, had a remarkably short memory. Thus, persons whose temperament is chiefly of the lymphatic nature, are most exposed to diseases of this intellectual

function." "It is very certain," he afterwards says, "that most men who indulge immoderately in the pleasures of love, have very little memory; and I have observed these habits and this result very sensibly in many persons that have a grave or deep voice, or, what is called, bass-tenor. Speaking of the immediate causes of defects of memory, he continues: "Mauget ascertained that there are two immediate causes of this defect; 1st. bad conformation and quality of the brain; 2d. the want of the occipital protuberance at birth. He pretends to have observed an excellent memory in persons whose occipital protuberance was very large." "In our days, a theory, based on similar localities of the brain, has been unable to withstand the strict scrutiny of observation and argument; and now the world is convinced, that it has no other foundations than a certain degree of probability ingeniously set forth. If there were a single point of the cerebral mass serving as the focus of memory, without doubt, this would indicate the positive seat of amnesia, (want of memory;) but we are far from determining in what part of the brain this intellectual function resides. The most probable supposition is, that it shares the lot of the other intellectual faculties, which, being indivisible, cannot be connected with separate regions of this viscus." *

This language shows, that M. Villermay has not the slightest acquaintance with organology. After concluding this account of the organs, I shall develop the main principles of my philosophy, and then correct a host of errors entertained by the scholastic philosophers, relative to memory in particular, and the moral qualities and intellectual faculties, in general. In the mean while, let us pursue our researches by the path of observation.

I am very well aware, that the designation, *memory of things*, does not include the whole sphere of activity

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* Memoires de la Société de Médicine de Paris. Ire. partie de l'annee 1817, p. 72.

of this organ. I have observed, that people with a large endowment of the memory of things, have, generally, a ready conception, an extreme facility in learning things; that they have the general desire of knowing, of being instructed in, and pursuing every branch of human knowledge; that they, ordinarily, have a decided vocation for teaching, and, unless prevented by the higher faculties, are easily induced to adopt the opinions of others—to embrace every new doctrine and opinion, and shape them to the fashions, manners, and circumstances around them. These considerations have led me to change the designation, *memory of things*, for that of *sense of things, sense of educability, of perfectibility.*

It would be wrong to confound this general and indefinite perceptibility, with the definite and special perfectibility of each fundamental quality and faculty. There is no moral quality, nor intellectual faculty, that cannot be exercised, and, by means of that exercise, receive an increase of perfection. Every fundamental power is susceptible of development, direction and education. This kind of perfection, however, is always confined to those objects alone, which are within the province of a special organ. On the contrary, the sense of things, of educability, or perfectibility in general, is exercised upon and extends to every thing not comprehended within the sphere of activity of primitive organs or powers. The account of the natural history of this faculty, as it exists in man and brute, will throw light upon this point. Let us begin by inquiring, whether brutes are capable of education; whether they can modify their instincts, and improve their faculties, according as they are favored by accidental circumstances and events.

If Demangeon had read what has just been said, with a little attention, he would never have been tempted to make the following remark.

"Educability, or perfectibility, which Gall has identified with the memory of things, must be measured, as observation shows, not by a swelling at the root of the nose between the frontal sinuses, but by the sum total

of all the faculties. How, in fact, can the child be educated in religion, morality, drawing, calculation, music, painting, philosophy, benevolence, social duties, without the aid of the different faculties which preside over all these objects of instruction. It is a contradiction to admit a special organ of educatibility, and at the same time, to assign to several faculties a special and exclusive part in the general work of education. If the educability of the domestic animals is in proportion to the breadth and prominence of the head between the ears, this shows, not that there is a single organ of educability, but a larger endowment of brain, coinciding with a larger intellectual capacity, without regard to the number of organs. But Gall has more than once inferred the existence of a primitive organ, from phenomena that result from a general increase of cerebral size, without showing at all that this increase of size denotes the unity of the organ."

In many parts of Demangeon's critique, a wish is manifested to attribute to a general increase of cerebral size, what belongs to a favorable development of particular cerebral parts. This disposition would render the plurality of organs superfluous. But how then will he explain, why the brain is more voluminous, sometimes in its superior, sometimes in its posterior, or its anterior, or lateral part, and why this more favorable development of these different cerebral parts, always gives rise to certain definite qualities or faculties? The examination of ten heads would be sufficient to convince him, that the most voluminous brains, the volume of which results from a very large development of its posterior and lateral parts, are by no means attended with a very great intellectual capacity, unless we confound the instinct of propagation, love of offspring, propensity to fight, carnivorous instinct, &c. with the intellectual faculties. All Demangeon's objections awaken the suspicion, that he finds it easier to reason, than to verify observations.

Natural History of the Sense of Things, of the Educability, of the Perfectibility of the lower Animals.

Every day, we see dogs and horses trained to minister to our most varied wants; we have often seen little birds placing the letters of the alphabet, or figures, so as to form names and numbers; and, at this moment, we have before our eyes, the case of a pig, that was trained to catch partridges. Who, too, has not witnessed the dancing bears, and the innumerable tricks of a restless ape? It certainly will not be said, that these properties have been bestowed on animals for the purpose of self-preservation. Whence is it, then, that some philosophers always seem to disdain these facts, and speak of brutes, if not as automata, at least as beings whose intellectual powers are either entire at birth, or rapidly attain the degree of development beyond which they can go no farther. Their instinct, say they, is equally remarkable for its promptness, its correctness, shrewdness, and certainty, and its very limited and unchanging nature.

Undoubtedly, the organization of the brutes, so defective in comparison with that of man, limits, in many respects, their natural perfectibility. But, if we observe the daily life of many species of animals, we shall be obliged to acknowledge, that they enjoy memory, the power of discerning relations, of forming judgments, and even of reflecting on their acts; that, very often, the degree of their understanding depends on circumstances; that it rises, when put in exercise by necessity or instruction, and remains stationary, only from want of exercise. But is man more fortunate in the last particular? When constantly occupied with providing for his immediate necessities, does he not also remain in the narrow circle of ideas connected with them?

To prove this principle, let us follow, with C. G. Leroy, the progress of the understandings of dogs, accord-

ing to the different uses to which they are put. This progress, in some, is owing to the instruction they receive; in others, to their own experience, to the reflections which dogs themselves make on occurrences around them. The house-dog, which is almost always tied up, and whose sole duty is to bark at strangers, remains in a state of stupidity, as almost any other animal would, whose understanding had no more exercise. The shepherd's dog, which is constantly occupied with a duty that requires activity, and, excited by the voice of his master, shows much more intelligence and discernment. All the facts relative to his duty are stored in his memory, and hence results an amount of knowledge that guides and modifies his conduct. If the flock pass near a field of rye, you will see the vigilant guardian collecting them together, keeping them from plants that must not be injured, watching those which would leap over the fence, frightening the rash by startling movements, and punishing the obstinate that are not satisfied with the hint. If we do not admit that reflection, or perfectibility alone, can be the origin of this variety of conduct, governed, too, by discernment, or reference to circumstances, it is absolutely inexplicable. For, if the dog does not learn, from his master, to distinguish grain from ordinary pasturage; if he did not know that this rye must not be eaten; if he were ignorant that the vivacity of his movements must be proportioned to the disposition of the sheep, and did not recognize this disposition, his conduct would have no motive, and there would be no sufficient reason for acting.

But we must follow this animal to the chase, to see the development and perfectibility of his intellectual powers. The chase is natural to the dog, which is a carnivorous animal; so that man, in applying him to this exercise, only modifies and turns to use, a taste and disposition, which nature has given it for its own self-preservation. Hence, in the actions of the dog, we meet with a mixture of acquired docility and natural sentiment,

and that constituent principle is most conspicuous, which circumstances have most excited to activity. Nature is more free and unrestrained in the hound, than in any other variety. The habit of subjection renders him attentive, to a certain degree, to the voice and motions of those about him; but, as he is not always under their hands, it is necessary that his mind should act of itself, and that his personal experience should often rectify the judgment of the hunters. The pains that the latter are obliged to take, in order that they may give chase to the animal first roused, break in the dogs, and chastise them when they lose the scent, gradually accustoms them to distinguish the scent of the stag before them, from that of all others. But the stag, hard pushed by the chase, endeavors to associate other individuals of his species with him in the flight; and then, the dog stands in need of the nicest discernment. In such cases, nothing can be expected of the young dogs; the most consummate experience only is capable of prompt and sure decision in this embarrassment. None but the old dogs, are what is called *hardis dans le change*, that is, they readily distinguish the scent of their deer, from that of all other animals that accompany him. The hounds, whose experience is just beginning, present to the attentive hunter, a picture of uncertainty, research, and activity, well worthy of observation. They pause and show every sign of hesitation; apply their nose to the ground with the utmost care and attention, or jump up to the branches with which the contact of the animal's body has left a stronger indication of his passage, and are only decided by the hunter's voice, who encourage them by his confidence in the most sure and practised dogs. If, in a moment of excitement, they get beyond the scent, and lose it, the leaders of the pack take the only means to recover it, which man himself would employ. They turn back, examine all around their course, to find, within the circuit they have traversed, the track which has escaped them. The skill of the hunter could do no more; and

here, the experienced dog has arrived at the limit of his knowledge, in taking every means that many conduce to success.

The setter has the nearest and most constant relations with man. He always hunts under his eyes, and almost under his hand. His master allows him to enjoy it, for it is a pleasure to him, even to take the game in his teeth. He brings him this game, and is caressed if he does well, and chided, or punished, if he does ill. He manifests either pain or pleasure, and an interchange of services, gratitude, and attachment, is established between him and his master.

While yet young, the setter is, nevertheless, docile; he listens only to his master's voice, and follows his orders with precision. But being guided by keener and surer senses than man, he is not always inclined, when age has given him experience, to manifest the same docility, though generally very obedient. If, for example, the game is wounded, and the old and experienced dog feels sure of having found the train, he will not suffer himself to be misled by his master, whose calls and threats are used in vain. He knows he serves by disobeying him, and the caresses that follow his success, soon teach him, in fact, that it is sometimes necessary to disobey.

A fox that escapes from a trap, with the loss of a foot, will avoid every kind of trap, for years together. When these crippled foxes are met with, whose infirmity announces experience, the intelligent hunter renounces all idea of taking them by ordinary means, and has recourse to others with which they are unacquainted. A young dog that has once got into a ditch covered with water-lentils, which he mistook for moss, will never, as long as he lives, be again deceived by it. In the Landes of Bordeaux, near Sales, the sheep-folds and parks are large buildings without floors or foundation. In the latter part of the eighteenth century, the wolves had never yet attacked the parks, except through the gates and holes in the walls. They never had tried to burrow

down and get under the walls. For some years, however, they have been obliged to lay foundations in masonry, for the wolves had learned to make holes under the wooden walls, large enough to carry away the animals bodily.

The fox, the hare, and the marten, that have been often chased, are far more on their guard, than others of the same species that have never been exposed to danger. The gardens in Paris are frequented by several species of birds, such as tom-tits, wrens, red-breasts, nightingales, chaffinches, green-finches, linnets, blackbirds, &c., which are very rarely met with in places where they are afraid of being annoyed. The experience of perfect security is all that has inspired them with this confidence. Even many species of accipitrine birds, whose natures are the farthest possible from all restraint, acquire an astonishing docility in a very little time. We see them, high in the air, regarding the voice of the hunter, and regulating their movements by his directions, when repeated experience has taught them that docility most effectually leads them to their prey.

If the lower animals obeyed the laws of a blind necessity, if they were deprived of all perfectibility, their actions would present a perfect uniformity; they would always labor in the same manner, would always begin as they ever had begun, and finish in the same way. But bees adapt the form of their combs to that of the space in which they work; and they can be made to build the royal cells, or destroy those already built. If we make a hole in a spider's web, she repairs the rent. I have often made several holes in a hang-bird's nest, suspended to a light branch, but it never failed to repair every breach, which it always did before going on with the construction of its nest. Two swallows were in the habit, every year, of building their nest in my friend Streicher's house, in Vienna. During their absence, a bell was hung, the wire of which passed directly through the place where their nest was. On their return in the spring, they rebuilt their nest in the old place; but they

took care to leave an opening for the wire, contrived in such a way, that it would play freely without touching the eggs or young. It is impossible to observe the nests of birds with tolerable care, without perceiving that those of the young are generally, poorly built and badly situated; frequently, even, the young females set any where without having made any provision whatever. The defects in these first labors are remedied afterwards, when the animals have been better taught by the inconveniences they have experienced.

It is clear, therefore, that brutes are instructed by experience; that their actions are modified, in consequence of the different trials to which they have been subjected. We see that, relatively to their wants, to surrounding circumstances, to the dangers to be avoided, they act as the most intelligent beings would act. Many naturalists have been so struck by the voluntary actions of certain animals, that they have thought proper to deny all innate dispositions, and have wrongly concluded that every thing they do, is the result of their experience and of the instruction of their fellows. The memory of things, the educability, or perfectibility of animals, can no longer, therefore, be called in doubt.

It is equally certain, that animals are capable of a degree of perfectibility which varies with the species, the individual, and the age. The dog is more remarkable for docility, than the wolf or cat; the horse is more docile than the ox; the lion, more than the tiger; and the otter, seal, and fox receive instruction of which the badger and hare are incapable. Some monkeys yield, with admirable pliancy, to the caprices of their masters; while others repel the least attempt at education with savage indocility. Who has not admired the almost human docility of the elephant? The common gray parrot learns with the utmost facility; while others, weary the patience of their instructors.

The different species of accipitrine birds are endowed with far less docility. The vultures are stupid, compared with the falcons; and among the latter, the com-

mon falcon, (*falco communis*,) the Iceland falcon, (*falco islandicus*,) the merlin, (*f. æsalon*,) the kestril, (*f. tinnunculus, gyrfalco, f. lunarius*,) the common goshawk, (*f. palumbarius*,) the sparrowhawk, (*f. nisus*,) readily suffer themselves to be trained to hunt. The *falco lithofalco*, and the *f. sacer*, on the contrary, like many other species, are completely indocile. The Tartars of Siberia know so well how to train the common eagle, (*falco fulvus*,) that it catches hares, foxes, wolves, and antelopes.

Individuals of the same species, and even variety of animals, present striking differences in respect to training. The intelligent water-spaniel, the vigilant shepherd's dog, the docile hound, are far more readily taught than the fine English mastiff and the graceful harrier. One water-spaniel excels another, in docility; one hound is preferable to another hound; one horse, to another horse. One gnat-snapper makes more rapid progress in instruction, than others of the same species; and so of the starling, thistle-finch, &c.

Finally, a well-marked difference, in regard to educability, results from difference of age. What the animal that has been instructed from its birth, easily learns, is difficult to the adult, and impossible to the old animal.

The above is a very brief view of the perfectibility of animals; and now my readers have a right to ask, whether the cerebral organization of brutes will generally explain their educability; and whether it differs with the different degrees of the educability of species, individuals and ages? When these questions shall be answered in the affirmative, it will be an extremely probable conclusion, that the perfectibility of animals must be considered as the function of a primitive organ of the brain.

Examination of the cerebral Organization of Animals, compared with their Perfectibility; Seat and external Appearance of the Organ of the Memory of Things, or of Educability—Perfectibility.

When we pause before a series of skulls of men and brutes, or compare those drawn from nature in my plates, our attention will be arrested by an essential difference between them. The human skull is broad in its inferior-anterior part, directly over the orbits; while those of brutes, on the contrary, are far more contracted and narrow, in that region, and generally rise so little, that they retreat immediately above the orbits, which are never overshadowed by the brain. Their brain, therefore, in its inferior-anterior region, is much less complex and perfect than man's, and their organs in this place are much fewer and smaller; and the consequence is, that the faculties connected with them are equally few and feeble. This fact has been observed by a great many naturalists. Camper has made it the foundation of his theory of the facial line, which I have elsewhere shown to be insufficient for determining the degree of intelligence. Lavater was so convinced of the significance of this difference in the form of the lower part of the forehead, that he formed a scale of the gradation of the forehead, from the frog to the Apollo Belvidere. Lavater thought only of his ideal scale, instead of presenting the series of steps which really exists in the gradual increase of perfection. There is a want of precision, too, in this theory; for the inferior-anterior region of the brain being composed of several organs, beginning on the median line, and extending to the temples, must not be considered without some qualification, in order to measure the degree of perfectibility. Those convolutions alone that are placed towards the median line, and separated only by the interposition of the inferior-

anterior part of the falciform process, are devoted to this function; so that it is only the corresponding part of the cranium that requires our attention, in the following observations.

Animals least capable of instruction, have the smallest cerebral parts above mentioned; hence the complete flattening of their head. Fishes, frogs, snakes, crocodiles come into this class. To make the observation easier, I will not dwell on a great many intermediate animals. Let us compare successively those of a pretty high order, viz. the heads of the badger, otter, beaver, seal, wolf, grey-hound, hound, and water-spaniel. In pl. lxvi. we see that the head of the badger, fig. 1, is most depressed, directly behind the frontal sinuses, where the brain begins. The highest line does not even indicate the position of the brain; it only marks the bony crest found on old badgers' heads, as in many other carnivorous animals. The second line indicates the direction of the brain. It goes on, descending from the frontal sinuses, and forms a segment of a circle with the bones of the face. In the otter, fig. 2, it is perceptibly more elevated. In the fox, fig. 3, it is still more so. In the head of a large greyhound, fig. 4, the elevation of the anterior part of the brain begins to form a forehead, of which there exists no trace in the badger, otter, or fox. The forehead is much finer and higher in the water-spaniel, fig. 5, which is remarkably teachable.

The same results are obtained by comparing the heads of the otter and beaver, with that of the seal, which is extremely docile; the heads of the wolf, hyena, jackal, and glutton, with those of all the varieties of the dog, particularly the water-spaniel, pointer, and our little house-dogs. The head of the stupid greyhound approaches very nearly the wolf's. I have the head of a wolf that was raised with the rest of the litter, but is remarkable for his mildness and docility. The region directly behind the frontal sinuses is much higher than in ordinary wolves.

I must refer my readers once more to pl. xxxiii., where they will see that the anterior convolutions are more developed and elevated in the brain of the lion, fig. 4, than in the tiger's, in which, on the contrary, the convolutions of the murdering instinct are larger and more prominent than in the lion's. Submitting the different species of apes to the same comparison, we see that the heads of the fierce papions and mandrins, which are so indocile, are conformed, as it respects the organ of educability, very nearly like those of the tiger and panther. Fig. 1. pl. lxviii. is the head of the redoubtable pongo, and fig. 2, the head of the fierce and lascivious papion of Buffon, (*Simia sphinx, Lin.*) Of a very different character, in respect to educability, are the apes represented in pl. lxxix. The sajou, fig. 1, (*Simia fatuellus,*) is very different from the say, fig. 2. (*Simia caprecina,*) and the latter, though possessing some very amiable qualities, cannot be compared with the chimpansé, fig. 3, (S. troglodytes.) They live in troops, build houses with the branches of trees, arm themselves with stones and sticks, and drive men and elephants from their abodes; they pursue negresses, and carry them away into the woods. In the domestic state, they are so docile, that they are taught to walk, sit, and eat like men.* Finally, the ape that most resembles man, in the shape of his head and brain, is the orang-outang, fig. 4, (s. satyrus;) he easily becomes tamed and attached, and imitates a great many of our actions. The brain of the orang-outang is represented in pl. xxxiv. fig. 2, and 3; fig. 1 represents the brain of the rhesus, (*patas,*) which is much inferior.

The same truth is confirmed, whatever order or family we choose to submit to a similar comparison, always having regard to the different degrees of educability of the different animals subjected to the examination.

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* Cuvier, *Regne animal.* T. 1. p. 104.

It remains to be examined, why young animals learn with more facility than adults and very old ones. They talk of the traces which impressions more easily leave on soft brains, than on those that are already in a consolidated state; but as we are totally ignorant how instruction is effected, this theory must be ranked among hypotheses. This, however, is certain, that in young animals, the inferior-anterior middle convolutions of the brain, are, proportionally, much more developed than they are at an advanced age. It is at the moment of birth, or soon after, that a knowledge of the external world is required, so far as it is necessary for its self-preservation. The author of nature has thus manifested his wisdom, in making the wants simultaneous with the development or activity of the cerebral parts destined to provide for them. The colt, the young ass, the calf, the kid, the young lion, the young wolf, the kitten, the young apes, and even young birds have the anterior-inferior region of the head more prominent than adult individuals of the same species. Thus, is there a perfect harmony between the organization and the function.

On the Domestication of the Lower Animals, and their Disposition to be tamed.

Why have certain animals been reduced to the domestic state? how have the wild bull and horse been tamed? Man, by the superiority of his intelligence, it is said, has tamed and enslaved the creatures that seemed most useful to him. Thus it is that man, proud of his prerogative, and arrogating extensive influence over every thing around him, forgets that it is to a higher order of being that he is indebted for the blessings of nature. If the power of human intelligence has tamed the bull, the stallion, and the boar, why are we, whose knowledge of animals is far more accurate than our ancestors, incapable of domesticating the wild fox, cha-

mois, pigeon and duck? It has been tried a thousand times to rear young wild pigeons with tame ones. The former have been taken from among the gregarious species, and been made to hatch and raise broods, generation after generation, in the hope that they would finally be converted into tame pigeons. As long as they were shut up, they were quite familiar with their companions, but the moment the dove-cote is opened, they soon fly off, never to return. The art of taming wild partridges, ducks and pheasants, has long been known. They buy the eggs, and have them hatched by hens and common ducks; the brooder is shut up, and the young are thus accustomed to their mothers, but hardly have their wings made their appearance, when they fly away. To keep them in the yard, they must be tamed about the house, gradually accustomed to other poultry, and, at times, shut up together with them. But this is not sufficient; the two stoutest feathers must be plucked very early from each wing, and the ends of the others cut off. While the young partridges and ducks are sensible of their feeble powers of flying, they fly short distances by day only, and return in the evening. But although they have been so tamed, as to return at the sound of the drum or whistle of him that attends them, yet if they neglect to cut their wings after moulting, they get at large, and prefer living at their own expense. It is just so with wild-boars, wolves, roe-bucks, which, however tame they may be, try to get at liberty, the moment their natural propensities are developed.

The most ferocious species may be subdued by hunger and caresses, and we may succeed in familiarizing them to us by habit; but no sooner does the animal find himself free from the barriers to which he has been accustomed, than nature resumes her rights and triumphs. The Tipoo-saib tiger, after being trained to the chase, will readily relinquish himself to the impulse of his natural instinct. So that, although it may be possible to make some individuals *domestic*, they are not

thereby necessarily *domesticated.* All these facts prove that it is not in consequence of his superior intelligence, man claims the empire over certain animals; and it must be acknowledged, that if the bull, the horse, the pig, the sheep, &c. are associated with the wants and labors of man, we must seek for its cause somewhere else, than in his will and designs.

It is very certain, that animals which live in the enjoyment of full and perfect liberty, present great differences in the facility with which they are tamed and domesticated. In Egypt, dogs are considered unclean, and no one takes the slightest care of them; still, they roam about in troops, through the cities and even villages. Other species, too, without being entitled to be called domestic, always seek the neighborhood of man; they establish themselves in his gardens, and even in his houses, while others fly far away from his abodes. Several species of swallows, the sparrow, jackdaw, merlin, white stork, &c., establish themselves in our towers, steeples, houses and gardens; while other swallows, the wood-sparrow, crow, common falcons, and black stork, prefer to be at a distance from man, and build their nests in the woods—an additional proof, that here, as every where, whatever man may do with the faculties of animals, nature always begins the work. The means by which she exerts this varied influence over animals, is the diversity in the development of the cerebral parts, in virtue of which they are more or less easy to be educated and improved.

If we compare the head of the wild-boar with that of the hog, the chamois' with the goat's, the head of the black stork with that of the white stork; if we compare the hyena, jackal, and wolf with the dog, the wild rabbit with the tame, the wild cat with the domestic, wild pigeons with domestic ones, the garden-sparrow with the wood-sparrow, the yellow thistle-finch with the gold-finch, the wild goose and duck with tame ones,—we shall always find the region of the brain and cranium above mentioned, more protuberant and

elevated in the domestic animal, and more flattened and depressed in the wild. See pl. lvii. fig. 6, wild duck; fig. 7, tame duck; fig. 8, wild pigeon; ring-dove; fig. 9, domestic pigeon. The angora cat, which is naturally tamer and gentler than the common cat, has this region perceptibly more prominent.

At Gottingen, Blumenbach showed us a gull belonging to a large species, which, we concluded, from its finely elevated forehead, must be easily tamed. He told us that the very first day, when one of its wings was broken by a musket-shot, it ran through the house like a perfectly domestic animal. Afterwards, we learned, that in some northern regions, the gull is, in fact, domesticated. Thus, the favorable development of the inferior-anterior middle portion of the brain, provided it is found in the whole species, always warrants us to infer, either that nature has designed it to be domesticated, or at least that some individuals are easily tamed and instructed. See the brain of the elephant, pl. xxxv. We may also confidently predict, that all the pains in the world, to domesticate animals, in which these cerebral parts are small, will be fruitless.

If this part is found remarkably developed in an individual belonging to a species naturally wild, it will always be distinguished from the rest, by its gentle and docile character. I have already cited the head of a wolf, remarkable for its mildness and docility. I have also spoken elsewhere of the ferocious animals in the Royal Garden, whose good or bad dispositions, in this respect, we have constantly divined. There is, at this moment, in the garden, a hunting tiger, which has been trained to hunt, like a dog. His forehead is more arched than the other tigers', and his temple less broad. One of my auditors brought in the heads of two woodcocks, one of which soon became extremely tame, after being wounded in the wing. The lady-owner of the estate, where these animals had lived, having previously often taken care of other woodcocks, wounded in this way, was struck with this peculiarity. All my auditors

instantly recognized the head of the individual that had been tamed by the benevolent lady. In this way I have long been in the habit of choosing from among a great number of thistle-finches, starlings, and bull-finches, those which are remarkable for their docility, and the ease with which they are tamed.

In domestic species, those individuals that have the finest forehead, excel the rest in intelligence. It is impossible to be deceived in the choice of oxen, horses and dogs, when we are ever so little familiar with the seat and external appearance of this organ, in the different varieties of these animals. Pl. lxiv. fig. 1, represents the head of a vicious, indocile horse. The forehead begins to retreat, about an inch and a half above the eyes. Fig. 2, is the head of a gentle, docile horse, in which, at the same distance from the eyes, the forehead either continues in a perpendicular direction, or swells out a little. The same difference exists in the two dogs drawn in pl. lxx. Fig. 3 represents the head of a dog, vicious and less docile than that represented by fig. 4, which combines great docility with gentleness of disposition.*

The result of all these observations made on the most different classes of animals, is, that the educability or perfectibility of brutes must be considered a peculiar fundamental faculty, and that its organ is situated in the inferior-anterior middle portion of the brain and head.

Memory of Things, Educability, Perfectibility of the Human Species.

The doctrine of the cerebral functions has been charged with being in opposition to the perfectibility of man, and to the effects of education. If by education is

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* When I come to treat of the organ of benevolence, I shall show how to distinguish the organ of docility from that of benevolence.

to be understood, the creation of primitive qualities or faculties, the germ of which does not exist in the organization, then, I deny the possibility of all education whatever. But if by education it is meant, that the innate qualities and faculties can be cultivated, neglected, repressed, or directed, I am among the strongest believers in education, and in many passages of this work I have shown how deeply I am impressed with its importance. All that I have been saying relative to the perfectibility of animals, will be a fresh proof to the reader, that I must, of necessity, entertain the highest ideas of the perfectibility of man, and, consequently, of the great influence of good or bad education. In the wildest state, idiocy excepted, man is still very far above the brutes, and in all his degradations, he never gets down to their level. Whatever may be his situation, he is still man—the most happily organized of all created beings. Whether he is in France, or the Cape of Good Hope, or the Straits of Magellan,—whether he be European or Hottentot, he every where operates upon objects around him, with his natural faculties and qualities. Man was designed to live under the most varied influences. The savage state, barbarism, civilization under a thousand different forms, are in turn his heritage,—without stability, and often without the slightest consistency in the governments, laws, and religions, whose object is to regulate his thoughts and actions. Sometimes master, and sometimes slave, he uses his faculties for his enjoyment, or he is condemned to every species of privation. He must then have received from nature a talent, or disposition, to accommodate himself to all kinds of circumstances, to a *single* concourse of which, without this flexibility of constitution, his happiness must have been entrusted. Every change or variation would have placed him in a state of opposition and misery. It was necessary that he should carry within himself the principle of perfectibility; curiosity, the desire of knowledge, the wish to be taught, must necessarily have inspired him with contempt of ignorance, dislike of defects, and aspirations for

perfection. The savage and the civilized man, nations and individuals, always and every where, tend to the same object. Yet, astonishing as it is, man has been seen for thousands of years, living in families, forming hordes, tribes, and nations—alternately under the yoke of despotism, and on the throne of independence—constantly prospering under the ægis of the arts and sciences, and declining under the influence of ignorance and sloth; for ages past, researches have been made on the education of the human species, or the civilization of nations,—and how few philosophical writers have had any precise and correct ideas relative to these marvellous operations!

Man has always reasoned upon principles contrary to his natural constitution. They have supposed that man, if abandoned to himself, would be utterly incapable of all self-instruction. Astonished at his own knowledge, and ignorant to the last of his own resources, man, in order to explain the origin of his powers, must have necessarily been obliged to recur to foreign direction and inspiration. The most essential things to his happiness, rules of moral conduct, he could not, consistently with this theory, derive from his own constitution. Hence the supernatural origins of which nations boast; hence the revelations directly from the gods, or through prophets and men, singularly favored by the Divinity. Hence also the fatal error, that there is no conformity nor harmony between moral and religious institutions and human nature; and that the former, on the contrary, are foes to the most natural desires, passions, and enjoyments of man.

The theory that derives all our ideas and all our knowledge from sensation, and considers the five senses to be the principal sources of all our faculties, has singularly favored the erroneous opinions relative to the primitive condition of the human species and the successive progress of his civilization. Even on this theory, there would still be some ground for believing, that when born with all his organs fully developed, man's

intelligence would, at first, be no less limited; that all his motions, and sensations, and thoughts, would be slow and painful; that he possessed only the simple capacity of improvement, and needed the impressions of external objects upon his senses, in order that this capacity should be exercised, that his faculties and propensities should be formed and developed. There would be some reason to believe, that the moral and intellectual man is entirely the work of art; that our primitive state has no manner of resemblance to that which we subsequently attain; that we as little resemble the man of nature—our original,—as an oak resembles an acorn; and that civilized man must be reckoned among the usurpations, which the factitious qualities and faculties have made over the empire of nature.

I have often shown that all this kind of reasoning is applicable to man, so far only as his knowledge is accidental, relative to outward objects. The whole physiology of the brain proves that the partisans of this theory overlook the inward man, the most fruitful source of human improvement; the only source of the affections, passions, instincts, sentiments, propensities, and talents; the only source, in general, of every fundamental quality and faculty with their common attributes. None of these powers, I repeat it, can be the result of sensations from without. Let them explain to me, why brutes that are surrounded by the same external objects, and receive the same impressions, never acquire the propensities and talents peculiar to man; let them explain to me why each species of animals, though moving in the midst of the same influences, continues to be confined within the specific sphere of its propensities and faculties. And after all, since every philosopher admits that brutes possess innate instincts, propensities and faculties, where do they find their authority for deriving the propensities and faculties of man from the constantly changing play of accident? The uniformity of the moral and intellectual character of all nations, and even of all individuals, though experiencing the most different impres-

sions, is in favor of my assertion, that man also has been originally provided with specific propensities and talents; and consequently, that there can be no factitious quality or faculty, no good or vicious disposition, that can be attributed to barbarism or civilization. Cicero's passion was literary glory, and not more factitious than the ambition of the savage to destroy his enemy.

Another erroneous notion on this subject, is that the only means of obtaining the exact estimate of the effects of civilization, or factitious qualities, would be to observe men, that had never had the slightest communication with their fellow-men. To this objection, I have already replied, when treating of innate dispositions, and I ask these philosophers, if they would consider themselves as having fully studied, and become acquainted with all the qualities and faculties of the elephant, orang-outang, beaver, bee, or ant, after observing a single individual of these animals? Now, it is an essential part of man's destiny, to live in society; all his propensities and talents are calculated for the social life; consequently, his history, like that of every other active being, must be drawn from his conduct in the situation for which he was formed, and not from his appearance in a forced and extraordinary state. A savage caught in the woods, even when not an idiot, is an exception, and cannot be taken for a general example. All experiments and deductions relative to the educability of man, require to be made on entire societies, and not on individuals separately considered. When, under such circumstances, man is found passing from the savage state to that of barbarism, and from barbarism to civilization, we must be convinced that he has not been moving farther and farther from his original nature.

The conclusion of the whole matter is, that the origin of every special quality and faculty belongs to nature, and not to accidental instruction, to the social relations, or to factitious wants. If we consider how much more numerous and intense these same qualities and faculties are in man; how much more developed are

the anterior-inferior middle convolutions in man, than in brutes, we shall easily conceive that the perfectibility of the human species must infinitely surpass that of brutes. The perfectibility of the latter is limited to their wants, which, in consequence of their imperfect organization, are much less numerous and urgent. Except the instinct of propagation, that of love of offspring, and that of self-preservation, or self-defence, almost all their interests are of a temporary nature. The degree of perfectibility that almost any species can attain, is confined to the individual and to a single life. There are but few cases where perfectibility is transmitted from one generation to another, and manifested spontaneously, like other bodily dispositions. The breeds of dogs that have been constantly trained to seize and bring the game, are finally born with these two dispositions, which are also obliterated and lost, if we cease to maintain them for many generations. This proves, no doubt, that some species are capable of a certain degree of perfectibility, which, however, is not at all to be compared to that of ours. Besides the superiority of his organization, man also possesses many external means for increasing the perfectibility, whether of individuals, or of the species. Tradition, language, writing, printing, monuments, social intercourse, leisure, &c., are so many instruments which he uses to extend the sphere of his ideas. On the foundation which the preceding age has left him, he builds for the coming age, and thus arrives at a degree of perfection in the use of his qualities and faculties, which can only result from the long experience and numerous efforts of many generations. Hence the wonderful and unfaltering progress of the arts and sciences. One new fact is added to another, and recorded by the manifold means of transmission.

It is impossible here to enter into the details of the educability of the human species—it would require the whole history of human civilization. I can merely remark, that the degree of perfectibility is always in proportion to the degree of the perfection of the organization.

This is the reason why certain nations remain for thousands of years at the same place on the scale, without our being able to attribute it to the severity of the climate, the influence of despotism, or a gloomy and superstitious religion; while other nations, as soon as they are formed, are advancing by long strides, towards the perfection of which our species is capable. The same difference occurs among different individuals of the same nation and family. There are young people who are interested in nothing, whose attention is fixed on nothing. Nothing can change their habits, and they remain just where circumstances have placed them. Others, on the contrary, seize on external things, with the keenest avidity,—every thing is observed: every event is a motive for instruction; and every specimen of excellence is a model for them to follow.

He who would behold with feelings of admiration, human educability in its fullest extent, has only to follow the progressive development of the understanding in well-organized children, from birth to the age of ten or twelve years. What a prodigious amount of knowledge has the child acquired, at two years of age, when the special, fundamental qualities and faculties are hardly sketched, much less fully developed and perfected.

From all these observations, I conclude that educability, perfectibility, the sense of things or facts, is founded on a primitive organ, both in man and brute, and must be ranked among the number of fundamental faculties. The following remarks will furnish conclusive proof of this assertion.

Seat and external appearance of the Organ of Educability, Perfectibility, of the Sense of Things in Man.

I have already said that, in man, the brain not only rises above the roof of the orbits, but even juts over

them, which renders our forehead higher than that of the brutes, and, in many persons, brings it out in advance of the level of the eyes.

In the human brain, the convolutions, xxi. pl. iv. pl. v, pl. ix. pl. xii. pl. xiii., constitute the organ of educability. The height and prominence of the corresponding part of the forehead, and the individual's capacity for improvement, or perfection of his sense of things, is in proportion to the development of these convolutions. If we will compare the heads engraved in pl. xviii. xix. xx. xxvi. xxviii. xxix. l. liv. fig. 2, which belonged to imbeciles, or to people whose intelligence or perfectibility was very limited, with the heads in pl. xxx. xlviii. lvi., which mark the great perfectibility and intelligence of the persons to which they belonged, we shall form a correct idea of the difference of this organization.

I have often shown, in my lectures, the head of a physician, whose immense variety of knowledge always enabled him to be brilliant in company. He knew something on every subject, but was always adopting every new doctrine. In the immortal Stahl's time, he was a zealous Stahlian; when Peter Frank appeared, he unreservedly professed the principles of this great man; and when the murderous doctrines of Brown were turning every head, he prescribed nothing but opium, wine, snake-root, and musk. Every new medicament immediately became a panacea, and he never failed to insert in the medical journals, accounts of the astonishing effects of his favorite remedies. His readiness in embracing new views, was such, that he never seemed to think of the necessity of subjecting them to the ordeal of experience. The inferior-anterior middle part of the forehead was very large, while the upper frontal part retreated. I have always observed, that persons thus organized, are rather like bees, gleaming from the productions of others, than the source of new inventions themselves. At Berne, we saw the founders of a new religious sect. Observing that one of them had the cerebral part in question, extraordinarily developed, I de-

clared that this man would labor in the department of education, if circumstances permitted. What was our surprise to learn, that this same individual was charged with the duty of disseminating the new doctrine, by teaching. Every day I meet with proofs of the influence of a large development of this organ; and it is almost superfluous to remark, that the direction this faculty receives, is noble or otherwise, according as the other cerebral parts situated against the forehead, are more or less favorably developed.

Pl. lxxx. represents the bust of the Abbé Gaultier, author of a great many elementary works on education. The whole forehead, but particularly the lower-middle part, is very prominent. The organs of benevolence, and love of offspring, are also very well developed, and we know with what zeal and disinterestedness, this estimable man devoted his whole life to the education of children.

Climate seems to have a marked influence on the development of this organ. It is, in fact, very sensibly larger in people that have early arrived at a high degree of civilization, than in those whose progress, though obstructed by no serious impediments, has been slow. But, since there is nothing perfect, those very nations so fond of learning, and so celebrated for intellectual brilliancy, also pass, with wonderful facility, from one fashion and opinion, whether political, religious, or philosophical, to another; while other nations, whose organization is less favorable in respect to educability, are less inclined to abandon the manners, customs, and opinions of their ancestors. A too great and exclusive activity of this organ, subjects both individuals and people to a continual fluctuation of manners and opinions; too little activity, on the other hand, condemns them to the slavery of an immutable, hereditary routine, it matters not whether good or bad. Such is the lot of the Caribs, Hottentots, &c., pl. lxxiv., in which, fig. 1 represents the skull of a young man from St. George's Bay, and fig. 2, the skull of an adult Carib from the Island of St. Vincent's.

In order to explain the great educability of young animals, I have shown that in them the organ is more developed than in adults. It is just so with the human species, as I have already indicated in many parts of this work. At three months old, the infant's forehead begins to be prominent, instead of maintaining its perpendicular outline. Frequently, (and this occurs in children uncommonly well organized,) the frontal part near the median line, advances far before all the rest, so that there is formed an elongated prominence, extending from the root of the nose to the middle of the forehead. In subjects whose organization promises great inductive talent, this prominence unites with the organ immediately above, where the latter is considerably developed. In this case there exists a long protuberance on the median line, extending from the root of the nose to the top of the forehead. Pl. xli. fig. 1, is the forehead of the newborn infant; fig. 2, the rounded, swelling forehead of the infant, when several months old. It is the great development of the inferior-anterior middle convolutions, that gives to children that extraordinary educability; that faculty of receiving and appropriating, in a very little time, a prodigious amount of impressions from the external world.

Thus, numberless observations made upon man, and every species of brutes, leave not the slightest doubt, that the sense of things, educability, perfectibility, is a fundamental faculty, whose organ is placed in the inferior-anterior middle part of the brain and head.

XII. Sense of Locality, Sense of the Relations of Space. (*Ortsinn, Raumsinn.*)

History of the Discovery.

My taste for natural history often led me into the woods, for the purpose of ensnaring birds, or finding their nests. In the latter pursuit I was quite fortunate,

because I had often observed on which side of the tree, whether northern, southern, eastern, &c., each species were accustomed to build their nests. I should have succeeded equally well, in setting my snares, because I was in the habit of ascertaining the district the birds frequented, by their song and movements; but when I went to see what birds had been taken, or to carry away the nest, five or eight days afterwards, it was often impossible for me to find the tree I had marked, or the snares I had set. And yet, after placing my snares, I would always, before quitting the spot, approach it by different paths; I would stick branches into the ground, and cut marks on the trees; but it was all in vain. This obliged me always to take with me one of my school-fellows, who, without the least effort of attention, would go straight to the place where a snare was set, though they might have placed ten or fifteen in a quarter, that was not familiarly known to them. As this youth's talents were not above mediocrity, the facility with which he could always find his way, was so much the more striking, and I often asked him how he contrived to guide himself so accurately; to which he replied by asking in turn, how I always contrived to lose myself every where. In the hope of obtaining some light on this subject, I took a cast of his head, and endeavored to discover persons that were distinguished for the same faculty. The celebrated landscape painter, Schoenberger, told me, that in his travels, he was in the habit of making only a very general sketch of the countries that interested him, and that afterwards, when he wished to make a more complete picture, every tree, every group of bushes, and every stone of any size, presented itself spontaneously to his mind. I took a cast of his head, and placed it by the side of my school-fellow, Scheidler's. At this period I became acquainted with M. Meyer, author of the romance, *Diana-Sore*, whose only pleasure was in wandering about. Sometimes he went from house to house in the country, and at other times attached himself to some man of fortune,

to accompany him in extended travels. He had an astonishing facility in recollecting the different places he had seen. I moulded his head also, and placed the cast by the side of the rest. I then carefully compared them together, and, though very different in many respects, yet I was struck by the singular form, common to them all, of the region directly over the eyes, near the organ of educability. They all had two large prominences which began just outside the root of the nose, and ascended obliquely, upwards and outwards, as far as the middle of the forehead.

From that time, I begun to think that the faculty of recollecting places, might also be a fundamental faculty whose organ was in the region of the brain just mentioned. Upon this hypothesis, all that was said of local memory is perfectly well explained, and we are abundantly furnished with matter for new reflection.

Before proceeding farther, I must remove one difficulty, which will be presented to the mind of the reader unacquainted with anatomy. In some human heads, particularly of males, the external plate is separated from the internal, directly above and on the sides of the root of the nose; and as, in these subjects which may not be very old, the external layer is carried outwards, and not inwards, as in the decrepitude of old age, there are produced two very perceptible prominences in this region. Now, it is these prominences, which the opponents of organology maintain that I take for the external appearance of the organ of the sense of locality. This objection was anticipated and answered, long before they made it. My opponents, and anatomists generally, err in considering the frontal sinuses to exist in all individuals. They are rarely found in women, and are often absent in men, till quite late in life, when the internal plate retires inward, without, however, forming any external prominence. True, these prominences, formed by the frontal sinuses, are situated just where the external mark of the organ of the sense of locality begins; but they have an almost horizontal direction,

most often directly between the eyebrows, and sometimes extend to half the length of the eyebrows. On the contrary, the prominences produced by the organ of the sense of locality, swell out more uniformly, present no inequalities, and extend obliquely upwards and outwards, to the middle of the forehead.

In order to avoid confounding the development of this organ with the projections of the frontal sinus, in the lower animals, a thorough acquaintance is required, with the structure of the head in the different species. In some, such as the bull, buffalo, elephant, bear, and pig, all the adults have large frontal sinuses. In others, as in the human species, they exist in one individual, and not in another. Many varieties of dogs, and often individuals of one of these varieties, appear to have large frontal sinuses, though anatomy shows, that they have none at all, and that their brain is placed directly against the very thin cranial bones.

Natural History of the Sense of Locality in the Lower Animals.

The first idea once developed, we suddenly find ourselves possessed of riches, whose existence we never suspected before. Long before making the observations just related, I had two dogs, one of which, though quite small, often left the house, on some excursion or other, but never failed to return. The other—the same before mentioned, as delighting in killing—always got lost whenever he quitted my sight in the street, and I never could find him, but by having him cried and advertised. Subsequently, I had a little bitch, that never could learn what story of the house I lodged in. When in accompanying me she got lost, she would stand still, and not move a step, and in order to find her, I had only to retrace my steps. I one day observed a little bitch busily engaged in eating on a dirt-heap. It seemed as if the manner, in which I looked at her, inspired

her with confidence, for she followed me without once inclining to return. I gave her to a lady, who, the next day, lost her beyond the barriers of Paris. That, and the following day, it rained in torrents without cessation; on the third, the dog returned to the lady's house, which was in a little out-of-the-way street in the middle of Paris. Although she subsequently became quite attached to her mistress, she still would take a daily ramble into every quarter of the city, even when she had young, but never failed to return at meal-time. One day she was missed about ten leagues from Paris; nevertheless, she reached home before her mistress. A dog was carried in a coach from Vienna to St. Petersburgh, and at the end of six months, he reappeared in Vienna. Another was transported from Vienna to London; he attached himself to a traveller, and embarked with him, but, as soon as they landed, he made his escape, and returned to Vienna. Another dog was sent from Lyons to Marseilles, where he was embarked for Naples, whence he returned by land to Lyons. A game-keeper in my native country, sold a hound to another hunter, who lived more than three hundred leagues off, in the very heart of Hungary. Some time after, they were informed by letter, that the dog had escaped, and, after some months, he arrived at his old master's, wasted with fatigue. Is there one of my readers unacquainted with similar facts? How is this phenomenon to be explained?

They generally have recourse to the exquisite smell of the dog. But, sometimes, dogs return from a very great distance, which have a very dull sense of smell, and how could a dog, by means of his nose, discover the traces of a journey which he made in a carriage, or by water, and that too, after having been shut up for several months? Would not the rains, snows and winds necessarily destroy all emanations? Who will venture to affirm, that a dog can discern the effluvia of his master, several hundreds of leagues distant. Besides, it is a well-attested fact, that, in these cases, a dog does not

return home by the straightest road, but takes circuitous paths, and frequently one very different from that by which he was carried away. Some naturalists, considering these circumstances inexplicable by the sense of smell, prefer to admit an unknown sense, which they call the *sixth sense*.

It is impossible, in fact, to explain the phenomena by means of the sense of smell. Nobody considers pigeons to have a very exquisite smell; yet it is universally known, that if we carry them in a bag across the fields, to a considerable distance, into a country with which they are entirely unacquainted, and let them loose, they will return directly to their dove-cote, and by the shortest route. M. M. Van Heynsbergen and Van Breda communicated to me the following fact: "Two pigeons, a male and female, of the variety called in French *pirouetteurs*, which have a very rapid flight, were sent from Vlaardinge (a little town in Holland, on the Meuse,) to Iceland. The ship had nearly reached her destined port, when the male escaped, and immediately rose so high in the air, that the eye could scarcely follow him. The captain of the vessel, fearing he would not return, let the female loose, in the hope that she might attract and bring him back; but she, after fluttering a few moments among the rigging, rose in the same manner, and joined the male. After amusing themselves some time with flitting about in the air, they directed their flight by the shortest course, towards Holland, with so much accuracy, as the captain himself, to use his own expression, could have gone by following the compass. It appeared from the date in the log-book, that the birds arrived the third day after, at Vlaardinge, at the house from which they were carried away. They were so fatigued and exhausted, that they fell from the roof into the yard, after having been called in vain, a long time by their master, who threw them some food, and during the first week, they never went out at all.

The papers lately gave an account of a bet, relative

to some pigeons that were carried to a great distance, from Bordeaux or Toulouse, to be liberated at an appointed place.

Baron Haak, carried from his country-seat near Manheim, a male and female pigeon, a distance of eighty leagues, into the Voralberg. There they were set at liberty, and both returned home.

Facts of this kind, gave rise to the practice now in use, of employing pigeons to carry letters.

Cats have been carried ten or twelve leagues in a bag, and still have returned. At Vienna, I saw an Iceland falcon, which had not forgotten its country after a captivity of several years. When he was unhooded for the chase, he rose perpendicularly from his perch, till he was out of sight. They followed him with spy-glasses, and observed him, after describing some circles in the air, directing his flight straight for the north. Joseph II. called the attention of the spectators, of whom I was one, to the direction of his flight. It was the emperor's amusement to let off after this falcon, two lannerets, which would rise above him, and bring him down. When in a country, abounding with honey, we carry off bees to a distance of several leagues, they rise to a considerable height, describe a circle in the air, and though they may belong to a hundred different hives, each one finds his own.

In O'Meara's Napoleon in Exile, (vol. I. p. 155,) we find Napoleon uttering the following words: "There is a link between animals and the Deity. Man is merely a more perfect animal than the rest. He reasons better. But how do we know, that animals have not a language of their own? My opinion is, that it is presumption in us to say no, because we do not understand them. A horse has memory, knowledge, and love. He knows his master from the servants, though the latter are more constantly with him. I had a horse myself, who knew me from any other person, and, by capering and proudly marching with his head erect, when I was on his back, manifested his knowledge that he bore a person supe-

rior to the others, by whom he was surrounded. Neither would he allow any other person to mount him, except one groom, who constantly took care of him, and when rode by him, his motions were far different, and such as seemed to say, that he bore an inferior. When I lost my way, I was accustomed to throw the reins down his neck, and he always discovered it, in places where I, with all my observation and boasted superior knowledge, could not. Who can deny the sagacity of dogs? There is a link between all animals. Plants are so many animals which eat and drink; and there are gradations up to man, who is only the most perfect of them all. The same spirit animates them all in a greater or less degree."

These cases taken from the brutes, strongly prove, that the expression, *memory of places*, is far from designating the full extent of the sphere of activity, filled by the sense of locality, or sense of the relations of space; for, dogs, pigeons, falcons, &c., which regain their old home or country, never return by the same route by which they left it. The sense of locality is rather the faculty of being correctly guided in places—of finding the course we wish to pursue, in spite of by-paths, woods, rivers, mountains, &c.; it is the faculty of ascertaining the relations of space, and therefore, I use the expressions, sense of locality, sense of the relations of space, in preference to that of *memory of places*.

Such a sense is indispensably necessary to brutes, which must be able to find their home, den, nest, kennel, or young. What could they do without it? How could we conceive, without this sense of locality, many of the most remarkable phenomena in the animal world, such, for instance, as the migrations of animals, which, without dispute, are an important point in the natural history of the sense of locality.

On the Migrations of Animals.

Why, at a certain season of the year, do some species migrate into other climates, and, the next season, return to the country which they left? and why, on the contrary, do some species not migrate at all?

Charles George Leroy's reply to this question, though incorrect, is, however, more specious than those hitherto given by naturalists. These are his words: "Nothing more resembles the occult qualities of the ancients, than the principles to which Reaumur attributes the actions of brutes. He says, for instance, that a bird of passage has an inward perception of the time when it is necessary to change its abode, and feels an attraction towards a certain place. It must be admitted, that an attraction felt by a being towards a certain region of which it has no knowledge whatever, would be a very extraordinary thing, and that the perception of a being that cannot perceive, would be still more so. It is difficult, no doubt, to ascertain precisely, how this habit of migrating, was originally established. There is reason to believe, that the disagreeable sensations, produced by a climate unsuited to the animal's constitution, gradually gave rise to it; an age, perhaps, may have been necessary to establish the perfect regularity of these migrations. But, at present, it is certain that the knowledge of the necessity of the passage, and of the time for starting, is the result of instruction, continued from generation to generation. They that want this instruction, do not migrate; and it is clearly visible, that the young birds are led by those which derive knowledge and authority from age and experience. Take the swallows, for instance, which every one may observe. Their departure is always preceded by assemblages, whose frequency and duration leave no doubt, that their object is, to prepare for a journey, undertaken by beings that are able to feel and understand, and can join in a common plan. The rapid and diversified chattering that prevails at these assemblages,

clearly indicates a communication of precepts, necessary for the numerous progeny of the season, which require some preliminary, and often-repeated instruction, to be prepared for this great event. Their frequent trials by flying in flocks, are no less indispensable, and they are always followed by a repetition of instructions, that resound from our roofs and chimnies. Such a project would be indicated to us in a similar manner, in an assembly of men whose language we did not understand. But the frequency of the phenomenon is a better proof than this analogy, that these migrations are not the result of a blind, automatical disposition. If at the time appointed for the passage—a time, which the season does not allow them to postpone without compromising the safety of the whole species—even a pretty large number are found too young to follow the flock, they are abandoned, and remain in the country. But let these live to become adults, *the attraction towards a certain region* is not felt, or at least is not sufficient to guide them, and they finally perish of hunger, victims of their ignorance and that tardy birth which has deprived them of the means of following their parents. If, as is pretended, the actions of animals are performed by a blind power of nature, none of these inconveniences would happen. There would be no tardy births; every single action would be done at a specific moment, as well-regulated clocks all strike at the same instant; and a considerable portion of the species would not be sacrificed to the voluntary errors of those to whom they owe their existence."*

If in place of the *occult qualities of the ancients*, we substitute *the organ of locality, of the relations of space, of the relations of place*, Leroy's whole objection will apply to the organ of locality; it is my business, therefore, to refute it.

Leroy has completely forgotten, that migrating ani-

* Op. cit. p. 215, 218.

mals, in the spring, return to the country which they left in the autumn. Now, what forces them to quit a climate where they are well off during our winter, and where they might do well, the whole year? If it were true, that the *disagreeable sensations produced by a climate unsuited to the animal's constitution* could have given rise to migration, this circumstance would, at most, only induce them to fly from a climate which incommodes them, and seek a milder one, but not by any means to return, not only to the same country, but to the very spot which they left, which, however, is the case. Every body knows, that the same pair of nightingales return to the same bush; the same pair of swallows, to the caves of the same roof; and the same pair of storks, to the same chimney.

Can a naturalist think that the emigrations of animals would be trusted to trials, whose results are uncertain? Would not the species have perished during the ages, that were required to be instructed in these trials? All birds of passage do not assemble in flocks like the swallows. In many species, the individuals fly alone during the whole passage; such as the red-breast, wren, (*motacilla troglodytes,*) the three-toed wood-pecker, (*picus tridactylus,*) the falcon, &c., at least they traverse a considerable space, before assembling in flocks. The young and females of these species, ordinarily depart from eight to fifteen days before the males; in the spring, the latter return, nearly the same number of days before the females. This instruction, therefore, which, according to Leroy, the old ones give to the young, is all a chimera. I exposed some young cuckoos in my garden, that they might be fed by other birds. While the other cuckoos remained in the country, the two young ones which I had reared, did not quit the garden, but disappeared at the period of the migration of their species, though they had had no communication with any of the old ones.

I believe that the cases, where a large number of individuals stay behind and thus perish, are rare; for, there

is a relation between the time of hatching and that of migration. The yellow mocking-bird departs at the end of June, and returns towards the middle of May. The nightingale and cuckoo depart later, and return during the first weeks of April. The swallow starts still later, and returns still sooner. If there are any feeble, ill-formed, or tardy ones among them, it is true, they perish; but it is only a confirmatory proof, that the migratory instinct is indispensable to the preservation of these species.

If it were the inclemency of the season, which inspires such animals with the disposition to migrate, why does not the severest cold, when our sparrows, partridges, and ravens freeze in the air, determine them to migrate into more southern countries? Who tells the *motacilla troglodytes*, and the *motacilla regulus*, the smallest of our birds, that they can endure the severest winters, while the stork and the vulture are forced to seek another sky.

It is said, too, that want of nourishment forces birds to migrate; but, if this were the case, what should induce them in the spring to return from a country where they would find an abundance of food during the whole year. Besides, birds migrate long before food becomes scarce; and they are frequently obliged, particularly if a few cold days supervene, to move to a considerable distance to obtain nourishment. You may supply a nightingale most abundantly with food, yet still you may observe him, at the period when his species migrate, fluttering about in his cage with every sign of uneasiness, particularly when the morn shines brightly; for it is then that nightingales are most fond of travelling. In certain countries, the field-lark, for example, is a bird of passage; in others, it does not migrate, but assembles in flocks during winter. Now, does not this fact furnish an objection against organology? If birds migrate in consequence of the activity of an organ, ought not their conduct to be the same in all countries? External circumstances, without doubt, exert a marked influence on the development and excitement of an organ. Thus.

birds reared in warm rooms, begin to sing earlier than those that live in the colder open air. Hens kept in very warm coops, never cease to lay, except during moulting. But heat does not create ovaries, nor songs. So, too, external circumstances are incapable of producing the propensity to migrate, unless the propensity be already determined by a proper organ. This is proved by the cases of the partridge and sparrow, just mentioned.

We must, therefore, certainly admit in the brutes a primitive sense and organ of locality, and that the activity of this sense varies, not only in different species, but in different individuals of the same species.

External appearance of the organ of Locality in Brutes.

At first sight, this organ does not appear to be situated in the same place in brutes as it is in man, and it even seems to be very differently situated in the different species. This anomaly, which is only apparent, arises, when one or more other organs, such as that of colors, tones, numbers, as in man and the singing birds, are found outside of the organ of locality, which, in consequence, is carried nearer to, or farther from, the median line. But when these faculties and their corresponding organs are wanting, the organ of locality is situated altogether on the side,—a convincing proof that the brains of the lower animals, are only fragments of the human brain, and that both are alike composed of many organs. In the smaller species of migrating birds, it is very difficult to distinguish the organ of the sense of locality. Even in the larger kinds, it may be easily confounded with the organ of the love of offspring. In the woodcock, and in some species of migrating falcons, the organ of locality appears precisely as it does in man, with this difference, that it is situated a little nearer the sides of

the head, and almost touches the posterior margin of the orbits.

In regard to the mammifera, we must never forget to inquire, whether the animal is of a migrating species, or is only distinguished from other individuals of its species, by a little stronger sense of locality. Squirrels, which, generally, have a pretty active sense of locality, sometimes emigrate in very numerous flocks to distant countries; but ordinarily they quit the woods in winter, when the cold becomes unpleasant, and establish themselves in our gardens. When a boy, I always was in the habit of keeping some; and I observed that, in the day-time, they would climb over the walls and the houses, to get into the neighboring gardens. In the evening, they would hastily return to the house to pass the night, in a box of cotton. We may observe, in their crania, two fine oval prominences, directly behind and above the great bulb of the olfactory nerve. The squirrel has no frontal sinus. The lemmings, at certain times, collect together in flocks of incalculable numbers at the approach of autumn. They leave the mountains in order of battle, pour into the plains, and continue their march in a straight line, and are never turned from it by perils or obstacles of any description. Would this be possible, asks Goeze, if these creatures were not impelled by a particular instinct? if they were not endowed with some intellectual faculties?* On examining the lemming's head, we cannot help being struck with the internal cause of this propensity. Its head, in front, and directly behind the eyes, is very broad, swelled out, and not contracting to a point before, like most animals. This is the reason why the propensity to travel is absolutely irresistible in these animals; they are arrested neither by fire, nor water, and will pass over brooks, rivers, marshes, and lakes, though they perish by thousands in

* Europaeische Fauna oder Naturgeschichte der europaeischen Thiere (European Fauna, or Natural History of the Animals of Europe.) Vol. II. p. 268.

doing it. They that survive the expedition, return the following spring, and again establish themselves in their Alps.

As the sense of locality differs so remarkably in different dogs, we may make a very instructive collection of the skulls of these animals. All of them in my possession concur in confirming my discovery, relative to the organ of locality. The skull of the bitch that never could recollect in which story of the house I lodged, is retracted in front and on the sides, pl. lxxxi. fig. 1. That of the bitch, which, though only four months old, could find its mistress's house, after being lost beyond the outer barrier, and would run all over the city without losing her way, is very broad and prominent in the same region, on the sides, as well as towards the top of the head. See the same plate, fig. 2. During the life of the animal, I was in doubt whether this prominence was not formed by the frontal sinus; but, on examining the skull, I saw that the whole bony box was filled by the brain, and that, in fact, there was no sinus. In all the skulls of dogs, the breadth of this region is in proportion to the activity of their sense of locality. After all these proofs, which are confirmed in every species of animals and in every individual, endowed with a very active sense of locality, can we still doubt that this sense is a fundamental faculty, whose organ is situated in the region, which, after numerous observations, I have assigned to it?

Further accounts of the organ of the sense of Locality, and of its sphere of activity, in Man.

In man, the faculty of judging of the relations of space extends to other objects also. It gives him the power of finding his way; it gives him what is called the *coup-d'œil;* it enables him to judge of the face of the country—to determine the position of armies, and to regulate their marches; it enables the officer to choose

the shortest route, or leads him, by secret paths, to the point he wishes to occupy. When the commander-in-chief is deficient in the sense of locality, he needs an aid-de-camp that is eminently endowed with it. Thus, Villars, it is said, supplied Turenne's deficiency in this quality. I have always found the organ of the sense of locality very large in military men who are said to excel in the faculty of finding their way; consequently, this faculty plays a considerable part in the operations of war. Without this organ there would be no such thing as geography and topography. All who are distinguished for making accurate charts, are capacitated for this work, by the activity of this faculty; by virtue of which, also, the mind of man traverses the infinity of space.

Endowed with another faculty still, (the sense of mathematics,) the astronomer calculates the distances and movements of the stars. I have seen no great astronomers in whom this organ was not very well developed. Look at the heads of Kepler, Galileo, Newton, Tycho Brahe, Descartes, Pascal, Hell, Lalande, Laplace, Burgs, Bessel, Bode, Olbers, Zach. The sense of locality, combined with that of arts and colors, produces the landscape-painter. Frequently, when I am asked in company, my opinion of an artist, I have determined, by means of organology, the department of painting which he would choose in preference to others. In such cases, most people have thought that there was some trick on my part, and that I knew beforehand the talent, which I had the art of divining. At Munster, where I was asked my opinion of an artist, I replied that his natural vocation was to be a landscape-painter. His organs of locality and color were particularly developed. In fact, he was a portrait-painter, and they thought I was deceived; but M. Ringklage declared that he painted portraits only for a living, and that, from childhood, he had had a decided taste for landscape.

Examine the portraits of Claude Lorrain, Vernet, Hackert, Breugel, pl. lxxxii. fig. 1.

I have been frequently asked, what is the organ of

the passion for play. I have looked for this organ in many inveterate professional gamblers, but have never been able to discover any thing constant. The reason is, that different games, to be played well, require different talents. Hence we may understand why it is, that persons who excel in all games at cards, are never, though using all possible application, more than tolerable players of draughts, and chess; and why, on the contrary, the best chess-players, are often poor card-players. Having had an opportunity of seeing many of the most celebrated chess-players, I have observed that they all had the sense of locality very large; and I conceive that the great talent of these players consists in the power of forming vividly and accurately, in their mind, a great number of possible positions of the pieces. But this is not what is required in games with cards, which rather require a talent of rapid combination.

In the history of the discovery of this organ, I have indicated its appearance on the external surface of the head. In the brain it is formed by the convolutions marked xvii. pl. iv. v. ix. xiii.

It frequently happens that this organ is very well developed, where there is no frontal sinus. In these cases, it is much less apparent than when accompanied by the swelling produced by this sinus, but its true direction is then much better indicated. When these same individuals have a very thick skin, it is even difficult to be sure of its presence by sight alone; but it may always be discovered by the touch.

On Love of Travelling.

When the sense of locality is very active, there results a propensity to change place, a taste for travelling. Idle and uneducated people are easily inclined to vagabond habits. Servants thus organized, do not long remain in the service of any particular person. People, who with the sense of locality, combine some other talent, ordina-

rily seek their fortunes in foreign countries. The painter traverses various countries, in order to obtain subjects for his landscapes; the devotee becomes a missionary; the naturalist, neglecting objects that have been around him from his birth, goes and explores another hemisphere; the young physician joins the train of some travelling lord, &c. We may say, without seeing them, that such persons have the organ of the sense of locality large; they are impelled by an inward force, whose existence even, they do not suspect.

A young girl had always had a great desire to travel. She suffered herself to be carried away from her paternal abode by an officer. In consequence of chagrin and remorse, she fell sick. I attended her, and she called my attention to two large prominences which her troubles has caused to arise on her forehead. They were thought by her to be the effect of heavenly wrath, but they were, in fact, the organ of locality which she had never before observed. I saw one day in the street at Vienna, an elderly woman, and was struck by the enormous development this organ had acquired. I entered into conversation with her, and before I had time to ask her country, she told me with the greatest earnestness, that she had fled from Munich to get the place of cook in Vienna, with the design of earning three thousand florins, so that she might spend her life in travelling like a lady. In the mean time, she changed her master every month, because it seemed to her impossible to remain long in the same house. At Torgaw, I was struck with the large size of the organ of locality in a man who was blind from birth, and requested those with me to attend to our conversation. As soon as I asked him what was his favorite occupation, he swore to me that he liked nothing better, than to hear people talk about foreign countries, and that he was always dreaming about them in his sleep. In the biography of Captain Cook, it is expressly remarked, that this navigator had these frontal bumps very prominent; still the biographer is disinclined to recognize the truth of my doc-

trine. The portraits of Columbus, pl. lxxx. fig. 2, and of Vasco de Gama, whose name is immortalized by his discovery of the passage to East-India by the Cape of Good Hope, presents the same conformation. Regnard had a strong desire to travel, from his childhood. The following inscription was made for him.

Gallia nos genuit; vidit nos Africa; Gangem
Hausimus, Europamque oculis lustravimus omnem;
Casibus et variis acti terraque marique,
Hic tandem stetimus, nobis ubi defuit orbis.*

A very convincing proof is furnished by M. Jaubert, Master of Requests, and Professor of Oriental languages in the Royal Library. This *savant* was always passionately fond of travelling, and was always employed by the government on important missions in Turkey, Persia, &c. His organ of locality was even more prominent than Brengel's, the landscape painter. I might here cite a long list of travellers, dead, as well as living, in whom the organ of locality was very large; such as M. M. Choris, Gaimard, Freycinet, &c.

A London physician, known by the name of Memory Thomson, was an astonishing example of local memory. Within twenty-four hours and at two sittings, he made a correct plan of the whole parish of St. James, with many parts belonging to the parishes of Mary-le-Bone, St. Anne, and St. Martin. This plan contained all the places, streets, courts, passages, markets, churches, chapels, public edifices, stables, all the corners of houses, and a great many other objects, such as pumps, railings, trees, and sheds, besides an exact plan of Carlton House, and the palace of St. James. He performed all this without the aid of plan, compass, book, or any other data whatever. He also drew, from memory, an exact plan of the parish of St. Andrews, and he declared that he could

* "France gave us birth; Africa has seen us; we have drank from the Ganges, and beheld all Europe. After various misfortunes, we stand here at last, where the very universe ends."

make some as good, of St. Giles in the Fields, of St. Paul, of Covent-Garden, of St. Clemens, and New-church. Name any building whatever in some large street, and he tells in a moment what business is carried on in it, and the shop, with every thing relative to its situation, whether it is in the right, left, middle, or at its extremities.—In going over a large house, completely furnished, he would give a verbal account of it, and subsequently a written description without a single omission. On the other hand, a conversation which he may have heard between a couple of men, thrice repeated, would be entirely new to him in a few days.

But the opportunity of verifying the real cause of the taste for travelling, is so common, that it will be sufficient for me to conclude, by mentioning that learned and celebrated naturalist, Baron Humboldt.

Sense of Locality in Insanity and Idiocy.

Frequently, when the organ is exceedingly active, there results a strong passion that may degenerate into insanity. Avicenna has already described this partial insanity under the name of *cutubut, wandering melancholy*. Dr. Beutel communicated to us the history of the Abbe Dabrowki, of Prague, as celebrated for the powers of his mind as for his profound knowledge. This man had an invincible passion for travelling, which was frequently manifested by an urgent and instantaneous necessity of changing his abode. These fits are so violent, that they have the character of real disease. Sometimes he wakes up in the night, and cannot help getting up and running across the fields. Once he had a fit when the weather was very cold; yet in spite of all that his better reason could do, he rose, dressed in the dark, and instantly set off; and he had gone nearly two leagues, with the snow up to his knees, before he could persuade himself to return and go to bed. Dr. Beutel, who at this time had no idea of organology, told me that

the only thing that had struck him in the appearance of this man, *was two enormous prominences on the forehead, directly over the eyebrows.*

Fodéré relates a case of true alienation of this organ, taken from a Memoir of M. Savary, entitled, *Faits pour servir à l'histoire des lesions des facultes intellectuelles.* (Facts, to serve as materials for a history of disorders of the intellectual faculties.) "A carpenter, forty-seven years old, with every appearance of good health, was assailed by a crowd of strange and incoherent ideas. He often imagined himself fluttering in the air, or traversing smiling fields, apartments, old chateaus, woods, and gardens, which he had seen in his infancy. Sometimes he seemed to be walking in public courts, places, and other spots that were known to him. While at work, the moment he was going to strike his axe at a given place, an idea would pass through his head, made him lose sight of his object, and he would strike somewhere else. He once rose at midnight to go to Versailles, and found himself there, without being sensible of having made this journey.

"None of these hallucinations prevent the patient from reasoning correctly. He is astonished, and laughs at himself, for all these fantastic visions, but still is unable to withdraw himself from their influence."

This faculty is sometimes quite active even in idiocy of various grades.

At Dresden, M. Bloede told us of a man who was always very uneasy, whenever he was obliged to remain more than one or two days in the same place. He spends the whole year in travelling over the greatest part of Saxony, Lusatia, and Silesia. He has a fixed station for every day; he visits all the landlords, to whom he carries the compliments and salutations of their friends and parents, and, with his eyes closed, and his body fixed, he relates the minutest details of his journey with astonishing volubility. Bloede assures us, that this man has also the two prominences of the sense of locality large and very marked. Now, after all the proofs I

have produced, how can it be any longer doubted, that the sense of locality is a fundamental faculty, exercised by the cerebral part that I have assigned to it?

"Our two authors," says Demangeon, "attribute to the organ of locality, the taste for travelling, the presentiment and discovery of worlds, astronomy and geography, the taste for landscape painting, the periodical migration of certain animals, as well as the instinct which enables each animal to find its home. This organ seems to be overloaded, and if we have before seen many organs for little things, we have here an instance of the reverse. They explain these differences by the different degrees of the size of this organ, which, however, does not remove the reasonable suspicion, that they may also be owing to other organs, such as those of habitation and height; and that there may even be a particular one for astronomy and chronology, for seasons and atmospherical changes, which birds announce not only by periodical migrations, but also by flying high or low. In this way, rabbits and other animals change their customary hours of going out and feeding at the appearance of approaching rain."

The only reasonable idea in this objection, is, that the instinct of choosing a habitation, may be attributed to the sense of locality. But it is not enough to reason; reasoning must be supported by observation, and must destroy the facts mentioned in the account of the instinct which impels animals to seek higher places.

In a former objection, M. Demangeon would derive from the single instinct of self-preservation, fear, courage, circumspection, prudence, love of offspring, the desire of immortalizing one's name, and consequently the most different propensities and talents. Now, he finds that the organ of the sense of the relations of space is overloaded, because I derive from it the taste for travelling, the presentiment and the discovery of worlds, astronomy and geography, the taste for landscape painting, the periodical emigrating of certain animals, and the instinct which enables them to find their home—things, all per-

fectly analogous! If in the rest of his objection, M.r Demangeon is tempted to put the faculty of knowing the relations of space on a footing with the sensibility of a corn, or the stump of an amputated limb; with the electricity of the feathers of birds, or the hair of other animals, which gives the presentiment of rain;—I leave it to him to justify his course.

Sense of Order.

The sense of locality, making known the relations of space, I have been inclined to think that it might also be the sense of taste, of symmetry, and of order. It is certain that some persons are destitute of all spirit of order; while others, from their infancy, are pained at the sight of the slightest irregularity in the furniture, tables, &c. This sentiment sometimes amounts to a passion, even in idiots. I have already mentioned the soi-disant savage of Aveyron, in the Institution for the Deaf and Dumb at Paris, and I know many similar cases. On the other hand, I know individuals, whose organ of the sense of locality is developed to such a degree, that they spend their whole life in running about, and who still are scarcely conscious of the most hideous disorder in their household; so that I suspect the spirit of order must be referred to a particular fundamental faculty, and consequently to a particular organ.

Dr. Spurzheim speaks of a girl he saw at Edinburgh, idiotic in many respects, but in whom the love of order was so active, that she avoided her brother's chamber, on account of the disorder that reigned within it. He thinks it probable, that the organ of order is on the external part of the superciliary arch, between those of color and numeration. Although he has a great number of observations in its favor, he thinks it necessary to multiply experiments. But these experiments are difficult to make, because, among the organs situated in the inferior-anterior region of the head, there are some very

small ones, in the number of which is apparently that of order. For my own part, I have not succeeded in collecting a sufficient number of invariable facts, to justify any opinion whatever, on the seat of this organ.

ORGANOLOGY;

OR,

AN EXPOSITION

OF THE

INSTINCTS, PROPENSITIES, SENTIMENTS, AND TALENTS,

OR OF THE

MORAL QUALITIES, AND THE FUNDAMENTAL INTELLECTUAL FACULTIES

IN MAN AND ANIMALS,

AND THE SEAT OF THEIR ORGANS.

By FRANÇOIS JOSEPH GALL, M.D.

TRANSLATED FROM THE FRENCH

By WINSLOW LEWIS, Jr., M.D., M.M.S.S.

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CONTENTS.

ORGANOLOGY. Continuation.

Confirmation of the truth of organology, and consequences which flow from this doctrine.

FUNCTIONS OF THE BRAIN.

XIII. *The Faculty of Distinguishing and Recollecting Persons.* (*Personen-sinn.*)

I HAVE been struck with the fact, that certain persons and animals recognise, with the greatest facility, individuals whom they have seen years before, though only in passing. This is a faculty which is very feeble in me, and the want of which has caused me, through my whole life, a thousand annoyances. I have seen in all classes, among the people at large as well as among well educated persons, those who possess this faculty and those who are destitute of it. There are persons, and I am of the number, who, when they rise from table, cannot distinguish in the party the person they sat next to during the meal. As this singularity often causes them embarrassment, exposes them to make a thousand ludicrous mistakes, and to pass, with the most indifferent manner, before those who approach them with an air of recognition, they make every effort to avoid such mistakes, but they cannot succeed. It costs them an incredible effort of mind to learn certain faces by heart, and it is only those countenances, that are marked by some peculiarity, which leave on them a durable impression.

On what does this depend? Those, who give only a superficial attention to this phenomenon, always have reasonings, or rather sophisms, ready to explain every thing, say that this belongs to the eye; that such

persons see in an indeterminate manner, or are near-sighted. My own example proves that it is not so. There are few men whose vision operates in a manner more determinate than mine. I have always been able to distinguish from each other, at considerable distances, birds and other animals, and plants, by their general appearance alone. I have never been near-sighted; and with a single look I distinguish, with the greatest clearness, all that surrounds me.

Does it depend on the faculty of comprehending the qualities of objects? Neither is it this which decides; there are hardly any persons who have exercised themselves more in this respect than I have; for both as a physician and a naturalist, I have made it my great business to know how to distinguish, both the various maladies which afflict the human race, and the infinitely varied objects which nature presents us. Though I neither know how to paint nor draw, I have always distinguished with great facility the numerous forms of the head; and were it an object to direct a painter, I certainly could indicate to him the most characteristic traits of the person, of whom he wished to make a portrait.

To be convinced that all these explanations are false, it is enough to cast an attentive look on what is passing in nature. Frequently, children from three to five years of age already possess the memory of persons to a very great degree. There are dogs who recognise, after years, a person whom they have seen but once; while other dogs, after a few days of absence only, no longer recognise persons whom they have frequently seen. Monkeys, dogs, horses, elephants, goats, and even birds, recognise, with more or less facility among a thousand others, their master, or one who has shown them kindness, or, one who has offended them.

All the animals which live in flocks, know each other,—who would believe it? All the bees of the same hive know one another, and their number

amounts to from twenty to eighty thousand. It is even remarked, that the bees of the same apiary, consisting perhaps of fifty to one hundred hives, well know how to distinguish a bee which does not belong there. The lamb, the chicken, &c., know their mother in the midst of a great number of sheep and fowls, &c.

No one can doubt, that the faculty of discerning individuals is, for the animal, one of the most essentially necessary of the fundamental faculties. It cannot, therefore, be supposed, that nature has made such a faculty to depend on accessory circumstances. Whoever knows the maternal solicitude of nature for all animals, will admit, that it depends on a particular interior organization — on a proper organ.

I think I have arrived by observation to the discovery of this organ; but before entering into any details concerning it, I must say a word on the different forms of the eye, and on the causes, which determine the diversity of these forms.

On the Forms of the Eye, and the Causes which determine their Diversity.

The eyes are placed in the orbits. According as the form of these osseous cavities varies, the balls have also a different form and position. The form of these cavities is determined in a great measure by the brain; this makes it clear how the position of the eye may be an external indication of the greater or less development of certain cerebral parts.

This cavity presents four walls. 1. The roof, which is formed by a part of the frontal and the sphenoid bones. 2. The internal wall, formed by a part of the os planum, and by the os unguis. 3. The external wall, formed by a part of the sphenoid and of the malar bone. 4. The inferior wall, formed by a part of the palatine, of the malar bone, and the su-

perior maxillary. Of these four walls, the roof and the posterior part of the external wall are alone in immediate contact with the brain. This part of the external walls corresponds to the anterior extremity of the middle lobes of the brain, while the inferior surface of the anterior lobes lies on the roof, XV. XVI. XVII. XVIII. XIX. Pl. V. VIII. XV. XVI. XI. XII.

The form of the orbit is found totally or partially changed, according as all the cerebral parts placed on the roof, or only some among them, are more or less developed. When they are very feebly developed, the whole orbit is found placed high, and the eyes are raised and brought near the superior orbitar arcade; in this case, the orbits are deep and formed like a hollow cylinder. But, when all these encephalic parts have acquired a high degree of development, the eyeballs are pushed forward, whence result large prominent eyes.

In this case the low roof depresses the ball, which, in its turn, depresses the inferior arch of the orbit toward the cheek, and produces below the inferior lid a kind of protrusion. When the external part, XIX, is alone developed, the corresponding part of the arch is alone depressed, which determines the depression of the external part of the eyeball, and of the external commissure of the lids, as well as the size of the external orbitar angle. When the internal part, XVI. is alone much developed, the internal part of the roof is alone depressed; this directs the internal commissure of the lids, downward.

Seat of the Organ of the Recollection of Persons.

Those eyes, whose internal part and the corresponding palpebral commissure are depressed, indicate, as I have discovered, after twenty years of observation, the great development of the memory of persons. But having met this faculty in a high degree

in persons who had not the eyes placed in the manner indicated, I thought I had judged hastily, and said no more in my account of the cause of this organization; but since then I have found my first opinion confirmed so often, that I have been forced to return to it.

Every time that I find the eyes so placed in an individual, whose organization is not otherwise too repulsive, I can engage that he has great facility in recognising persons. But one cannot always deny this faculty to those, who have not their eyes placed in this manner. It may happen, that the neighbouring organs being advantageously developed, there results a depression of the whole ball and a horizontal position of the two eyes. In such case one might incorrectly believe, that there is an inconsiderable development of XVI. and XIX. This difficulty may occur the more easily, as XVI. and XIX. are both very small organs.

Idiots have often been shown us, who by their faculty of recognising persons, caused the astonishment of physicians. We have constantly found, in these individuals, the above indicated position of the eyes.

It is probably this faculty, carried to a very high degree, which principally constitutes, in a painter, the talent of successfully seizing a resemblance. This resemblance is not limited to the features; it is composed of whatever is characteristic in the whole person, the habitual gestures, the gait, the dress, &c. Hoffman, the famous portrait painter at Friburg in Brisgau, has in an eminent degree the eyes which we have described. I find the same conformation in Titian and Tintoret, who both excelled in the painting of portraits.

In the print of Montaigne, who constantly paints the whole person, the eyes are manifestly depressed at the internal angle.

I have always been struck with the direction of the eyes of Sterne. Pl. LXXXIII. fig. 6, it will be difficult to find any which present to a higher degree the sign

of this faculty. Convinced, many years since, that, in the greatest number of cases, the conduct of man is but the counterpart of his organization, I have lately read Sterne a second time. Both in Tristram Shandy and in the Sentimental Journey, we meet with portraits drawn with great detail, and minute to excess, although such portraits are not essential to the design of the author. We read, for example, in the *Sentimental Journey;* —

"I have his figure this moment before my eyes, and think there was that in it, which deserved better. The monk, as I judged from the break in his tonsure, a few scattered white hairs upon his temples, being all that remained of it, might be about seventy; but from his eyes, and that sort of fire which was in them, which seemed more tempered by courtesy than years, could be no more than sixty — Truth might lie between — He was certainly sixty-five; and the general air of his countenance, notwithstanding something seemed to have been planting wrinkles in it before their time, agreed to the account.

"It was one of those heads which Guido has often painted, mild, pale, penetrating, free from all commonplace ideas of fat, contented ignorance looking downwards upon the earth; it looked forwards; but looked as if it looked at something beyond this world. How any of his order came by it, heaven above, who let it fall upon a monk's shoulders, best knows; but it would have suited a Bramin, and had I met it upon the plains of Indostan, I had reverenced it.

"The rest of his outline may be given in a few strokes; one might put it into the hands of any one to design, for t'was neither elegant nor otherwise, but as character and expression made it so: it was a thin, spare form, something above the common size, if it lost not the distinction by a bend forward in the figure, but it was the attitude of entreaty; and, as it now stands presented to my imagination, it gained more than it lost by it.

"When he had entered the room three paces, he stood still; and laying his left hand upon his breast, (a slender white staff with which he journeyed being in his right,) when I had got close up to him, he introduced himself with the little story of the wants of his convent, and the poverty of his order, and did it with so simple a grace, and such an air of deprecation was there in the whole cast of his look and figure, I was bewitched not to have been struck with it."

In another place; "She was dressed in white, and much as my friend described her, except that her hair hung loose, which before was twisted within a silk net; she had superadded likewise to her jacket, a pale green riband, which fell across her shoulder to the waist; at the end of which hung her pipe.—Her goat had been as faithless as her lover; and she had got a little dog in lieu of him, which she had kept tied by a string to her girdle; as I looked at her dog, she drew him towards her."

In another place he says, "And in translating according to my custom, French figures and attitudes into English."

Such a correspondence between the organization of a writer, and the kind of spirit that pervades his works, is a strong presumption, that the sense of persons or individuals must be recognised as a fundamental faculty, which has its proper organ in the brain.

XVI. *Faculty of attending to and distinguishing Words; Recollection of Words, or Verbal Memory, (Wort-gedächtniss); History of the Discovery.*

In my ninth year, my parents sent me to one of my uncles, who was a curate in the Black Forest. The latter, to inspire me with emulation, associated with me in my studies another boy of my age. They often reproached me, because I did not learn my les-

son, as well as my fellow pupil, although more was expected from me than from him. From my uncle's house my companion and myself went to Baden, near Rastadt. Among thirty scholars that were there, when the object was to recite by heart, I had always to fear those, who in composition obtained only the seventh or even the tenth place. Two of my new fellow pupils surpassed even my former companion by their facility of learning by heart. As both had large, flaring eyes, we gave them the nickname of *saucer-eyes*. After three years, we went to Bruchsal; there again, some scholars with saucer-eyes caused me mortification when the point was to learn by heart. Two years afterwards I went to Strasburg, and I continued to remark that the pupils, who learned by heart with the greatest facility, were those who had large, flaring eyes, and that some among them, in other respects were only indifferent scholars.

Even if I had had no preliminary knowledge, I could not have avoided the inference, that eyes thus formed are the mark of an excellent memory. It was not till afterwards, that I said to myself, as I have already mentioned in the introduction to my first volume, if memory manifests itself by an external character, why should not the other faculties have their characters outwardly visible? It was this which gave the first impulse to my researches, and which was the occasion of all my discoveries.

It will, no doubt, be thought singular, that it is precisely on the subject of this faculty and its organ, that my works are least complete. I shall confine myself wholly to facts. The facts will remain immoveable, even in case my manner of viewing them should undergo some modifications.

Natural History of Verbal Memory.

Men long since began to distinguish this species of memory, by the aid of which we learn by heart with great facility, even things which we do not understand, and have termed it *memory of words, verbal memory* (*memoria verbalis*). It was also known that those, who have an excellent memory for words, have not always the other faculties to a very eminent degree; and this idea was even too much generalized. The conclusion should have been, that this faculty supposes a particular organ; but though proofs without number, were presented in support of this opinion, received prejudices were opposed to admitting it. Almost every where, in the schools, in the various institutions of education, in the lives of philosophers, we see examples of prodigious memory, without the subject endowed with it having given evidence of other faculties to an eminent degree. If, in treating of this faculty and the following ones, I burden the reader unusually with names and words, let him throw the blame on the faculty of which I treat.

The memory of words is sometimes manifested in a surprising manner from the tenderest infancy. At Landau, a boy of five years of age knew by heart all the Catechism, all the Fables of Lafontaine, and a great number of other poetical pieces; he also learned by heart, without at all understanding it, an entire volume of the mathematics of Bezout; he knows in the same manner much of history and geography. Dr. Spurzheim saw, at Linden, a young boy, who is likewise a prodigy of memory. In treating of the succeeding organ I shall cite several other examples of the same kind.

Persons, endowed to a high degree with verbal memory, recite by heart a very long passage, a great number of verses, an entire play, after having read it once or twice. They know how to quote on every occasion the finest passages of the classic authors,

A man was one day presented to Frederic II., endowed with such a memory, that he recited by heart a considerable piece, which he had never heard read but once. The same day, Voltaire had to read some verses to the king. Frederic concealed the stranger behind a screen, and when Voltaire had finished reading, he told him that the piece was neither new nor of his composition; and then made his accomplice appear, who recited it, and maintained that he had himself composed it twenty years before. Let the reader judge of the fury of the irascible Voltaire, and of the shouts of laughter of the philosopher of Sans-Souci.

I had already remarked at Vienna, and I found this observation confirmed in the whole course of my travels, that persons endowed with verbal memory apply themselves in preference to a kind of study, in which many words are needed; for example, to mineralogy, entomology, ichthyology, ornithology, natural history in general, or to numismatics, heraldry, &c.

The memory of words is highly important to comedians, though far from constituting by itself a great actor.

I have already cited, in several places, examples of the entire loss of this kind of memory, without the other faculties being in the least disturbed in consequence.

Seat and external Appearance of the Organ of this Faculty.

In treating of the organ of the memory of persons, I have said, that the anterior convolutions of the middle lobe touch the posterior external parts of the orbit. When these convolutions are very much developed, this part of the sphenoid, which forms the posterior third of the external wall of the orbit, is pushed forward; this diminishes the depth of the orbit, and renders the eyeball prominent.

It is, however, by no means probable, that the middle lobe is peculiar to the faculties. The frugivorous animals have only the internal convolutions, and they learn words and names, as well as the carnivorous animals. Besides, memory has too little analogy with the carnivorous instinct to permit us to suppose, that the convolutions of the middle lobe, placed above the ear, constitute the organ of the carnivorous instinct, and the anterior convolutions of the same lobe, the organ of the memory of words.

Now, if it happen in fact, that the ball is pushed in front of the orbit by a considerable development and a great prolongation of this lobe, the form of eyes which results from it, would no longer be the mark of a great memory. This is perhaps the reason why certain persons possessing large eyes projecting even with the head, in the prime of life and health, have not always a more than ordinary memory. It is at least certain, that some persons learn by heart in general with facility, but have a treacherous memory for names; while others easily fix names in their minds, but have much trouble to recollect pieces, however inconsiderable, whether prose or verse. I have not yet succeeded in discerning well all these varieties; but in ten cases that might be referred to me, I should not be deceived in more than one. I should be still less likely to deceive myself, if the organ of this faculty were not placed in such a region, that it can easily extend itself in all directions, from above downward, forward, laterally, and from below upward.

I regard, as the organ of verbal memory, that cerebral part which rests on the posterior half of the roof of the orbit, (Pl. iv. between xv and 59.) In the prints we have not given ciphers peculiar to the part in question, because we had considered the memory of words only, as forming a part of the faculty of speech.

Yet it is certain, that frequently it is only the posterior half of the orbitar plate, which is found depressed by the great development of the cerebral part indicated;

and, in this case, the posterior part of the orbit must equally lose its depth, and the ball be pushed forward. This form of eyes is often met with, without the circumstances, which I shall indicate in speaking of the faculty of language, taking place at the same time. It is for this reason, that I treat of this organ separately.

Let us observe persons who make collections; we shall find ninety-nine in a hundred have large, flaring eyes. It appears, that the necessity of furnishing their head with a great number of names inspires them with this love of collections. They experience great pleasure in retaining with great facility, the names of the thousand objects which they collect. My respectable master, M. Jacquin, sen. Professor of Chemistry and Botany; the Abbé Mazola, and M. Kreuzer, both of them Entomologists; the Baron Vanderluhe, the Count of Herberstein, Botanistr at Vienna: the Counsellor Bloch, Botanist and Entomologist at Dresden, who each form with ardor collections in their respective departments; M. Œtzel of Potsdam, who makes collections of all the objects met with in commerce; Rœding, at Hamburg, M. Martens, at Bremen, who has made a precious collection of algæ; Benth, at Hamburg, who amasses all that can be considered objects of natural history; Gering, at Frankfort, who makes a collection of insects and butterflies; Professor Sukow, at Heidelburg; Goll, who makes a collection of prints; Winter, at Amsterdam, who collects birds, monkeys, and shells; Messrs. Camper, father and son, at Franaker, Bruggmans, at Leyden, &c., have all, without exception, large, flaring eyes. Temmink, at Amsterdam, who is making a collection of monkeys and birds, has this organization to a less degree than the others; but yet, as he says himself, makes this collection, only in the idea of establishing one day, according to certain characters, a division of the different varieties of these animals. I should never finish, if I wished to cite all the examples within my knowledge, which confirm this observation.

Hufeland speaks of an individual having large eyes singularly projecting, and who has yet no memory: he says very large, eyes singularly projecting.

It is precisely this manner in which he expresses himself, which makes the observation suspicious to me; for such eyes are frequently the sign of disease, either rickets or hydrocephalus, which the patient has experienced in his early years. Although such persons in maturer life appear to enjoy good health, the practised physician can discover in them the traces of their former disease; they are very sensitive and extremely irritable; their head is not symmetrical, it is more elevated sometimes before, sometimes behind, sometimes on the sides, and they are greatly disposed to mania. Certainly such projecting eyes cannot coincide with an excellent memory.

In the second place, such persons may have already lost the faculty with which they were originally endowed. Excesses of every kind, too long sustained mental effort, severe diseases of long duration, misfortunes, frequent lying-in, singularly enfeeble the memory. In subjects who have incurred these accidents, we can only determine what existed formerly, and by no means what exists now.

When a person unacquainted with organology asks of a stranger whether he has a good memory, he may receive such an answer as to mislead him. I one day asked a young person in whom I observed very large projecting eyes; "Have you a good memory?" "No," said she, "I cannot remember any thing at all." "Yet you have been to school?" "Certainly." "And how did you manage to learn your catechism?" "In almost no time, I knew it from one end to the other; no one of my companions could equal me in this respect: I could recite it still to you entire and even backwards." "But you have just told me that you could remember nothing." "Ah! my God, that is but too true: I forget all the commissions which my mistress gives

me." This explained the enigma. The case, which Hufeland cites, was perhaps of the same nature.

It remains for me also to examine, how far the masses of fat, placed behind the ball, may become sources of error. A man of my acquaintance once experienced violent headaches for a long time. The cephalalgy affecting at first the right side exclusively, the right eye sunk in the orbit; the pains having afterward reached the left side also, the left eye underwent the same change. I would not venture to decide whether this sinking of the eyes was occasioned by the mere absorption of the fat placed behind the ball, or, whether there was a diminution of the cerebral mass placed behind the eyes. It is known, that, by emaciation of the whole body, the eyes sink equally, and that by strong congestions of the blood to the head, they appear more projecting; but these are circumstances which could not lead a physician into error.

It would be possible, that the dimensions, more or less considerable, of the ball itself might here enter into the account; but we must not forget, that the dimensions of the ball are in proportion to those of the orbit, and that the form and size of the orbit, are determined in a great measure by the brain.

I have said, that the cerebral mass, belonging to the memory of words, might act in all directions. I should wish to know more precise cases, to be able to determine, in what circumstances, the considerable development of these parts has acted in one direction or in another. The greater or less diameter of the head, from one temple to the other, might serve as an important guide. A great diameter in this direction is always a favorable augury for the memory of words. The eyes are also sometimes more, sometimes less distant, so that the root of the nose is sometimes broader and narrower; which equally indicates, that there exists in this region a cerebral mass more or less considerable. I have seen persons, who, with an ordinary conformation of the eyes, yet learned by heart with great

facility. But, in these cases, the diameter from one temple to the other is ordinarily very considerable, and sometimes even the inferior part of the temples is projecting, which attests a great development of the adjacent cerebral parts.

I often hear others speak of hollow eyes, where I see large prominent ones. This happens when the inferior part of the forehead projects considerably; such a prominence makes the eyes appear sunken, though placed in orbits which have no great depth in the skull. A forehead, which projects in its inferior part, indicates a great prolongation of the cerebral part placed on the orbitar plate. The eyes of which I mean to speak are well cut, well opened, and the ball advances in a half sphere beyond the inferior part of the orbit. Deep eyes, on the contrary, are rather small, and do not pass the edge of the inferior arch of the orbit. Compare the eyes of Racine, Pl. LXXXIV. fig. 1, of Milton, fig. 2, with those of Rousseau, fig. 3.

Milton wearies me by the crowd of names of which he is every where lavish. In the first canto of Paradise Lost, there is an enumeration of names which takes several pages. In all his poems he gives names to all the objects of which he speaks, of whatever nature they may be. Here again is the impress of the organization of the writer.

Racine, it is said, never forgot any thing. J. J. Rousseau, on the contrary, complains without ceasing of his bad memory.

"Every morning about ten o'clock," says he, "I went to walk in the Luxembourg, a Virgil or a Rousseau in my pocket; and there, till the hour of dinner, I recalled to memory sometimes a sacred ode, sometimes a bucolic, without being discouraged; because in conning over that of the day, I never failed to forget that of the previous evening."

Two women of my house had small sunken eyes. After more than eight years, they had not succeeded

in retaining the names of persons to whom I was in the habit of rendering professional attention.

Of the Memory of Names and of Words, in the state of Disease.

An officer was wounded by a thrust immediately above the eye. He tells me, that since this moment he has had much trouble in remembering the names of his best friends; he had absolutely no knowledge of my doctrine. He does not perceive any debility of his other faculties.

At Marseilles, another young man received, above the eyebrow, a stroke of a foil, which destroyed entirely his memory of names; he could not recall those of his most intimate friends, not even that of his father. I have cited other similar facts in several places of this work.

Baron Larrey had the kindness to bring me one of his patients, whose history is as follows:

Edward de Rampan, aged twenty-six years, received from a foil, the point of which had been broken on the cushion, a blow on the middle part of the left canine region, near the nostril, in a direction oblique from below upward, and a little so from without inwards. The instrument penetrated to the depth of about three and a half inches, across the left nasal fossa, crossed the cribriform plate of the ethmoid near the insertion of the falx cerebri, and appears to have penetrated, in a vertical direction and a little oblique from before backward, to the depth of five or six lines in the internal posterior part of the anterior left lobe of the brain, in such a manner as to approach the anterior part of the mesolobe.

The patient experienced a very considerable hemorrhage at the very instant of the wound, and a very large quantity of splinters escaped by the nose and mouth.

All the organs of sense were paralyzed at the instant; but they have by degrees recovered their functions, and there remain at present only the following alterations:

The sight of the left eye has been totally lost for a month; it is now restored, but the patient sees all objects double.

The smell was totally extinguished; it is restored at present, and the patient can distinguish the odorous alcoholic liquors from the inodorous liquids.

The taste was equally destroyed. It returned by degrees on the right side of the tongue, so that the right half of this organ perceives savors very well, while the left side is deprived of this faculty; the whole of this organ is drawn to the right in opposition to the hemiplegia, which exists on the right side; the mouth being thrown to the left.

The hearing, first lost in the ear of the wounded side, was subsequently restored, and nothing now remains but a buzzing.

The voice, which was likewise lost, has been also restored, and there remains only a slight stuttering.

The force of the generative organs has been perfectly preserved. There supervened a hemiplegia of the whole right side; there remains now only a paralysis of the upper and lower extremity of this side for locomotion only, the sensibility remaining untouched.

The memory of names has been wholly extinguished, and is reproduced now with great difficulty; while the memory of images, and of all which is susceptible of demonstration, is perfectly sound.

The mental aberration, which existed in the first periods in the organs of intellect, has now ceased; but whatever has relation to his self-love, to his military success, &c., throws him into a state of profound alienation and melancholy; while the conversations, which have relation to his family, neighbours, friends, restore his faculties again.

The patient recalled to himself very well the person, the figure, and the face of Baron Larrey; he would have recognised him without difficulty; he saw him always before his eyes, (the patient's own expression,) yet he could not recall his name, and always designated him as Mr. Such-a-one.

I have seen this patient, and have convinced myself that his state is such as it has been just described to me.

If the memory of words is often destroyed in the state of disease, it happens sometimes also, that this faculty acquires a greater degree of activity. The following is an example.

A madman, says Pinel, cured by Dr. Willis, has thus given the history of the paroxysms. "I always," says he, "awaited with impatience the access of agitation, which continued six or twelve hours, more or less, because, while it lasted, I enjoyed a sort of beatitude. Every thing seemed to become easy to me; no obstacle arrested me in theory, or even in reality; my memory suddenly acquired a singular perfection; I recalled to myself long passages from the Latin authors."

I think the difficulties we have encountered in this treatise on the organ of words, will disappear, in proportion as we advance in the treatise on the organ of spoken language, which is to follow.

XV. *Faculty of Spoken Language; Talent of Philology, &c., (Sprach-Forschungs-sinn.)*

The treatise on this faculty will offer important remarks of more than one kind. I shall occupy myself, first, with the material and experimental part, and shall conclude with philosophical considerations. When the greatest part of the middle portion of the inferior anterior convolutions, placed on the superior plate of the orbit, or on the roof, is greatly developed, this wall is not only flattened, but even depressed.

Hence results a peculiar position of the eyes. In this case, the eyes are at once prominent and depressed towards the cheeks, so that a certain space is found between the ball and the superior arch. The ball, thus depressed, acts on the inferior arch and augments its cavity. This large cavity produces in the living subject, when he has the lids open, the appearance of a little pouch filled with water, and hence the name of *eyes with pouches.* (See Pl. LXXXII. fig. 3, 6; Pl. LXXXIII. fig. 4; Pl. LXXXIV. fig. 1, 2, 5, 6; Pl. LXXXV. fig. 1.

Persons who have the eyes thus formed, possess not only an excellent verbal memory, but they feel a peculiar disposition for the study of languages, for criticism; in general, for whatever has relation to literature. They compile dictionaries, write histories; they are well fitted for the offices of librarian and keeper; they collect the scattered treasures of all ages; they compile learned volumes; they search into antiquities; and, however little other faculty they may possess, they excite the admiration of every body by their profound erudition.

Sometimes this faculty is already very active in childhood. At the age of six years, Baratier (Pl. LXXXIV. fig. 6,) already knew more than six languages; at so tender an age he translated the Greek authors, and corrected the translations of his predecessors. We see, that this youthful philosopher had a very happy conformation of the scull, and large *pouched eyes.* Louis Dufour de Longuerue was, from the age of four years, a prodigy of memory. The living and dead languages, history, theology, ancient and modern philosophy, antiquities, belles lettres, chronology, geography, were familiar to him. He dictated an historical description of France absolutely from memory, without consulting any book. We have seen the son of Dr. Perking, aged only eleven years; he was occupied with languages the whole day; he understands Latin, Greek, Arabic, and several living languages. His eyes are formed like those of Baratier.

I need not say, that such an organization acts very differently, according as it coincides with the greater or less development of other organs. When it is joined to eminent superior faculties, it produces universal geniuses, who embrace the whole sphere of activity of human intelligence. (Pl. LXXXII. Galileo, fig. 3, Bacon, fig. 6; Pl. LXXXIII. Rabelais, fig. 4; Pl. LXXXIV. Voltaire, fig. 4.

I am going to give the list of a certain number of remarkable men, endowed with this organization, without taking account of their other faculties, and without confining myself to chronological order.

The work of Dominicus Custos, printed at Augsburg in 1612, contains engravings of the persons, whose biography he gives. We have been not a little astonished to see, that the organization, of which I have spoken, is found in all the learned men, of whom mention is there made as philologists. Such, for examples, are Just. V. Mathiolus, who had also a collection of plants; Occo, a physician who possessed a collection of medals; Aldovrandus, a naturalist; Jerome Wolf, David Hoischel, Gryph, Nicholas Glanardus, William Canter, Francis Pogge, all philologists.

Pic de la Mirandole had so great a memory, that it was sufficient for him to hear a book read three times, and he would recite two or three pages in succession, or even repeat the words of these two or three pages in a retrograde order. It is related, that at the age of eighteen years, he knew twenty-two languages. Milton (Pl. LXXXIV. fig. 2,) was possessed of the most vigorous memory, so that all the studies of his youth were constantly present in his mind. His history of England supposes the knowledge and comparison of all the cotemporary writers, even of those who have put in operation the first materials. Coming from the hand of a blind man, it was as astonishing a prodigy as Paradise Lost. He was author of principles of grammar, of dictionaries, and knew Latin, Greek, Hebrew, Syriac, &c. The position and conformation of

his eyes announce this prodigious memory in the most distinct manner.

Rabelais (Pl. LXXXIII. fig. 4,) was acquainted with the languages, ancient and modern, grammar, poetry, philosophy, astronomy, jurisprudence, medicine. He had furnished his memory with all the riches of his time. But let us attend also to the considerable development of the frontal parts, both superior and inferior. Let us consider also the admirable organization of Leibnitz, Haller, &c. Let us direct our eyes to the portrait of Edmund Castell, (Pl. LXXXV. fig. 1,) which is found at the head of his Lexicon Heptaglosson, a work which will continue for ages the resource of all philologists. What a resemblance appears in the organization of all these distinguished men!

Pelloutier, philologist; Perrault, architect and writer; Perron, who studied by himself Greek, Hebrew, philosophy, and the poets, a writer of prodigious memory; Rollin; Renaudot, who knew seventeen languages, and history; all had large pouched eyes; as well as Crebillon, (Pl. LXXXIV. fig. 5,) who never wrote his pieces till it was necessary to give them to the theatre. When he presented to the players his tragedy of Catiline, he recited the whole of it to them from memory; he never forgot any thing that he had learned.

Let us consider the eyes of Strabo, of Arétin (Leonard), polygraphist, historian, and translator; of Sarpi, author of the history of the Council of Trent; of Gibbon; of John Müller, author of the history of Switzerland; all have eyes very prominent and depressed toward the cheek.

Let us consider the portrait of Adelung at Brunswick, and that of his daughter, who inherited her father's genius for languages; those of Messrs. Bottiger, of Dresden; Heyne, of Gottingen; Schlosser; Birkenstock, of Vienna; Saxe, of Utrecht; Murr, of Nuremburg; Harles and Meusel, both of Erlangen; Krans, of Kœnigsburg; Rasdorfer, of Schweinfurt; Wolf, of

Berlin; Wolke, of Leipsick; Binger, of Manheim; the last became blind from excessive reading. Finally, let us admire the external sign of this beautiful faculty in our two celebrated professors of the university of Paris, MM. Desgenettes and Percy.

I should fatigue the reader by multiplying quotations. Whenever I look at the portrait of a man who has gained a name, in a department which supposes this kind of memory, I find large depressed eyes. How, after this, could I doubt, that this is a proper fundamental faculty, and that the organ has its seat above the orbitar plate?

The facts prove to demonstration, that this organization always produces the same turn of mind. To what fundamental force can we refer the functions of this organ? Is it by means of this that the human race has created for itself a spoken language? Has this organ traced to nations the immutable laws of general grammar? These are questions, which can be answered only after very numerous observations. The following might lead to the supposition, that they ought to be answered affirmatively.

Faculty of Language in the State of Disease.

A certain woman had intellectual faculties sufficient to arrange her household and take care of her children. But although her hearing was good, she could never learn to speak. In her cranium, the superior orbitar plates are hollowed into a spherical shape, a certain proof, that the cerebral parts, placed above, were very feebly developed. In the cranium of an individual completely idiotic, the superior orbitar plates likewise take a spherical form in the cranial cavity.

Pinel reports a fact, which I shall give in this place.

A notary, in consequence of an attack of apoplexy, had forgotten his own name, that of his wife, his

children, and his friends, although, otherwise, his tongue retained all its mobility. He no longer knew how to read or write, and yet he appeared to remember objects, which had formerly made an impression on his senses, and which related to his profession of notary. He has been seen to point out with his fingers the files of papers, which enclosed acts which could not be found, and indicate by other signs, that he preserved the former chain of his ideas.

A soldier, whom Baron Larrey had the kindness to send me, is in a state almost similar.

It is likewise in consequence of an attack of apoplexy, that this man finds himself unable to express his sentiments and ideas by spoken language. His face carries no trace of deranged intellect. His mind finds the answer to the questions addressed to him and he does all in his power to express it. I showed him an arm-chair, and asked him if he knew what it was; he answered me by sitting down in the chair. He is incapable of articulating, immediately, a word, which is pronounced in order to make him repeat it; but, some instants afterward, this word escapes him involuntarily.

In his embarrassment, he points with his finger to the lower part of his forhead; he manifests impatience, and indicates by his gestures, that it is from that point, that his inability to speak comes. It is not his tongue which is embarrassed; for, he moves it with great activity, and pronounces very well a large number of insulated words. Neither is his memory in fault; for, he manifested to me very strongly, that he was sorry not to be able to express himself on many things, which he would have wished to tell me. Nothing is lost in him but the faculty of speaking. This soldier, like Pinel's patient, is no longer capable of reading or writing.

Perhaps similar facts throw light on those mental diseases, in which the patients absolutely refuse to speak. I have the scull of a madman of this species;

in this scull also the superior plate of the orbit forms a vault elevated to the segment of a sphere.

It might be said, that in these cases in which the nervous system is attacked with weakness, it is the part previously the most feeble, which suffers most, and that the patient finds himself incapable of speaking, and has even lost the recollection of ever having spoken, though the exercise of his other intellectual faculties continues to take place to a certain extent. This would also explain how, after a fall, or any lesion, a man, from disease, may find himself incapable of speaking, without this incapacity being imputable to a palsy of the vocal organs. In such cases we have tried, in the insane hospital at Vienna, to excite the action of the brain, not only by internal treatment, but also by friction, for example, with the ointment of tartarized antimony, and we have thus succeeded in restoring the faculty of speaking.

There are children from two to twelve years of age, and even of fourteen, who know not how to speak, although they are not idiots, and understand nearly as well as other children, who speak. In these cases, the fault does not lie in the vocal organs, as the ignorant sometimes persuade themselves, and still less in a state of apathy of the subject. Such children, on the contrary, often have great physical vivacity; they do nothing but jump, pass from one idea to another with astonishing rapidity, and fix their attention on nothing. When you hold them, and pronounce in their ear a name or any other word, they repeat it distinctly. It is very difficult to make this experiment twice in succession, and impossible to go to three times, which proves a general weakess of the organs of the intellectual faculties. Sometimes, however, such subjects are capable of expressing their ideas and sentiments in writing with sufficient order, which well proves, that their intellectual weakness is peculiarly relative to the faculty of speaking. Though these cases are not absolutely rare, I have not hitherto

been able to procure the cranium of such a subject. When we treat these children by a tonic curative method, when we do not compel them to undergo too strong an exertion, and too long continued exercise of their feeble intellectual faculties; when, by the progress of age, their cerebral parts gain more consistence, their intellectual faculties often develope themselves by degrees, and they at length acquire the faculty of speaking, and take rank among reasonable people. It is only in the case, in which there exists hydrocephalus, or any other organic disease, that we need despair of a favorable event.

Spurzheim saw, at Inverness, in Scotland, a man who, being struck with apoplexy, knew the qualities of objects, who recalled vocal signs, but who could not pronounce them. If a color was shown him, as green for instance, and the question was asked whether it was brown, yellow, or any other color than green, he said no; when the true color was named, he replied in the affirmative. Spurzheim observed a similar case at Paris. The man understood all that was said to him, but could not find the pronunciation of the words which he wanted. He asked for different objects; and if the article was brought him which he mentioned, he always said it is, or it is not, that.

Sometimes this species of memory is found exalted in the state of disease. The patients recall events of which they had no recollection in the state of health. They quote whole passages which were long since forgotten; they speak languages which they had learned in infancy, but of which they had completely lost the exercise.

The organ of the faculty of language is perhaps particularly excited in those cases of alienation, in which the patients think they hear some one addressing them. I have had charge of two women affected with this kind of mania, both had large, flaring eyes depressed toward the cheeks.

The same irritation appears to exist in those mad-

men who think they speak all languages. In a madman of this sort, whom we saw at Berlin in the great hospital, called la Charité, the cerebral part peculiar to this function was unusually developed.

There exists, then, a partial mania limited to the faculty of speaking; now this phenomenon would be impossible, if the faculty of verbal language were not founded on a particular cerebral part.

In order the better to show what the language of words is, and what the faculty is which gives birth to it, it will be useful to examine its mode of existence and its different degrees of perfection in animals.

On the Language of Animals.

All language is the expression or the manifestation of the ideas or the sentiments, which men or animals experience. There are consequently as many different languages, as there are means of expressing or communicating one's ideas or sentiments. These means are either verbal sounds, or gestures, signs imperceptible to the ear. Sounds and gestures are either natural or arbitrary; man makes use of two languages; where natural signs are not sufficient for him, he invents arbitrary ones. Animals have the language of signs. No one doubts it. In another place I shall develope the origin of the language of signs. But have animals verbal language also? It is this which we are now going to determine.

The following is the manner in which C. G. Leroy expresses himself on this subject.

"We remark, in animals, only cries which appear to us inarticulate; we hear only the constant repetition of the same sound. Besides, we have some trouble to figure to ourselves a connected conversation between beings which have a long snout or a beak. From these prejudices, it is generally concluded that animals have no language, properly so called; that

words are an advantage peculiar to us, the privileged expressions of human reason. We are too superior to the beast, to seek to disguise to ourselves or to misapprehend what they enjoin, and the apparent uniformity of the sounds, which strike us, should not mislead. When a language, which is strange to us, is spoken in our presence, we think we hear only the repetition of the same sounds. Habit, and even the understanding of the language, alone teach us to judge of the difference. That difference, which the organs of the beasts make between them and us, ought to render us much more strange to them, and even make it impossible for us to recognise and distinguish the accents, expressions, and inflections of their language. It is however certain, that the beasts of each species distinguish very well among themselves, those sounds which to us appear confused. It does not happen to them to mistake in this matter, nor to confound the cry of fear with the sighing of love. It is not only necessary, that they express these marked differences, but also to characterize the slightest shades. The language of a mother who announces to her family, that they must hide, conceal themselves from the view of the enemy, cannot be the same as that which indicates that they must accelerate their flight. This is a question which must be resolved by the solution of two others. Have they the mechanism necessary for speaking? Can they without speaking execute what they do execute? Language supposes only a succession of ideas and the faculty of articulating. We have recognised, without being able to doubt the fact, that the beasts feel, compare, judge, reflect, conclude, &c. They have then, in regard to connected ideas, all which is necessary for speaking. With regard to the faculty of articulating, most of them have nothing in their organization which, as appears, should deprive them of it. We even see birds, otherwise so different from us, succeed in forming articulate sounds entirely similar to ours. Beasts have, then, all the conditions

which are necessary to language. But, if we closely follow the details of their actions, we see farther that it is impossible they should not communicate a part of their ideas, and should not do this by the aid of words. Their various agitations have different intonations which characterize them. If a mother, terrified for her family, had but a single cry to warn them of the danger which threatened them, we should see the family at this cry always make the same movements. But, on the contrary, those movements vary according to circumstances. Sometimes it is to take to flight, sometimes to hide themselves, another time it will be to present themselves in the attitude of combat. Since, in consequence of the order given by the mother, the actions are different, it is impossible but that the language should have been so likewise. Can it be said, that the expressions are not much varied between a male and a female during the period of their commerce, when we remark between them a thousand movements of a different nature? Eagerness more or less marked on the part of the male; reserve, mingled with enticement, on the part of the female, pretended refusals, vehemence, jealousies, reconciliation. Could it be believed, that the sounds, which accompany all these movements, are not as varied as the situations themselves, which they express? It is true, that the language of action is of great use among brutes, and that it is sufficient for their communicating the greater part of their emotions. This language, familiar to those who feel more than they think, makes a very prompt impression, and produces almost at the instant, the communications of the sentiments which it expresses; but it cannot suffice in all the combined actions of brutes, which suppose concert, convention, designation of place, &c. Two wolves who, in order to hunt more easily together, have divided their parts, one of whom has gone to attack the prey, while the other has charged himself with waiting at a given place to rein-

force his comrade with new strength, could not have acted together with so much concert, without communicating their project; and it is impossible, that they could have done this without the aid of articulate language.

"The education of brutes is accomplished mostly by the language of action. It is imitation, which accustoms them to most of the movements, which are necessary to the preservation of the natural life of the animal. But, when the cares and the objects of foresight and fear have greatly multiplied with the danger, this is no longer sufficient; the instruction becomes more complicated, words become necessary to convey it; without an articulate language, the education of a fox could not be completed. It is certain from observation, that before having been able to instruct themselves by personal experience, the young foxes on leaving the burrow, for the first time, are more distrustful, and more cautious in the places where war is often made on them, than the old ones where the snares have never been spread. This observation, which is incontestable, proves absolutely the need they have of language; for, without it, how could they acquire the knowledge of proper precautions, which knowledge supposes a succession of facts known, of comparisons made, of judgments rendered? It appears then, that it is absurd to doubt, that brutes have among them a language, by means of which they transmit ideas, the communication of which is necessary to them. But the invention of words being limited by the need one has of them, we see that language must be very limited among beings, who are always in a state of action, of fear, or of sleep." *

When one has frequent occasions of observing animals, he learns to understand their language, and knows the different inflexions assumed by the cry of

* Lettres philosophiques sur l'intelligence et la perfectibilité des animaux, par C. G. Leroy à Paris, 1802, p. 82, 87.

the cock, the chicken, and other birds, according to the sentiment or the idea which they wish to express. I saw a flock of ducks utter confused sounds with all the marks of inquietude; their singular movements fixed my attention; I could not doubt, that they were occupied with something which greatly interested them; their inquietude became every moment more visible; at length a duck, that had run from a distance at full speed, threw herself into the court. All her companions received her with marks of the most lively joy; all approached her, extended their heads towards her, stooping down, wagging their tails, and making a sort of reverence. The quacking became more and more animated, and all finished by retiring, much pleased, into their cover. Now, will any one tell me, that these ducks did not speak to each other? I am informed of all the wants of my dogs by the different sounds which they utter. My monkey manifests by sounds, always modified, the most varied wants, sentiments, affections, and ideas. There are none, even to my domestics, who do not understand his language.

This language is natural to animals; it is inherent in their natures; it is the same in all the individuals of the same species; every individual learns it, all speak it well, and all understand it perfectly. The attentive observer will easily convince himself, that this language is much more extended, especially in the more intelligent species, than is commonly supposed.

But what proves still more in favor of a faculty in animals for language, is their aptitude to understand the arbitrarily formed languages of mankind. All our domestic animals furnish evidence in favor of this last assertion. They learn to comprehend, not only insulated words or articulate sounds, but entire periods expressing several ideas. I have made, on this subject, many observations. I have often designedly spoken of objects which might interest my dog, avoiding to name him, and without allowing to escape any

intimation or any gesture, which could have awakened his attention. Nevertheless he expressed pleasure or chagrin according to the occasion; finally, he manifested by his conduct, that he had well understood that the conversation concerned him. I had brought a female dog from Vienna to Paris; at the end of very little time she understood French as well as German. I have assured myself of this, by uttering before her whole sentences in both languages.

It remains for me to examine to what extent comparative anatomy confirms these observations, by the examination of the cranium and of the head of animals.

On the Organ of the Faculty of Language in Animals.

In man, the brain, or rather the inferior anterior convolutions, which at present interest us, extend themselves, ordinarily, about two inches from the median line toward the right and left; in such a manner, that the whole width of the anterior inferior surface of the human brain is ordinarily about four inches. In the horse and the ox, it is nearly two and a half inches; and, in fact, the forehead of animals is much less broad than that of man. The whole of this cerebral mass, situated on the orbitar plate and against the forehead, is composed of several organs, such as those of educability, of the faculty of localities, memory of persons, of words and of language, of the faculties of tones, of numbers, and perhaps those of order and time. Now, according as a species is found endowed with more or fewer of these organs, its cerebral mass will extend more or less on the sides, and the inferior anterior surface of the cranium will be more or less large. In man, the ball of the eye, or the orbit, except its external edge, is covered by the inferior convolutions of the anterior lobes of the brain, and the superior plate

of the orbit is very large, more or less extended toward the side, and more or less flattened or prominent, according as the convolutions are more or less large or developed. In the monkey, nature has remained faithful to the same type; but the anterior parts of the brain shrink much more than in our species; a much larger part of the eyeball is placed without the encephalon. The superior orbitar plate is not only less in size, but also more spherical in the interior of the cranial cavity; the effect of which is, that, making allowance for proportion, the brain of the monkey terminates forward more in a cone or an oval, than that of man. Pl. LXXXIX. fig. 1. the interior of the base of a human cranium; fig. 2, open base of the cranium of the monkey, shows that the inferior middle convolutions of the anterior lobes are much more excavated, that is, much less developed toward the orbitar plate, than in man. The orbits of the ape (*guenon*) and of the ourang outang are almost as deep as those of man; which proves, how much smaller the inferior surface of the anterior lobes is in these animals, than in man. In the papions, the mandrils, and the pongoes, more than half the eyeball is found outside of the brain. Compare the crania of man with the crania of all the species of monkeys; Pl. LXXV. LXXXVIII. with Pl. LXVII. fig. 1, the cranium of the pongo, fig. 2, cranium of the papio, and Pl. LXXIX. fig. 1, the cranium of the sagouin, fig. 2, the cranium of the capuchin monkey, fig. 3, the cranium of the troglodyte monkey, fig. 4, the cranium of the ourang outang. Compare the brains of the patas monkey and of the ourang outang, Pl. XXXIV. and Pl. LXXVII. the brain of an ape (*guenon*), fig. 1, with all the plates of the human brain.

In the dog, it is only the posterior internal part of the ball, which touches the brain; more than two thirds of the eye are found placed outside of the encephalon. In several other animals, the whole ball is found outside of the brain, and more forward. This

takes place in the badger, the beaver, the pig, for the part of the cranium which, in these species, seems, at first view, to constitute the superior orbit, forms, in fact only the frontal sinuses. See Pl. LXVI. LXX. LXXII. the two heads of dogs, LXXXI. fig. 1, and fig 2; in general all the heads, and, Pl. XXXIII. the brains of the kangarou, fig. 3, of the tiger and lion, fig. 4, and 5, Pl. III. the brain of the calf; Pl. XIV. the brain of the sheep; Pl. LXXVII. fig. 2, the brain of the cat.

In birds there is always as much more of cerebral mass placed above the internal part of the ball, as the species has more aptitude for language. Compare Pl. LXXXI. fig. 3, the pie; fig. 4, the starling; fig. 5, the great raven; fig. 6, the parrot, with the gallinacea, Pl. LVII. and the brain of the chicken, Pl. I. fig. 2.

This small number of examples will enable the reader to conceive, not only, that animals may have among them a determinate language, but also how they are capable of comprehending those arbitrary sounds, which compose our languages, how they are competent to seize a series of ideas expressed by a period.

It even appears, that the aptitude for language, possessed by animals is destined, not only to subserve their proper wants, but also to render them capable of understanding the signification of sounds, and the language of other animals and of man.

Philosophical Reflections on Spoken Language.

Since Condillac, philosophers have exhausted themselves in reasonings on the influence, which signs in general, and spoken language in particular, exercise on our ideas and our knowledge. They maintain, that, without signs we should hardly think; that it is only articulate words which can lead us to abstract ideas; that signs and language develope our faculties, give birth to our inclinations, our sentiments, affections,

passions; that, without signs, we could not compare our simple ideas, nor analyze our compound ones; that in this way, languages are as necessary to thought as to speech, to the possession of ideas as to their expression: that without language we should have only very few ideas, and these very confused and incomplete.

It happens, by a fatality common to philosophers, and which happens to physicians and all others, to take the symptoms for the disease, the shell for the fruit. Destutt Tracy has aready said, that Condillac should have announced his discovery differently, and have said, that every sign is the expression of the result of a calculation executed, or, if you will, of an analysis made, and that it fixes and establishes this result, in such manner, that a language is really a collection of discovered formulæ, which afterward facilitate, and marvellously simplify the calculations and analyses which we wish to make ulteriorly. In fact, all possible signs, the language of gesture as well as verbal language, are the product of the activity of the faculties, inclinations, affections, and passions of men and animals. It is in the nature of man and animals to produce certain sounds as soon as they are affected; as soon as the experience they necessity of communicating with their fellows. It is an effect so necessary to their organization, that it even takes place in spite of us; and these seem almost always to depict our various affections so well, that they become the most certain and the most distinct natural signs. Before all language, the organs of our qualities and faculties are active, and however little this action may be felt, it manifests itself either by gestures, or by sounds, or words, or by both in combination. It follows, that these external signs, for the most part, are proportioned to the action of the internal faculties; it is by means of language, that man and the animal communicate their feelings and their ideas; and consequently the language of each species of animal, of each people, of

each individual, must be more or less rich and just, according as the sentiments and the thoughts are more or less numerous, clear, lively, and determinate. Any language whatever can never have more signs, than those who form it have ideas or sentiments. Languages and knowledge always are in concert; and in their progress, the equilibrium always establishes itself between the interior faculties and the signs. In order to transmit to my hearers or my readers, in a clear manner my ideas and my feelings, I try to impress myself with them, to personify them, if I may be permitted to use the expression, and the proper language spontaneously presents itself. This is the reason why the most perfect language is always employed by the most profound and enlightened men; and whenever language is poor, vague, imperfect, vacillating, the sentiments and the course of the ideas are open to the same charge. The language of brutes is, for the same reason, very limited; and thus it may be conceived, why that of certain savages is composed only of three hundred words. The words are created only in proportion to the need we have of them.

The doctrine so pompously announced, therefore, is false; namely, that language, that signs in general, have called forth, directed, and fixed the progress of the human mind in its combinations and researches. I admit, that the history of signs is, at the same time, the history of the successive advancement of human knowledge. But it is knowledge, inclinations, sentiments, talents, which have produced the signs; never could any sign give rise to any inclination, sentiment, or talent. It is necessary first to have experienced these, and then to have found the acceptation of the word or sign invented by others. Speak of metaphysics in the most distinct terms to an animal, an idiot, a man of very limited powers, and it is talking of colors to a blind man. Boast to a miser the pleasures of beneficence, to a cruel man, the charms of compassion; you will never, with all your signs, awaken

benevolence in the miser, or humanity in the cruel man.

Verbal language, it is true, is, of all languages and of all possible artificial signs, the most convenient to employ; it needs neither instruments nor preparations as for traced figures; it requires neither space not freedom of limbs as for gestures; in whatever position one is, maimed, sick, acting, he can produce this language. It is heard as well by night as by day, at a distance as well as near, without disturbing one's self, without turning toward the speaker, without being earnestly attentive, without even wishing it. These properties, which sounds possess, of being the most natural and the most convenient of all signs, cause them to become by custom the most habitual of all, and within us they are the most intimately connected with the ideas which they represent.

It is also true, that sounds have the very precious property of being able to become permanent signs by means of writing; that they remain fixed under our eyes, like hieroglyphics, drawings, and all other durable signs; and can, like them, awake in us, constantly, the ideas with which we have been transiently affected, and recall to us those which we may have forgotten, and which serve as necessary connections with others.

Notwithstanding all these advantages, so well detailed by Destutt Tracy, it must be confessed, that the language of gestures, though destitute of some of these properties, is more natural, more intelligible, more universal than spoken language, and that the language of actions or of gestures, is anterior to spoken language, &c. The immense utility of the language of gestures I shall make evident, when I have occasion to speak on *pathognomony* and *mimickry*.

The cases of disease, which I have quoted above, in which the patients had full knowledge of things, without being able to find or pronounce their names, prove, that the action of the internal forces precedes signs; that it is, in some measure, independent of

these; and, finally, that arbitrary signs, like spoken language, can give rise to ideas and sentiments, only so far as they have become by use means of association.

If it were true, that without signs, we should hardly think, and that nothing but articulate words can lead us to abstract ideas, then children would scarcely think before knowing how to speak. Now, experience shows that, before speaking, children acquire an infinity of notions, which without thinking, would be impossible. Children even commence the operations of their intelligence by making abstract ideas for themselves. Without stopping at the shades of color, all these shades are referred to the abstract idea: they are all green, red, blue, &c. The young of animals, the calf, the foal, &c. are the offspring of the cow, horse, &c. Thus, abstraction is the first want of the understanding, and is effected without the aid of any language.

It is likewise proved by experience, that, when an individual has been deprived of hearing, he employs other signs, natural or artificial, to express his sentiments and his thoughts. Men have at length seen the fallacy of the opinion, refuted many centuries since, that persons, deaf from birth, are not susceptible of the same sentiments, ideas, acquirements, as those persons who hear. The attainments of the deaf, unless their intelligence is imperfect, are often more just and more precise than the vague and indeterminate knowledge of other persons. The instruction of these is too often given in ill understood, ambiguous terms; the instruction of the deaf, on the contrary, always commences with the objects themselves; the deaf man will never persuade himself, that he has a positive idea of spiritual things; he knows very well, that whatever he learns of them is founded on negations, because he has been made to conceive, for example, that spirit is not an extended body, that it is not matter without action, &c. For the rest, every body knows the precision of their ideas on the affections, the sen-

sations, the sentiments, and the passions, and with what rapidity they communicate together before having received the least instruction.

Spurzheim saw a young Scotchman, born *deaf* and *blind*, who, though deprived of these two principal means of communication, and without having received any education whatever, manifests moral or affective qualities and intellectual faculties, to a higher degree than many other individuals endowed with all the external senses.

This fact is too important to be omitted. I shall relate it, as Spurzheim has reported it in his Phrenology.

"The history of James Mitchell, a young Scotchman, born deaf and blind, furnishes us an evident proof, that the five senses do not procure us our affective and intellectual faculties, and that they are only intermediate instruments. On account of the importance of the fact, and because I have myself seen this young man, I will speak of him with some detail.

"He was born the 11th Nov. 1795, deaf and blind, of intelligent parents. It may be conjectured, that he perceives sounds internally, for he appears to experience pleasure in moving hard bodies against his teeth; he has been seen to do this for whole hours. He has always seen the light so far as to distinguish day from night, and dazzling colors; and amused himself in his youth with looking at the sun through the clefts of the door, and with kindling fire. At the age of twelve years, the drums of both ears were perforated, one by Sir Astley Cooper, the other by Mr. Saunders, but without any improvement of the hearing. At fourteen years, Mr. Wardrop performed for him the operation of cataract on the right eye; after this he recognised more easily the presence of external objects, but never made use of sight to distinguish the qualities of bodies. Before and after this period, the colors of red, white, and yellow particularly fixed his attention. His senses of relation were always smell and touch. At present, he recurs to smell less than

formerly; he turns bodies with quickness in all directions, and turns the head sideways in the same manner as other blind men. His desire to know external objects, their qualities and uses, has always been great; he examines all that he meets, men, animals, and things. All his actions indicate reflection. One day, the shoemaker brought him a pair of shoes too small; his mother shuts them in a neighbouring closet and takes out the key. Some moments afterwards Mitchell asks his mother for the key, turning his hand, as if in opening a door, and pointed to the closet. His mother gives it to him; he opens the door, brings the shoes, and puts them on the feet of the young boy, who accompanied him in his excursions, and whom they fitted very well.

"In his childhood, he always smelled out the persons whom he approached, carrying their hands to his nose and drawing in the air. Their odor determined his affection or aversion, in the same manner, as persons, endowed with the sense of sight, are attracted or repelled by a handsome or ugly person. He always knew his clothes by the smell, and refused to put on those of another. Bodily exercise always amused him, such as rolling himself from the top to the bottom of a hill, turning a somerset, making wood or other objects float down a brook, which ran past the house of his father, picking up round and smooth stones, which he found on the bank, arranging them in a circle, and placing himself in the midst, or building houses with pieces of turf, in which he left openings, probably to imitate windows. Since he is able, by the aid of his right eye, to distinguish objects better, he is bolder in his excursions. He goes alone the distance of twelve Scotch miles, from Nairn to Fort Georges. He passes the greatest part of the day in the fields and on the road; but returns at the hours of meals.

"The traits of his countenance are very expressive. In general his natural language is not that of an idiot,

but of an intelligent being. When he is hungry, he carries his hand to his mouth, and points to the closet where the eatables are shut up. When he wishes to lie down, he inclines his head on one side on his hand, as if he would place it on his pillow; he imitates the motions of artisans in referring to them, as the movements of a shoemaker, who draws his thread by extending his arms, or of a tailor in sewing. He loves to mount on horseback; he designates this exercise by joining his hands and placing them under the sole of his foot, no doubt to imitate the stirrup. He makes, like every body else, the natural signs, for yes and no, with his head. He does not like any one to kiss him on the face, and if his sister does this in sport, he wipes and rubs himself with a discontented air. It is remarkable that almost all the signs, which he invents, are calculated for the sight of others. He appears to know his own inferiority in regard to this sense. Formerly he was accompanied by a little boy in his excursions; he went where he wished, but if he met any object, which seemed to him an obstacle, he waited for his companion to come up.

"He easily recalls the signification of the signs made to him. To make him comprehend the number of the days, they incline the head to him, to intimate that he must lie down so many times before the thing takes place. Approbation is manifested to him by caressing his shoulder or arm, and disapprobation by striking a slight blow. He is sensible to the caresses and the satisfaction of his relations. He loves young children, and takes them in his arms. He is naturally good and offends no one, yet his temper is not equal. Sometimes he loves to have others play with him, and breaks into bursts of laughter. One of his favorite amusements is to shut up somebody in a chamber or in the stable; but if others thwart him much, or too long, he becomes angry, and utters very disagreeable cries; in general, he appears contented with his situation.

"He has natural courage, but has always acted with prudence. When young, he wished every day to go farther than he had done the day previous. One day he found in his way a narrow bridge of wood, which was over the stream near his father's house; he places himself on his hands and knees to pass it. His father, to intimidate him, sends a man to make him fall into the water, at a place where there is no danger, and immediately to draw him out again. This lesson produced the desired effect, and he passed there no more. Some years after he still remembered this punishment. One day, being vexed with his little companion, while they were playing in a boat tied to the bank, he took him, plunged him in the water and drew him out again.

"He fears the perils of fire, water, and cutting instruments. Animals killed, such as fowls, never made a disagreeable impression on him; but when he touched the body of a dead man, (it was his father,) he retired terrified and with precipitation. Since then he has touched other bodies, without experiencing the same emotion; he knows that they are interred, and his sign to express it, is to carry his hand towards the ground.

"He is afraid of dying, and knowing that people die in bed, he never remains lying when sick; and having remarked, that the dead are covered with white cloths, he is uneasy in sickness, if dressed with white linen. The death of his father has given occasion to observe his attachment to his parents. When the coffin, which enclosed the body of his father, was exposed before the door, previous to interment, James went out of the house with precipitation snuffing the air about him, probably to guide himself; he approached the coffin, threw himself on it, and pressed it in his arms, while his whole countenance indicated the greatest sorrow. At the moment when they wished to remove the coffin, he threw himself on it anew, held it, and they were obliged to tear him from

it by force. Some time after, his mother being indisposed, he shed tears. Every time that any one of the family is absent, he manifests uneasiness. During some time he had a disease in one foot, which was placed on a stool. A year after, observing, that the boy, who usually accompanied him, did not leave his chair, he touched his legs, and finding a bandage, he went to the barn, and looked for the stool to put his friend's foot upon it. In 1814 he was attacked with acute rheumatism. He loves particularly his eldest sister, and prefers her to every other person. An aunt, to whom he was also attached, came to see them. At this time his sister fell sick and was obliged to keep her bed; Mitchell manifested uneasiness, and wished to know what had become of his sister; he made a sign, that they should lead him up stairs, for his sufferings would not allow him to walk alone. Having found his sister in bed, he experienced pleasure in pressing her hand; but after descending into the parlour on the ground floor, he no longer wished to have his aunt remain near him; he always made signs, that she must go up stairs, desiring, without doubt, to express, that she ought to go and take care of his sister. In my work on *Madness*, page 132, I have related this fact; but by mistake I stated, that it was the aunt who fell sick. It is true, that this circumstance is not essential; yet, through love for truth, I think it my duty to state the fact as it occurred.

"It is difficult to say whether he experiences religious sentiments; he accompanies his parents to church, and is accustomed to place himself on his knees during the prayers of the family. He conducts himself decently; but is this from custom, or through devotion? He knew that while they were on their knees, his father had a book (the Bible) before him. Three months after the death of his father, one Sunday, when a clergyman, who had assisted at the prayers of the family while his father lived, was at the house,

Mitchell brings him his father's Bible, and makes a sign to all the family to put themselves on their knees. It is certain, that he experiences the sentiment of justice and injustice. He is troubled every time he has offended his sister or his mother; and caresses them to regain their affection. His sentiment of self-love, or personal dignity, is evident; for, he would not take his regular meals in the kitchen where the servant is, but in the chamber, in presence of the family; yet, if he returns before the dinner hour, he will go and ask a potatoe of the cook. His love of approbation is very decided. He likes to be caressed. He gives the preference to well dressed persons; and, if he has new clothes, will not change them for the old ones. Several times he has thrown into the river his old clothes, or shoes, to prevent his parents from making him wear them. Sometimes, in great anger, he has also torn his clothes. They wished to teach him to make baskets, but the sedentary life displeased him, and, as the employment wearied him, he threw the materials into the fire. Destruction therefore serves him as a means to rid himself of disagreeable things. A neighbour taught him to smoke, and this taste became very strong with him. Every time he emptied his earthern pipe, he broke it. They gave him a more durable pipe, but he refused it the second time. They allow him at present daily, four supplies of tobacco, and two new pipes; so that each pipe serves twice; after that, it is broken. This enjoyment sometimes calls forth his cunning. One day his sister makes him a sign to go and buy two pipes. In returning he brings one in his hand, and gives it to his sister; she gives him to understand, that he ought to have two. At first he makes believe, that he does not understand her; but when his sister urges him to go and find the other pipe, he draws it out of his pocket with shouts of laughter. Several persons of the city of Nairn, who know his taste for tobacco, furnish it to him. On returning to the house, he never shows it till after having received from the family his daily ration.

"I shall finish what I have to say of this singular being, by speaking of his sense of property. One day he meets on the road a man mounted on the horse, which had been bought of his mother some weeks previous. Mitchell according to his custom touches the horse, appears to recognise him instantly, and makes a sign to the rider to dismount. The latter, in order to observe his intention, obeys, and sees with surprise, that Mitchell leads the horse to his mother's stable, takes off his saddle and bridle, gives him oats to eat, retires, shuts the door, and puts the key in his pocket."

It is impossible to have a more certain proof of innate dispositions, and of the insufficiency of external instruments. This young man is deprived of the two principal senses of relation; he has received no education, does not understand the artificial signs calculated for the hearing and sight, and yet manifests the affective and intellectual faculties in a high degree; while many other persons, who enjoy all the external senses in perfection, are very limited in their mental manifestations, or are even idiots.

From all which I have said in regard to the sense of languages, I think myself authorized to infer, that verbal language, considered as a cause, is by no means in so close connexion with our faculties as philosophers pretend; that it is rather an effect, a creation of our internal faculties; and finally, that a particular organ of the brain presides over this admirable function.

"One might easily conceive," says Demangeon, "the different species of memory already admitted by the ancients, without so great a number of organs. Memory would be almost limited to words, with faculties very few in number, or little developed, as in children, parrots, and other animals; with faculties more numerous or more developed, it would extend itself to things, places, numbers, &c. Thus, without denying, that the angular form of the exterior of the orbit sometimes is the indication of aptitude for calculation, that

the prominence of the eyes in man is a sign of verbal memory, or that the swelling of the internal and superior part of the arch of the eyebrows, indicates the sense of locality, which constitutes already three sorts of memory, I think our authors have multiplied organs too much, and have often endowed them with a speciality of function, which they do not possess. Such, among others, is the organ of aptitude for philology or languages, which can only be learned by means of several faculties.

"Of what species was the memory of the Italian Magliabecchi, who, having read a manuscript, which, in order to try him, they pretended to have lost, dictated it from memory without missing any thing? It is also related that Frederick II., king of Prussia, one day confounded Voltaire, who came to read him a piece of verse of his own composition, without having yet communicated it to any body, by telling him, that this piece was not his, that he knew it already, and could even call some one who had learned it by heart, at the same time introducing a man of his court, who repeated it without forgetting any thing, after having heard it once only, while concealed behind a curtain. Is this the simple memory of words; or is there a memory of phrases, of verses, of rhymes, construction, style, &c.? By the force of what organ do the mocking birds reproduce, not only the words of different languages, but even the notes of other birds and the cries of several animals? If it is by means of the two organs of verbal memory and of imitation, why cannot man, who has these two organs, equal them in the reproduction of the same phenomena?"

Demangeon always holds to his idea on the results of the enlargement of the brain in general, without having regard to the favorable development of certain cerebral parts; and while ever complacently giving himself to reasoning, he has the appearance of forgetting facts, of which, however, the reading of my book might have furnished him a very large number.

I have instanced bees, which, with an extremely small cerebral mass, have an astonishing local memory. I have cited pigeons, dogs, horses, &c., which, having hardly the tenth, or even the hundredth part of the human brain, have local memory, or the faculty of guiding themselves, to a degree infinitely higher than men. I have even instanced imbecile persons, and idiots, who excel in the memory of persons, places, music. I have cited great mathematicians, geographers, mechanics, musicians, philologists, whose other faculties were very limited. On the supposition of Demangeon, every great compiler of dictionaries, of grammars, every great musician, mathematician, &c. ought to be at the same time a great poet, metaphysician, warrior, actor, &c. In general, every considerable volume of the brain ought to have, as its result, moral qualities and intellectual faculties very energetic. Is not Demangeon in contradiction with himself, when he maintains that mocking birds reproduce, not only the words of different languages, but also the notes of other birds, and the cries of several animals, and that man cannot equal them in the reproduction of the same phenomena?

Demangeon asks, of what species was the memory of the Italian Magliabecchi, &c. I answer, let him again read my own passage in my large work, T. IV. p. 70, where I have myself related the mystification of Voltaire by the king of Prussia, and he will find, that I attribute the faculty of retaining phrases, with so great a facility, to the memory of words or verbal memory.

XVI. *Faculty of distinguishing the Relation of Colors; Talent for Painting, (Farben-sinn.)*

By the expression, faculty of distinguishing the relation of colors, I do not mean to designate the simple faculty of seeing or perceiving colors. Animals also see

different colors; they are susceptible of illusions produced by the employment of colors, of light and shade. I have seen dogs bark at the portraits of persons, who were unknown to them, which they perceived by chance in an apartment, and give marks of affection to the portrait of their master; but it will be difficult to find examples of animals who have shown, that they had a perception of the harmony or want of harmony of colors.

There are persons who are incapable of perceiving a very marked difference between one color and another. Dr. Unzer, of Altona, never was able to distinguish the difference between green and blue. A boy, who wished to learn the trade of a tailor, was obliged to renounce that design, in consequence of his incapacity to distinguish certain colors. Spurzheim cites the case of a man whom he saw at Dublin, who loved the mechanic arts and drawing, especially that of landscapes, but who was obliged to abandon painting, because he could not distinguish red from green. At Edinburgh, in Scotland, he also saw three brothers and a cousin german of theirs, who cannot discern green from brown. Such persons certainly are not made for painters. There are other persons, on the contrary, who discern the most delicate shades, and who have a peculiar tact, by the aid of which they are capable of arranging colors to please the eye. But these advantages, though necessary to the painter, have nothing in common with the true talent for painting. By the expression, faculty of distinguishing the relations of colors, I mean the faculty of judging the harmony and contrast of colors, of perceiving and judging of their laws, and conforming to them in their employment.

It is this faculty of distinguishing the relations of colors, which constitutes the talent of the painter. I do not here speak of the painter as an artist, nor under the relation of composition, nor under the relation of drawing, nor that of expression; I speak of the painter only so far as he is a colorist.

In speaking of the functions of the senses, I have already proved, that the talent of the colorist does not at all depend on the eye. The most perfect eye is sometimes found the property of the most indifferent painter, and there are examples of excellent colorists who had weak sight. Before the cerebral organs were thought of, men were doubtless compelled to deduce all our qualities and all our faculties, from the five senses. In this system, painting also could only be a product of the eye, I might quote, in favor of this error, several authors who have written on painting; but I content myself with relating what Sobry says on this subject, who has explained, better than any one else, the opinion of his contemporaries.

"It is not enough," says he "that the sense of sight should be useful to man; it is not enough, that it should be indispensable to him; nature has wished, that it should also be a source of pleasure; she has wished, that it should be the source of his most constant, sweetest, purest enjoyments. In distinguishing man from all other animated beings, in this respect, she has ordained this sense to be the principle of one of her most moral enjoyments.

"In fact we do not see, that animals extend the use of the sense of sight much beyond its utility to them; a fine situation, agreeable places, objects well arranged, appear to affect them but little; the bird seeks, without choice, the foliage in which he conceals himself: the fallow deer, the cave which shelters him; the domestic animal, the asylum which receives him; no one appears to take either more or less interest in the sight of the things which surround him, and it may be said, that, for all animals, the sense of sight is bounded absolutely by its physical character.

"It is to man alone, that it has been given to have moral enjoyments through the sense of sight, independently of the physical means of this sense, with which he is so liberally provided for his advantage. So that it may be said, that, if the sight of man is limited to a

certain number of objects, as regards utility, it embraces an infinite extent of them, as a source of delight.

"From the pleasure of seeing, springs the desire of representing to one's self what has been seen; hence reiterated attempts to trace objects; hence the gradual success of the enterprises of drawing and painting; arriving, from rude beginnings, to satisfactory productions, and finally to a perfection approaching to illusion."

But it is precisely from the circumstance, that animals, notwithstanding the perfectibility of their eye, remain insensible to the fields enamelled with flowers, and to all the beauties of nature, that we ought to infer, that neither the pleasure caused by the sight of these objects, nor the judgment which the mind passes on them, enters into the sphere of the activity of the eye. It ought to be felt, that, though the eye transmits to the soul the impression of these objects, there are nobler objects, which set this impression at work for more elevated ends. Indeed, the talent of the colorist is founded on a faculty much superior to that of seeing. It is founded on the agreement of an internal sentiment and an act of the intellect, with the laws of the proportions of colors, such as they exist in the external world. Let me explain myself.

The internal man and animal are formed for the external world; their interior organization ought, therefore, to be found in unison with external objects, inasmuch as the animal and the man must have points of contact with objects from without. Their organs of taste and smell are in unison with the substances which are appropriate to their nourishment. In the same manner all the cerebral or internal organs are adapted to external objects. The animal has the instinct of propagation, and their exist males and females; the instinct of the love of offspring, and it finds its object in children and young ones; the faculty

of distinguishing localities, and it finds its application in the relations of space.

There must exist likewise, in the external world, objects on which the faculty of colors can be exercised. The laws of the proportions of colors have not been invented by man; they exist in creation; man, and probably he alone of all animals, is endowed with an organ, by the aid of which he recognises these laws; that is, this organ and these laws are in direct relation: the action of the organ becomes a revelation of these laws; the organ bears the impress of the laws to which the proportions of colors in the external world, are submitted.

View of the Laws of the Proportions of Colors.

I pass over in silence all that Newton, Buffon, Goethe, and the modern natural philosophers, have said on the proportions of colors and on their mixture. I likewise abstain from examining the question, whether there exist seven primitive colors, or three only. I have no other end but to convince the reader, that there really exist, out of ourselves, determinate laws for the proportions of colors. Thus, for example, the three fundamental colors, supposing them to be only three, when placed side by side are always inharmonious. Blue, yellow, and red are inharmonious. If two of these colors are mixed, a mean color ensues. Blue and yellow compose green; blue and red, violet; red and yellow, orange. To obtain harmony, we must place by the side of a primitive color, a mixed color, in which the primitive color enters as part of the mixture; the mixed color will always be in harmony with the two primitive colors from which it results. Place a riband of silk, of one of the three primitive colors which I have named, and nearly an inch wide, on a leaf of white paper, and look at it attentively; at the end of some

instants, there will be seen the three primitive colors, and by their side the mixed color, resulting from the two last primitive colors. If, for example, we place on the paper a blue riband, there will be seen beside, the yellow and the red, and by their side the orange, resulting from their mixture.

Klotz, at Munich, is entirely satisfied of the internal laws of colors. It is on these laws, that the possibility of the scale of colors rests; and if we ever are enabled to represent these laws of the proportions of colors by signs, as we do those of the proportions of sounds, we may hope to preserve pictures from the scythe of time. We might then note a picture of Titian or Rubens, as we do a piece of Mozart or Grétry, and reproduce masterpieces of the pencil, as well as those of musical composition, after the lapse of many ages.

The most recent experiments of naturalists on colors, made by the aid of a certain number of superimposed transparent laminæ, give still more precise ideas on the laws of their proportions.

He, who, by virtue of his organization, is capable of seizing these laws, is from this circumstance susceptible of feeling the harmony, or want of harmony, existing between colors. He, in whom this organization is developed in a high degree, has a natural and lively impression of this harmony; without having learned these laws he divines them; wherever he meets with colors, he passes judgment, without knowing how or why, on the harmony or the want of it existing between the colors. This is the talent of the painter, so far as he is a colorist. This is what determines the vocation for painting. This talent, it is true, may be perfected by the study of rules and models, and thus become an object of intelligence; but it would not exist without that revelation, which comes from the activity of the organ, and constitutes its natural foundation.

Talent for Painting in Mental Alienation.

In Pinel's establishment, a sculptor gave himself up to all the extravagance of rage in his cell; he tore every thing to pieces, and continued several months in a most violent state of mania. Calmness at length succeeded, and his freedom was given him in the interior of the hospital; his understanding was still feeble, and he supported with difficulty all the weight of an inactive life. The art which he had cultivated seemed to smile in his imagination, and he desired to try himself first in the class of portrait painting. They readily seconded him in his design, and he made the sketch of the portraits of the Superintendant and his wife. The resemblance was well caught; the patient soon had a relapse, which terminated his miserable existence.

My readers will no longer doubt, I suppose, that the faculty of colors is a fundamental faculty founded on a distinct cerebral organ.

Of the Organ of the Faculty of Colors, and of the external Appearance of this Organ.

At Vienna, I never lost sight of the difference of the talents which constitute the art of painting, and I observed with very particular attention the painters who distinguished themselves for coloring; for example, Lamby. In all of them I remarked, that the frontal part, situated immediately above the middle of the eye, advanced into an arched prominence; the whole arch, and especially its external half, was directed upwards in such a manner, that the external half of the superciliary ridge was more raised than the internal.

I have only been able to discover the seat and form of this organ, by observing attentively very distin-

guished colorists, and I made the discovery at a period, when I had not the least idea either of the form or of the direction of the individual cerebral convolutions. Afterwards, however, an attentive examination enabled me to discover, in the region indicated, a little convolution projecting outward, having from half an inch to an inch of transverse diameter. It is the convolution XVIII. Pl. IV. V. XIII. the favorable development of which determines the faculty of distinguishing the harmony and disagreement of colors.

I have found this discovery confirmed in all my travels. We have seen, in a passionate amateur of coloring, a collection of portraits of all the famous painters of both sexes, who have distinguished themselves in this department of the art. In all these portraits, we found the region immediately above the middle of the eyebrows, extremely prominent.

We were especially struck by a bookseller at Augsburg, blind from birth, who maintained, that it is not the eye but the intellect, which recognises, judges, and creates the proportion of colors. This man even assures us, that, by means of an internal sense, he has precise notions of colors, and it is a fact that he determines their harmony with exactness. He has a great number of pearls of colored glass; he forms with them different figures, and the arrangement of the colors is always harmonious. He tells us among others, that, whenever he takes much pains to arrange the colors of a ground, he feels a pain immediately above the eyes, especially above the right eye. The region which I have above indicated is considerably developed in this man.

"Devoyer, born nearly blind, who has never seen paintings, except with the aid of a glass, passes for a connoisseur."

Now compare the greatest painters, who have excelled in coloring, with other painters equally distinguished, but who, in regard to this point, have not equalled the first. Compare Titian, Pl. LXXXV. fig. 2;

Correggio, Rubens, fig. 3, Claude Lorraine, Van-Dyke, Paul Veronese, Giorgion, Rembrandt, fig. 4, Teniers, le Tintoret, with le Poussin, Lesueur, Raphael, fig. 5, Michael Angelo, fig. 6, Lebrun, Jouvenet. In the portrait of the first you will always see the superciliary ridge strongly raised in the middle; in the last, on the contrary, this ridge has almost a horizontal direction; from the root of the nose to near the middle of the superior arch of the orbit, it is flattened or depressed; while in the first, this region becomes more and more prominent as it approaches the middle of the superciliary ridge.

The organ of the sense of colors is usually more developed in women than in men. Hence it happens, that the eyebrows form, generally, an arc of a circle in women; this explains why they are more susceptible than men of receiving an agreeable impression from a happy choice of colors; why they are so much pleased with a dress of various colors, and why they are more frequently than ourselves, lovers of flowers. A woman will always prefer, whether for herself or her friend, a colored portrait to a bust. This shows why female artists, who in every other respect rarely equal men of genius, raise themselves sometimes to the level of the most distinguished painters in the art of coloring. Angelica Kauffman, daughter of the celebrated Ruisch, is an example of this.

The faculty of colors explains several phenomena, which would remain for ever inexplicable without organology. I confess, that to speak pertinently of all the objects which enter into the domain of the physiology of the brain, I should have to make treatises much more complete than my work permits; I should need almost universal knowledge, an impossible thing, but which must one day engage the connoisseurs to make application of organology to every individual part. I will furnish, meanwhile, a little extract from observations which Dr. Gambs, of Frankfort, has had the politeness to communicate to us.

"If," says he, "we direct our attention to painters in general, we shall observe two clases of them, essentially distinguished from each other. The first is formed by the historical painters; the second by the landscape painters, to whom we must add the painters of animals, flowers, and fruit; all those, in fact, who copy from nature. It is to be remarked that the first, who make a study especially of anatomy, history, antiquities, the works of the ancient and modern masters, who consequently are obliged to study nature and art at the same time, need, to a greater degree than the second, a taste for the arts, and consequently the organ of the arts, of which I shall speak hereafter, ought to be more developed in them.

"This organ of the arts, being placed at some distance from the organ of the faculty of colors, is a circumstance, perhaps, which explains, why the painters of history have rarely been good colorists; why some among them, as Michael Angelo and Poussin, have even neglected coloring, which they professed to consider the least essential part of painting, while their merit in regard to drawing, invention, expression, and composition, places them in the rank of the first historical painters.

"If, on the contrary, we observe attentively the landscape painters and the painters of portraits, who in the exercise of their art especially need the faculty of localites and that of persons; if we observe attentively, that the organs of these two faculties are very near that of colors, we shall perceive why, in the number of landscape and portrait painters, there has always been a great number of excellent colorists, who in this department, have surpassed almost all the painters of history. Compare the excellent landscapes of Claude Lorraine, of Schwanenfeld, of Ruisdael, Both, and others, with the works of the first painters of history, and you will easily be convinced of this truth.

"2. Climate appears to exercise great influence on

the organ of the faculty of colors, as well as on other organs. Almost all the Italian painters, though surrounded by the most beautiful nature, are so indifferent in regard to coloring, that, if we except Annibal Caracci and Titian, both colorists of the first rank. Italy does not possess a single landscape painter equal to Claude Lorraine, to Schwanenfeld, or to Ruisdael, and to other Flemish painters. Holland, Germany, and even the North, on the contrary, have produced a great number of excellent landscape painters, but a very small number of good historical painters. Spain and Portugal have excellent painters of history; for example, Velasquez and others, but not a single landscape painter. In the Italian school, the Venetians, placed more toward the north, are almost always the best colorists. The French school is reproached with being a mongrel, which takes the middle stand between the Italian and the Flemish; it is even predicted, that it will never produce a Raphael, a Titian, a Paul Veronese, a Correggio; it is generally maintained, that the French are endowed with the faculty of arts and of that of colors, to a less degree than the Italians and the Flemish; that the greater part of their historical paintings are also hard, and want natural character as much as their music; and that we cannot acquit the greater part of their paintings of the fault of bad coloring."

I imagine, that custom and natural feeling have much to do with these criticisms. I am neither an artist nor a good connoisseur, but it seems to me, that the new French school has some masterpieces to oppose to its detractors, and that the names of the Gerards, Guerins, Robert-Lefevres, Girodets, Vernets, Forbins, Davids, Regnaults, of the excellent colorist Gros, &c., ought to place them in the first rank among the modern schools. But I repeat it, I consider myself incompetent to decide this controversy.

Neither will I undertake to decide, as some have done, how far the narrow forehead, more prominent in front

of the Dutch and Flemish, explains the greater activity of their organ of the faculty of colors. To determine the question with a knowledge of the cause, I ought to have compared, not only the foreheads of different nations in general, but also to have studied particularly in them, the organ of the sense of the relation of colors.

The different degree of talent for painting, in different nations, reveals itself even in their drawings and engravings. The drawings of the Flemish, even those by the pen, are always, in regard to shades, more finished than others, and exhibit masses of crossed lines by which the artist has intended to give them the appearance of coloring. Many are retouched with india ink, or offer white lights on dark ground. The Dutch landscape painters, properly so called, have been in the habit of coloring their landscapes *in gross* after nature, on the spot, or at least, of taking a colored sketch of them.

In the first engravings of the Dutch and German artists, we cannot mistake the intention of the engravers to imitate colors. The Italian engravers, on the contrary, from the origin of the art to our day, have never been able to imitate them by giving to their works the perfection of retracing the colors, as Reubens and his pupils did, and as the superb dog of Golzius shows.

The organ of the faculty of coloring is pretty generally much developed among the Chinese, whatever may be the variations which the form of their head undergoes. It is for this reason, that their superciliary ridges are strongly drawn upward, especially in the external half. Every body knows to what degree they are prodigal of colors. Every part of their houses is covered with them; the columns, the entablatures, the friezes, all is painted in green, blue, red, yellow; they paint even their statues; they surpass all the nations of Europe in the art of dyeing.

According to the different degree of activity of the organs of the faculties of localities, of the arts, colors, the taste of those who make collections of objects of art, or who consider themselves critics, must modify itself variously. John Fuseli has written a journal of the arts, in which, in criticising works, he gives proof of an exquisite faculty of the arts, but of a very defective one of colors. There are other critics whom nothing escapes which has relation to coloring, but who pay no attention to bad composition, to a drawing so incorrect as to revolt the eye, to a mistaken expression, or one absolutely false.

Men have always been struck by the difference which exists between the faculty of the arts and the faculty of colors. How then happens it, that it has not been concluded from this difference, that each of these faculties ought to be founded on a particular and proper organ? It is either because few go back from an effect to its cause, or because, for want of exact knowledge, men are contented with an insufficient explanation, provided it be generally adopted.

"According to Messrs. Gall and Spurzheim," says M. Demangeon, "the organ of painting directs itself to landscapes, when united to that of localities, but to portraits when seconded by that of persons. But to what organ was united the extraordinary talent of Vernet for painting views of the sea and harbours; that of James Van Es, for painting, with so much perfection, fishes, birds, flowers, fruits, and especially shells; that of Peter Breughel, the younger, or the infernal, for painting sorceries, devils, and hells; that of his father and his uncle, who preferred landscapes, fruits, and pleasing subjects; that of those who undertake to paint only caricatures, portraits of women, and other partial and exclusive subjects?"

We have already said, that man is not the result of a single organ, but of the combined action of all; that only the most energetic leads him to act in preference

in the direction of his faculty. Again, this organ is modified by the more or less powerful action of others; thus, when we say, that the talent for painting directs itself rather to landscapes or portraits according as the organ of localities, or that of persons is conjointly developed, we do not exclude the idea, that the painter, who ought essentially to make use also of the talent of imitation, may make use of this faculty on all suitable objects. All the objections of Demangeon do not destroy the principle, that it is necessary to have a sense of colors, in order to seize well their relations and represent them in painting. Besides, these sea views, these sorceries, devils and hells, caricatures and portraits of women, are they not either places or persons? Does not the organ of a caustic spirit contribute to the composition of some of these paintings? Finally, where have we said also, that the painter cannot imitate things? No where.

XVII. *Faculty of perceiving the Relation of Tones, Talent for Music.* (*Ton-sinn.*)

Why seek in the brain an organ for music? To be apt for music, nothing is requisite but an ear: all the talent of the musician lies in the ear. Thus says the multitude; thus say the physiologists.

In the treatise on the functions of the five senses, I have endeavoured to refute this prejudice, and have assigned its sphere of activity to the ear as well as to the eye. As I cannot suppose, that all persons have read the first volume of my large work, I am here going to repeat, what I have there said against the opinion of those who maintain, that to be a musician, nothing is needed but ear; by this means, we shall here find collected all the proofs in favor of the existence of an organ for music.

There are a great number of animals endowed with a finer ear than man, which, however, do not evince

the slightest aptitude for music. We know birds who do not sing, endowed with as fine an ear as the singing birds. In the species of singing birds, the female, deprived of the faculty of singing, is endowed with the same auditory organs, and as fine an ear as the male.

Certain naturalists do not wish to hear the singing of birds spoken of at all. The notes of birds, say they, have no more analogy to music, than the neighing of horses. It is man alone, endowed with an acoustic ear, who is capable of distinguishing chords and discords. This faculty, they continue, belongs to a peculiar instrument called the cochlea, with which man is furnished, and of which all other animals are destitute.

It is indisputable, that many animals have a finer ear than man, and that the auditory organs in them are more perfect than in our species; this is what I have proved in speaking of the sense of hearing. There I have also shown, that the other mammifera are furnished with a more perfect cochlea than that of man. In my lectures I am accustomed to show my hearers the cochlea of the ox, the dog, the cat, &c.

What shows this error in all its nakedness, is the circumstance, that birds in general, and singing birds in particular, are destitute of the cochlea. It is replaced in them by an osseous canal slightly curved.

If the ear were the material cause of singing in birds, and of music in man, birds and man could not, in regard to singing and music, do more than repeat what they have heard. Now, how has each of the singing birds acquired his note? Where is he who gave lessons to the first thrush, or to the first nightingale? How happens it that birds, hatched and raised by those of a different species, and who have never heard their parents sing, yet utter the note peculiar to their species? M. Darvin says, on the authority of Kircher, "that the young nightingales, hatched by other birds, never sing except in those

cases where they have been instructed by associating with other nightingales." But this is not the fact. If the comparison be permitted, it is with the singing of birds, as with the language of men of the same country. In essential particulars it is the same, but it undergoes modifications within a circuit of some leagues only, in each inconsiderable district, even in a little island. Young birds, raised in the house, do not sing so well the first years, but they improve themselves from year to year, without ever having heard other birds of their own species sing.

How can we conceive the invention of music in man, if the musician must have heard before, all the music which he makes? Who does not perceive, that the composer of music derives these compositions from the interior of his soul? That whatever he expresses on paper by notes, he had previously perceived and conceived within himself? Why then are not persons, endowed with the finest ear, likewise endowed with the most distinguished talent for music?

I am aware that Buffon, Cabanis, and others, charge the musical faults of certain composers to the inequality which exists between the two ears; but daily experience refutes this assertion. It is difficult to find an individual, who has both ears equally good. Holzbauer, the celebrated chapel master at Manheim, was deaf of one ear, and heard very imperfectly with the other; that did not prevent him from composing very harmonious music. Astley Cooper speaks of a man who was very hard of hearing from his childhood, and who, notwithstanding, was very sensible to harmony; this person played very well on the flute, and performed with great success in concerts. "I have known a child," says Darwin, "who loved music extremely, who easily retained an air after hearing it sung distinctly, and whose organ of hearing was yet so imperfect, that it was necessary to speak very loud in adddressing him." I have read in the work of a French physician, the case of a boy who had lost his

hearing in consequence of the small pox, and who, notwiihstanding, composed songs himself, and sung them very correctly. All these facts prove, that the ear is, at most, but one of the conditions for executing musical compositions; but that it cannot be considered as the cause of the perception of music and of musical invention.

Those who attribute to the throat, the note, whether of birds or of man, also pass a judgment equally superficial. The throat is for the note only a means of execution, as the hand is for the painter and the sculptor. A counter-tenor or bass voice, the flexibility of the voice, &c. depend, it is true, on the structure of the windpipe. But must not such a faculty, whether in the bird or man, have conceived the whole succession of tones before impressing on the windpipe such or such movements? For the rest, I know perfectly, that the windpipe or the glottis is in connexion with the instinct of propagation and with that of song. The glottis in singing birds is differently formed in the male from its formation in the female. Gelded birds do not sing. The voices of women and of eunuchs differ from that of men. A great number of the species of birds sing only in pairing time. The red-breast, the wren, the canary bird, and the goldfinch, on the contrary, sing through the whole winter. All physiologists know the relation, which exists between the windpipe and the sexual parts, as well in animals as in man.

Willis deduced aptitude for music from the softness of the brain; but he could not sustain this opinion, either by facts or by reasoning. There remains, therefore, no other course to take, but to admit, that there exists in the brain, a peculiar organ for music.

History of the Discovery of this Organ.

There was shown me a young girl, named Bianchi, aged about five years, and I was asked to decide what was the most remarkable talent of this child. I discovered nothing in her, which indicated extraordinary memory; and the idea had not yet presented itself to my mind, that the talent for music could be recognised by the form of the head; I did not even know, at this period, the different species of memory. My friends, however, maintained, that the young Bianchi had an extraordinary memory for music, and they inferred from this, that the ideas, which I professed in relation to the external signs of memory, were false. This child repeated all that she had heard sung or executed on the piano; she retained by heart whole concertos, which she had heard at most twice. I inquired whether this young girl learned every thing, without distinction, with the same facility. Her parents assured me, that she was endowed with this astonishing facility, for music only. What could I conclude from this declaration? That there exists a well marked difference between memory for music, and the other species of memory which I knew at that period; and that each species of memory must have its distinct organ.

From that moment I devoted myself to more connected researches into the different species of memory. In very little time I became acquainted with a considerable number of persons, who had an excellent memory for certain objects, and a very feeble memory for others. These observations led me to augment the number of my denominations for memory, and I admitted a peculiar memory of tones.

While occupying myself with these researches, I did not fail to perceive, that the individuals, endowed with an excellent memory of tones, were ordinarily good musicians, and sometimes composers in this art.

This observation led me to conclude, that the denomination, *memory of tones*, was too limited; that it does not express all that constitutes the talent of the musician; that the sphere of this talent extends much beyond the memory; that it comprehends all which regards the relations of tones. I therefore adopted the expression, *faculty of the relations of tones*, an expression which refers the manner, in which the intellect of the musician brings into operation the relations of tones, to the mode of action of the senses in general.

I was fully assured, that the talent for music was not dependent on the aggregate force of the intellectual faculties in general; but that it belongs to an individual, fundamental faculty, and has consequently a particular organ. I had then to reflect on the means of discerning this organ; for, it is only when the seat of an organ is discovered, so as to leave no doubt upon the subject, that I can consider myself secure from all the specious reasonings by which others would combat its existence.

I applied myself to observing the heads of musicians. Chance so ordered, that I met with several, in whom the superior lateral part of the forehead was very narrow, and the temporal part, on the contrary, very broad; whence it resulted, that their foreheads formed a segment of a truncated cone. At this period, I was not far enough advanced in my observations, to seek the external mark of each particular faculty in a determinate region of the head. I therefore thought, for some time, that a forehead, in the form of a segment of a truncated cone, was the external sign of musical talent.

But soon I had an opportunity to see great musicians, Beethoven, Mozart, the son, Kreibig, &c., who had the superior part of the forehead large and prominent; which made me renounce my idea, that a forehead formed like the segment of a truncated cone, was the characteristic sign of a talent for music. It was not difficult for me, at Vienna, to observe a great number

of musicians, among whom were some of the highest merit. I moulded the heads of several of them, in order to be able to make these comparisons more easily. I finally succeeded in discovering a region, in which all musicians, endowed with inventive genius, have a prominent projection, produced by the subjacent cerebral mass.

The better to establish my discovery, I endeavoured to ascertain the counter proof. I observed children and adults who manifested no taste for music, some of whom, in fact, gave evidence of antipathy to it. In all these individuals, I found the same region of the brain absolutely flat. Finally, I procured for myself the skulls of some great musicians, and their examination at length convinced me, that my discovery, relative to the faculty of the relation of tones, was absolutely exact. After this, nothing prevented my professing this truth publicly. I am going to lay open to my readers the natural history of the faculty of the relation of tones, both in animals and in man; after which I shall explain in detail, the proofs of the existence of this fundamental faculty and its organ.

Natural History of the Faculty of the Relation of Tones in Man.

The innate forces of man have manifested themselves at all times. Song has also been in all ages, one of the favorite amusements of the human race. Music and song are not the inventions of man; the Creator has revealed them to him by the aid of a peculiar organization. By means of his organization, man is placed in relation with the laws of the vibrations of bodies, as the painter is with the laws of colors. There exist without us certain laws, according to which sonorous vibrations are produced and propagated. The experiments of Chladni have rendered sensible to the eyes some of the laws of these vibrations,

If we cover with fine sand a plate of glass or metal, hold it by one of its points, and make it tremble by means of a blow from a fiddle-bow applied to one or another of these points, we can decide beforehand, that the sand, arranging itself in a manner foreseen, will form this or that determinate figure. The vibration of the molecules of the disk gives rise to this or that regular figure, according as the point to which the bow is applied, and that which is sustained, vary. The reader will be able to see the farther experiments, by aid of which this philosopher demonstrates the laws of the vibrations of bodies, by referring to the treatise on acoustics which he has published. It is on these laws of vibration, that tones are founded, which are subordinate and coördinate among themselves, according to fixed laws. On the supposition that man must necessarily be sensible to music, it would follow, that he must be endowed with an organization, that places him in relation with all the laws of music, that he should possess an organ on which these laws are impressed, and which should, to a certain extent, represent their type. Wherever the organ is wanting, there exists no relation between the animal and the tones. Where the organ exists, the animal or the man is agreeably affected by harmony, and disagreeably, by the discordance of tones. When this organ has acquired a certain perfection, the animal or the man not only perceives and judges well the relations of the tones, but also creates within himself relations and successions of tones, which please the more, as they are more conformable to the external laws of vibrations, and to the organization of other individuals.

The following observations will convince the reader, that the faculty of tones is a proper and independent faculty, and, consequently, supposes a particular organ.

There are frequent examples of this faculty having existed, in a high degree of activity and perfection, from the tenderest age. Handel had hardly begun

to speak, when he attempted to compose music. His father banished all the instruments from the house, yet he soon found means to exercise himself. At the age of ten years he commenced a series of sonatas in three parts. Piccini, from his tenderest infancy, showed such a decided taste for music, that he could not see a harpsichord without starting. Mozart, sen. travelled through Europe at the age of six years, playing on the piano, not only with great power of execution, but with soul and taste. Mozart, jr. studied composition at the age of twelve years, under the famous Streicher. Another prodigy is the famous Desales, a child of twelve or thirteen, who played a concerto on the violin, beset with difficulties, with a vigor and address altogether extraordinary. This child felt strongly what he executed; his style was grand and full of energy. Mademoiselle Bills, of Bruchsal, then seven years old, began taking lessons in music from her father, towards the end of Dec. 1799, and, from the month of April, 1800, began to give concerts at Paris. Crotch, from the age of two years, discovered an extraordinary talent for music. Crouchby played on the harpsichord at the age of three years, and gave evidence of disapprobation at each false touch; at the age of six years he was a virtuoso. Every body knows the brothers Pixis, of Manheim, and many other similar precocious geniuses.

Mademoiselle Leontine Fay, and the child who plays Richard III. at London, have found a rival in the young Hungarian, Baron de Praun. This young man is hardly ten years old, and he has already astonished the Romans, among whom he passed some months, not only as a virtuoso by his success on the violin, but also by his astonishing erudition. In a brilliant *soirée*, where was found united all that Rome contains of distinguished *savans* and artists, the young de Praun, after having executed the most difficult concertos of Rhode, with a taste and precision which astonished Paganini himself, sustained a scientific

examination, and resolved more than a hundred questions, which were addressed to him by the professors of the archi-gymnasium. His Holiness, wishing to honor the precocious talent of this new Pic de la Mirandola, has just named him knight of the golden spur, and count of the sacred apostolic palace. The archi-gymnasium has likewise decreed to him a gold medal.

Such prodigies are, ordinarily, in every other relation except in that of their peculiar talent, children like others; which proves, that the faculty by which they distinguish themselves, as well as its organ, are independent of all the other faculties and all the other organs, and that we must recognise it as a peculiar power.

Individuals, endowed with a great development of the organ of the faculty of the relation of tones, born, consequently, for music or for song, often excel, without any previous instruction, in any kind of music which they are able to execute. Such a peasant is a virtuoso by his manner of whistling; a leaf from the linden tree, a straw, are the instruments on which he surpasses his comrades; a milkmaid leads the singing at church; a beggar charms beneficent souls by his ballad.

Activity of the Organ of Music in Idiocy and in Mental Alienation.

In certain cases both of mania and of idiocy, where all the other qualities and faculties of the soul are deranged, this manifests itself almost in a state of integrity. A girl of fourteen years sang with precision forty songs, all which she knew by heart; she was, however, in such a state of idiocy, that she ate plaster and charcoal, gnawed bones like a dog, and made efforts to devour whatever fell into her hands. A lady, who usually never sang, became insane in consequence of lying-in; during her insanity, she sang

without interruption for several weeks, and sometimes her singing was singularly melodious. Spurzheim relates a similar fact, observed in England. Would it be right to conclude, that there exists a relation between the womb and the organ of music? I have already spoken elsewhere of a young boy, who remained two months deprived of the consciousness of his own existence, and who, during this period, sang all the ballads which he had before learned. Pinel speaks of a mad musician, in whom, from the time of his convalescence, a confused recollection recalled his favorite instrument the violin. It was given him, and he regained in a few days his previous superiority. It is to be remarked, that this musician still held at the same time the most rambling discourses, often spoke only by monosyllables, which he mixed with leaps, dances, and gestures the most senseless and the most absurd. I have seen a madman who gave lessons on the violin. It is too well known, in the insane hospitals, that certain maniacs trouble the repose of all the neighbourhood by their perpetual singing. Cabanis remarks, that he has known certain persons, who, always singing false in a state of health, sang justly by accident in the paroxysms of fever or in certain extatic desires.

External Appearance of the Organ of Music in Man.

In order to make observations on this organ, it is necessary to avoid confounding with real musicians those persons, who from habit have a great facility for playing on an instrument. Frequently they pretend to tell me, that I ought to find in certain persons, especially certain ladies, an organ of music greatly developed; and I find nothing but the habit of execution. Such performers betray themselves by the character of their playing, which is rather the work of the fingers than of their minds. Their countenance

expresses nothing of that abandonment, of that sweet delight, which penetrates the whole soul of the true musician.

Thus far I have seen the organ of the faculty of the relations of tones greatly developed in all the musicians, who are composers in their art; it assumes two particular forms. Either the external angle of the forehead, placed immediately above the external angle of the eye, enlarges itself considerably toward the temples, in such manner, that in this case the lateral parts of the forehead overlap the external angle of the eye, in which case all the frontal region above the external angle of the eye, as far as the half of the height of the forehead, is considerably prominent; or there rises immediately above the external angle of the eye, a prominence in the form of a pyramid, the base of which is supported above the eye, and the point extends to the external anterior edge of the forehead, as far as the half of its height. Hence it happens, that musicians have the lower part of the forehead either very broad, or square. The celebrated drawer of animals, Tischbein, at Hamburg, without thinking of the existence of an organ of music, had made the same remark on the heads of great musicians. They have ox fronts, he tells us. Frequently the foreheads of musicians appear much swollen above the external angle of the eye.

Mozart, father and son, Michael Haydn, Paër, MM. the brothers Naderman, Dussek, Pl. LXXXVI. fig. 1; Marchesi, fig. 2; Viotti, fig. 3; Blasius, Daleyrac, Delavigne, Zumsteeg, Crescentini, are examples of the first conformation. Beethoven, Lafont, Neukom, Joseph Haydn, J. J. Rosseau, Benucci, fig. 4; Grétry, fig. 5; and Gluck, fig. 6, of the second.

I have, as yet, no idea of the difference of talent which results from this difference of conformation. It is, however, to be presumed, that a musician, who should be at the same time instructed in organology, would discover a difference in the talent of music; it

is certain, that one or the other of these two conformations is constantly met with, in all persons endowed with great musical genius.

I know personally a great number of musicians celebrated either for song or for composition. I have carefully examined the ladies Mara, Sessi, Canabich, Schmalz, Gail, Bigot, Catalani, Barilli, Bertinotti, Voitus, Bills, Albert, Pasta, Fodor, &c., &c., MM. Krebs, Himmel, Reichard, Glœgle, Gara, Dulong, Boyeldieu, Galli, Rossini, Lays, &c. In all of them, the development of the cerebral part indicated, is so full, that, if we could arrange all their busts in one line, the most indifferent observers could not fail to convince themselves, that this is the constant and characteristic mark of musical genius.

Neither have I ever met an exception in the portraits or busts of great composers of music, of whom there remains to us nothing but the works. Examine the busts of Haydn, Gluck, Mozart, Grétry, Lulli, Sacchini, Rameau, Philidor, &c.

At Vienna, an ecclesiastic came to see me, and without being willing to give his name, begged me to instruct him in organology. After I had explained to him its general principles, he ased to see some organs. I showed him several, as well in sculls as in casts. On coming to the organ of locality, I told him, that he was endowed with it to a high degree, and that he must be very fond of travelling: he told me, with joy, that he actually was so. When I affirmed, that he had also the organ of the faculty of numbers and of mathematics greatly developed, he threw himself from his chair, and told me that he was professor of mathematics. "Yet," I continued, "you would have distinguished yourself still more in music, especially in the theory." He then sprang on my neck, and told me that he was the abbé Vogler. He has himself related this anecdote in all societies, which has made him a zealous proselyte to organology.

A lady had become insane in consequence of a blow

received on the occiput; her relatives requested me to observe two large prominences which had grown out, they said, since her disease, on the lateral parts of the forehead. These prominences were only the organs of the faculty of music, become more apparent because she had lost her flesh. I learned afterward, that they deplored the misfortune which had happened to this lady, especially on account of her great talent for music. In treating of the faculty of localities, I have related a similar example.

The organ of the faculty of music is formed by the convolutions xx. Pl. VIII. x. plaited in zigzag, the folds of which regularly diminish; they form a pyramid or cone, the base of which is placed immediately above the external angle of the orbitar plate, and rises to an inch or an inch and a half. When these convolutions are much developed, especially in their inferior part, it follows, that the brain and the cranium become larger in the region which they occupy; the external part of the superior orbitar wall is completely filled by the cerebral mass: there is then, in the cranium, only a small part of the external orbitar wall which is found placed without the brain, a circumstance which enables us very easily to distinguish the organ of the faculty of tones on the cranium. Pl. LXXV. represents the cranium of Kreibig, a celebrated violinist, who played habitually with the Emperor Joseph II., in whom likewise the organ of music was very well developed. What a difference between this head and that of Pl. LXXVI!

This explains why the negroes, the inhabitants of Otaheite, the Spaniards, the French, and the English, furnish a much smaller number of great musicians, than the Italians, Bohemians, and Germans. The heads of these last are generally broader in the region referred to than those of other nations. See the narrow head of a negro of the Cape of Good Hope, Pl. XC. Must we again attribute these differences to the influence of climate?

I know, however, some negroes, who from their infancy have had a passionate fondness for music, and who evince a great musical talent. All these negroes have the inferior exterior part of the forehead, placed above the eyes, very large. Pl. xci. represents the head of a Congo negro, who learned music of himself, and executed it on almost all the known instruments. No one will deny that the Russians, Spaniards, French, and English have great musicians; and, on the other hand, there are among the Germans and Italians individuals, in whom the organ of music is developed to so feeble a degree, that, far from finding pleasure in music, they have even an antipathy to this art. Lessing and Tischdein are remarkable examples of this.

The organ of music, as happens likewise with all the other organs, is modified in a different manner in each individual, though essentially it is the same organ in all. The different individuals of the same species of birds have each a note differing a little from that of the other. Thus the music of Mozart, of Leo, of Jomelli, of Pergolesi, of Durante, Martini, Cimarosa, has a different character from that of Gluck, Haydn, Cherubini, Boyeldieu, Spontini, Mehul, Nicolai; and all vary among themselves. Baillot, Boucher, Rode, and Lafont, though all four excellent violinists, offer, however, great modifications.

The character of the composition of each musician is determined by the greater or less development of other organs, which accompany that of music. When the considerable development of the organ of music coexists with a great development of the organ of murder, it produces a predilection for warlike music; when coexisting with a development of the organ of theosophy, it produces a predilection for church music, &c. Musicians by applying these principles, will be able to account to themselves for their individual taste, and for the proper character of their compositions.

It appears to me, that men who are capable of de-

ducing the laws of composition from the laws of sonorous vibrations, and from the relations of tones, and of thus establishing the most general principles of music, ought at the same time to be endowed with an organ of numbers very much developed; for, the exercise of this degree of musical talent requires, without question, much calculation; moreover, the inferior convolution of the musical organ, the largest of all, is immediately continuous with the organ of numbers. This explains why one may be an excellent musician, and not have the talent of composition, or be a great composer, without being at the same a great musician.

We have seen, that this organ does not always follow the usual course in its development. It acquires, commonly, a precocious development in subjects endowed with very great musical talents; and I saw it so developed in a little girl aged two years, that it was not difficult to me to predict the astonishing progress which this child has since made in music; but I also know a case, where it began to develope itself only at the age of seventeen.

I here quote a passage extracted from Memoirs, or Essays on Music, by Grétry, published in the year V. In this passage, Grétry speaks of his innate taste of the instinct which drew him towards music. Perhaps it might be inferred, that a wound contributed to the development of his musical organ.

"If during these miserable years I did not wholly waste my time, if I made any progress in music, if I gained any trifling knowledge, I did not obtain this advantage from the lessons of the instructer, but in spite of them; for, if any thing had been capable of destroying in me that innate taste, that instinct which carried me towards music, I dare affirm it was the manner adopted to teach it me.

"*I must here speak of an accident which I think has influenced my organs in regard to music.* I may be in an error, but it is certain, that no man would dare affirm the contrary.

"In my country it is the custom to say to children, that God never refuses them what they ask the day of their first communion. I had long since resolved to ask him, that he would cause me to die on the day of this august ceremony, if I was not destined to be an honorable man and distinguished in my profession. That very day I was threatened with death.

"Having gone after dinner, on the towers to see the wooden clocks strike, of which I had no idea, there fell on my head a rafter, weighing three or four hundred pounds, and I fell down insensible.

"The church warden ran to the church to seek the *extreme unction*. I came to myself during this time, and with difficulty recognised the place where I was; they showed me the weight I had received on my head. Come, said I, putting my hand on it, since I am not dead, I shall be an honest man and a good musician. They supposed these words to be the effect of my confusion. I appeared not to have any dangerous wound; but on reviving, I found my mouth full of blood. The next day I observed, that the skull was beaten in and the cavity still exists.

"I had perhaps arrived at the period when the character changes; but it is certain, that I became all at once an habitual dreamer; my gaiety degenerated into melancholy; music became a balm which consoled my sadness; my ideas were more clear; and my vivacity returned only at intervals."

Several times, persons who had applied themselves to music with unusual ardor, and long in succession, complained to me, that they experienced pains and spasms in the external inferior part of the forehead. The reader will easily explain to himself, why a long continued application to music provokes pains and spasms rather in the region referred to, than in any other. A lady spoke to her singing master of the organ of music. She could not designate the place to him, when the master said to her; "If there is an organ of music it is there, placing his fingers; it is

there when I compose, that I experience a painful sensation; when an idea does not come to me, it is there that I carry my hand."

I asked Mr. Berton what he felt, after having composed a long time with great application? He answered me, that he felt a great void in his head, and while saying this with a certain air of embarrassment, he carried both his hands to the two organs of music.

All, I have hitherto said on the faculty of music and its organ, leaves no doubt, that the faculty of music is a fundamental quality, and that this faculty is founded on a particular organ.

Natural History of the Faculty of Music, and of its Organ, in Animals.

There is not a single mammiferous animal endowed with the sense of music, to the extent of being able to sing itself, or even of repeating the notes which it hears. Thus the skulls of this class of animals are smaller than that of man, in the region where the organ of music has its seat. Their orbits are placed either half or wholly outside the brain. Either there exists no orbitar plate, or there is only the internal part situated toward the cribriform bone or the nose. It follows, that the mammifera are destitute of a great portion of cerebral matter, which in man is found in this region, and which consequently must be destined to functions peculiar to the human race.

I will not, however, maintain, that certain mammifera are not endowed at least with the sentiment of the harmony of tones; the elephant, and sometimes dogs appear to hear music with interest. Camels, asses, mules, and even oxen, better support the fatigue of their accustomed work, when they are allowed to hear the sound of music or of singing; every body has seen dogs, bears, and Franconi's horses dance in time; but what is mentioned, in this respect,

of spiders and serpents, seems to me to belong rather to an agreeable impression which the vibrations of the air excited in them, than to a sentiment of harmony or of melody.

The greater part of birds have nothing which can be called singing. Some of them are endowed with the faculty of imitating a song, or a melody: of this number are the bullfinch and the tufted lark. In a few species, singing is common to both sexes; but the note of the female is always weaker, and less perfect. Almost always it is the male only that sings. Some have only their proper, well characterized note, as the *pinçon*, the goldfinch, the greenfinch, the nightingale, &c. Others, beside their proper note, have the faculty of imitating the note or the cry of the birds in their neighbourhood; as the different magpies, the *écorcheur*, the mocking bird, the mocking thrush (turdus polyglottus); others finally imitate the voice of man and other animals, and can be taught by various wind instruments.

How can we account for these differences? Whenever any animal has a quality or a faculty in common with man, he must also have the corresponding organ in the brain. Compare the brain and the cranium of singing birds, with that of birds which do not sing. In these last, the brain is less broad near the eyes; the cranium is contracted immediately above the eyes, or, the anterior superior part of the orbits; the orbits themselves are very large and oval; and in many species the brain does not advance to the eyes. Pl. LVII. fig. 1, 2, 3, 4, 5. LXXI. fig. 1, 2, 3, 4, 5, 6, 9, 10.

In the singing birds, on the contrary, the brain, and consequently the cranium, are broader toward the exterior anterior edge; hence it happens, that the orbits are rounder: for, the lateral depression, which exists in those who want the organ of music, is diminished by the development of this organ. Pl. LXXI. fig. 7, 8, 11.

To form a clear idea of this difference, let any one

place before him the crania of the grossbeak, by the side of that of the yellow canary, or of the goldfinch; that of the cuckoo, the rollier, by the side of that of the blackbird, the common thrush, or the starling.

After this, compare together the singing birds, either species with species, or individual with individual, always having regard to the greater or less perfection of their note. The cranium of the *pinçon* of the goldfinch, and of the redbreast, is not as broad in the region alluded to, as that of the nightingale and the mocking bird; that of the blackbird is less so than that of the thrush properly so called, (turdus musicus.)

To convince myself of the truth of what I have just advanced in relation to individuals of the same species, I have reared, for example, dozens of mocking birds; and, while they were still blind, I have placed near them thirty chosen singing birds, of different species. Some of my mocking birds learned to imitate the note of one only of their numerous masters; others imitated several; and some imitated them all with astonishing perfection. Both during their life, and after their death, a practised eye could distinguish by the inspection of their heads, the greater or less development of this cerebral part. The greater part of my auditors, after having a little practice, had acquired a facility for discovering these differences.

In those species in which the male alone sings, the male ordinarily distinguishes himself from the female in a manner equally striking. Place the cranium of a male nightingale by the side of that of a female, and you will always find the orbits of the female more hollowed, those of the male on the contrary more rounded; and consequently his head larger in the superior part, in the diameter from one exterior edge of the orbit to the other. Among the singing birds, the bird catchers recognise the male by this sign, that is, by this great breadth of the head above the eyes,

and thus distinguish him from the female which has the head narrower above the eyes. Still more, even among the males, those, which have the head broadest in the region referred to, have the most perfect note. In the choice of birds, I have always had reference to this sign, and it has never deceived me. This difference is sensible even in the yellow canaries; though the females learn by imitation, to repeat little pieces which they sing, yet always less perfectly than the males, and they usually forget them during the moulting season. I well know, that such observations require much experience, and great patience, and great perseverance. The adversaries of organology find it much easier to cut short the question, than to constrain themselves to make numerous observations, the result of which would expose them to the danger of being convinced of the truth of my doctrine, by the force of facts.

Certain persons, with the best intentions, can discover none of these delicate differences. Let such persons remember, that, in researches of every kind, it is necessary, in the first place, to learn by long practice to place a sure reliance on the senses. It is necessary to understand music, and to look at paintings. There are individuals who never learn to exercise their fingers in touching, or their eyes in seeing. Since Doctor Garden, in an article of the Journal on the *physiognomical system* of Spurzheim, has advanced, that even in the human cranium, there does not exist one of all those prominences, which we attribute to a considerable development of the brain, I should be wrong to complain of those, who cannot distinguish differences so minute in the heads of birds!

I can warrant to those who are willing to observe, and who are capable of making observations, that they will find all those which I relate, confirmed, and that the examination of the heads of birds, will equally convince them of the existence of an organ of music.

"The comparison," says Demangeon, "of lovers of music, and of musicians without tact or rhythm, as well as the difference of talents for symphony, harmony, and melody, also lead us to believe, that music cannot belong to a single faculty. Can it be believed, according to Mr. Gall, that the organs of music and of the generative energy are so distant from each other, and without any cord of communication between them, when we consider, that several animals sing only during their pairing; that the changing of the voice follows the progress of puberty," &c.

Has Demangeon already forgotten, that the generative energy has also its organ in the brain, and, consequently, the organ of music and that of the propagative instinct are not so distant from each other? Moreover, it is also in my work, that he has gained the knowledge of the relation, which exists between the development of the instinct of singing, of the genital parts, of the glottis, &c.

XVIII. *Faculty of the Relation of Numbers.**

There is no faculty which men think themselves better entitled to deduce from the intellectual forces taken collectively, than the disposition for arithmetic and for the mathematics generally. It is supposed,

* I know perfectly well, that the vulgar arithmetic, which itself is only a small part of the science of calculation, does not constitute all the mathematics, and that the synthetic method, which the ancient geometers employed exclusively, has nothing in common with calculation. I am not ignorant, that distinguished mathematicians have sometimes very little of the habit of numerical calculation. But, as I find the same cerebral part very much developed, as well in all persons who have a great natural facilty for calculation, as in those men who have enriched mathematical science with the most sublime discoveries, I think myself authorized to admit, that it is the same organ which gives to the young Colburn the facility of calculation in his head, to Pythagoras that of proving, that the square of the hypothenuse equals that of the two other sides of the rectangular triangle, and which enabled Laplace to write his mécanique celeste.

that the study most capable of exercising the judgment is that of mathematics. Nothing in this science, it is said, comes from without, every thing here is the work of the human understanding, every thing here is a real creation of attention and of the faculty of deriving consequences. There cannot therefore exist any peculiar organ for the faculty, by virtue of which a man has a great facility for arithmetic and for mathematics in general.

What I am going to say will show how far these pretensions are true or false.

History of the Discovery.

At Vienna, they mentioned to me a scholar of St. Pœlten, who was known throughout all the country, by his talent for calculation. He was the son of a blacksmith, and had received no more instruction at school than his companions; for every other purpose, he possessed about the same talent with them. I induced him to come to Vienna, snd presented him to my audience: at this period he was nine years of age. When they gave him three numbers, each expressed by ten or twelve figures, asking him to add them, then to subtract them two by two, to multiply and then divide them by numbers containing three figures; he gave one look at the numbers, then raised his nose and eyes in the air, and announced the result of his mental calculation, before my auditors had time to make the same calculation with their pens in their hands. He had created his method himself.

This boy astonished the inhabitants of Venice. An advocate came to testify to me his vexation, that his son, aged five years, was occupied exclusively with numbers and calculations, and that it was impossible to fix his attention on any thing else, even the sports appropriate to his age. I compared this child with the first; I could find no other resemblance be-

tween their heads, than a remarkable prominence at the external angles of the eyes, and immediately at the side. In one as well as the other, the eye was in a degree covered by the superior lid at its external angle.

These two examples of distinguished talents for arithmetic, and the coincidence of a similar conformation of the same region of the head, suggested to me the idea, that the talent for calculation might well be a fundamental faculty, depending on a particular organ; for, at this period, I had already made great advances in my theory of the plurality of organs.

I then sought out men distinguished by their talent for calculation. I first remembered counsellor Mantelli, whose favorite occupation was to invent and resolve problems of mathematics, and of arithmetic in particular. I found the same conformation of the head, in the region of the external angle of the eye. I went to see the Baron de Vega, author of the Tables of Logarithms, and then professor of mathematics, who in every thing, not immediately concerning this science, was a very ordinary man. I found again the same form of head in both. I examined families and schools, and had shown to me those children who distinguished themselves from their fellows by the talent for calculation. As I found the same external character in all, what could then prevent me from considering the faculty of numbers, as a peculiar faculty, and admitting a peculiar organ for this faculty.

Natural History of the Faculty of Numbers.

Man creates nothing. His intelligence is limited to the recognition of what exists. If one plus one necessarily equals two, and twice two equals four, it is not the talent of man which creates this necessity, but his talent acknowledges this necessity

as the result of eternal and immutable laws. The opposite angles of a parallelogram are eternally equal, whether this truth be discovered by a philosopher or not; and it is the same with all mathematical truths. If mathematicians justly take possession of optics, astronomy, music, &c., inasmuch as these sciences require the application of numbers, I ask, if the laws of the refraction of luminous rays, the laws of the vibrations of air and of sonorous bodies, the laws of motion in general, if these materials, which the mathematician puts in operation, have in the external world a real existence, independent of the mind, which conceives and combines them, or, if it is the genius of the mathematician, that creates them? If they have an existence, independent of the genius which submits them to calculation, which my readers will admit without difficulty, it follows, that there exists an external world for the talent of the mathematician, as for all other talents, and that his merit is limited to conceiving this external world.

Now, man must have received an organ for these objects, an organ by the aid of which he finds himself placed in relation with them; by the aid of which a particular series of laws is revealed to him. Without such an organ, it is impossible, that he should be instructed in the existence of these laws. When this organ has acquired a high degree of development and activity, these secrets are found in some manner unveiled before it. Man divines the external world, and the operations of this organ are in harmony with the true proportions of quantities, with the laws of refraction, of vibration, and of motion in general.

If it were otherwise, how could this talent be sometimes found to such astonishing perfection, in children and in men, absolutely of gross intellect? Independently of the two cases which I have related, the journals have spoken in a tone of admiration of a boy of seven years, named Devaux. He had a passion for going to all the fairs, and waiting for the traders,

at the moment when they had closed their accounts; and when they had been mistaken in their calculations, it was his greatest pleasure to discover the error.

The young Bidden, of Devonshire, aged only twelve years, had the honor of exercising in presence of His Royal Highness, the Duke of York, his astonishing faculty for the combinations of numbers. His Royal Highness and the persons present at this exercise expressed the greatest surprise, when they saw this child, without the aid of any figure, resolve all the problems proposed to him. He surpassed all that had been seen extraordinary in this department; and all kinds of calculation were equally familiar to him. He was the son of a poor laborer of Exeter, the father of nine children.

I saw in Paris the young American, Colburn, of whom mention has been made in the papers of the United States, and subsequently in the English and French Journals. I have moulded the head of this child, and had his portrait drawn. (Pl. LXXXVII. fig. 1.) I give a short notice in regard to him, which follows:

"This child was born in April, 1804, at Cabot, county of Caledonia, state of Vermont. He was not yet seven years old, when he was seen by Mr. Mc. Neven, who gives an account of this visit in the *Medical and Philosophical Journal and Review*, printed at New-York, 1811. In the ordinary course of life, Zerah appears in every thing like other children, by his frivolity and the puerile character of his amusements; but when his attention is entirely fixed on any subject, he then displays faculties very superior to his age, and when numbers are in question, superior, I think, to what could be expected from any age whatever. It was in August last, (1810,) that his father, hearing him repeat between his teeth some numbers, which he multiplied for his amusement, perceived his prodigious faculty for calculation. The attention which it excited, and the exercise given to

it in consequence of this attention, have, in a few months, singularly increased it. The promptitude of his answers on the questions of arithmetic proposed to him, is such, that he seems to answer from memory.

It cannot be doubted, however, that this promptitude is due to the rapidity of his combinations, for in calculations at all complicated, he is often heard to multiply, add, or subtract, aloud, and with incredible rapidity. He catches himself sometimes when he commits any error, and appears excessively mortified in consequence; but this scarcely ever happens to him. Mr. McNeven has heard him answer without the slightest appearance of hesitation, and without the least error, to the following questions: *Question.* What is the sum of 1347, 1953, and 2091. *Answer.* 5391. *Question.* What are the numbers, which, multiplied together, give 1242? The following solutions were given as rapidly as the words could be uttered; 54 by 23, 9 by 138, 27 by 46, 3 by 414, 6 by 207, 2 by 621. *Q.* What is the number, which, multiplied by itself, produces 1369? *A.* 37. *Q.* What is the number, which, multiplied by itself, produces 2401? *A.* 49; and 7 multiplied by 343 produces the same number. When the numbers were expressed by thousands and hundreds, he exclaimed with impatience, "Put them in hundreds;" that is, for 2401, he wished them to say twenty-four hundred and one. *Q.* What will 6 give, multiplied by itself 6 times? He calculated aloud in the following manner, as rapidly as he could speak; 6 times 6 make 36, 6 times 36 make 216, 6 times 216 make 1296, 6 times 1296 make 7776, 6 times 7776 make 46656, 6 times 46656 make 279936.

Q. how many hours in 26 years 11 months and 3 days? *A.* 226992. The person, who had addressed this question, was mistaken in the calculation he had made on his side; so that when Zerah answered, he thought it was he who had deceived himself. Zerah after a moment's reflection assured him, that it was

his own calculation which was right. The operation was repeated and the justice of his claim was allowed. Those, who questioned the child, had forgotten to bring into the account the difference of the leap years, and reckoned the last eleven months at thirty days. This forgetfulness reminds me of an anecdote of the same kind. They brought to D'Alembert a little shepherd, who had also an astonishing facility for calculation. "My child," said D'Alembert to him, "there is my age; how many minutes have I lived?" The child retired into a corner of the room, hid his face in his hands, and came a moment afterward to announce the reuslt to D'Alembert, who had not yet finished his own calculation. Having completed this, he finds that the two results do not agree. The child returns into his corner, repeats his calculation, and returns, assuring him, that he was not mistaken. D'Alembert verified his own. "But, Sir," suddenly answers the child, "have you thought of the bissextile years?" D'Alembert had forgotten them, and the little shepherd was right.

"As they proposed to him to multiply 123 by 237 his father objected that two triple numbers were too difficult. The child answered that he could multiply them, and kept his word; he even multiplied very promptly 1234 by 1234. Still it was seen, that difficult questions fatigued him, and he often begged, that they would not give him such complicated ones. While he answers, it is seen, by his appearance, the state of his eyes, and the contraction of his features, how much his mind labors.

"His physiognomy is very expressive; his forehead is small, but angular; the orbitar arcs (the eyebrows) considerably advanced; his eyes are grey, lively, and always in motion; his scull is arched and considerably broad; he has a small occiput, and red hair; he is singularly strong and large for his age; his motions are rapid, and he is slways in action.

"He has never been at school, and neither knows

how to read nor write. He was asked how he made his calculations. He answered, that he saw them clearly before him. He has yet no idea of fractions, and can reckon only in round numbers. He is the fifth of seven children, of whom no one is distinguished by remarkable faculties. His father, Abiah Colburn, was born with six fingers on each hand, and Zerah is the only one of the children, who inherits this singularity.

"Mr. McNeven, in speaking of Zerah Colburn, recalled another personage, Jedediah Buxton, known in the last century by an extraordinary talent for calculation, but unaccompanied with any sort of mind. Jedediah even seemed destitute of some of the most common feelings. Music offered to him only a confusion of sounds; and when carried to a play of Shakspeare, played by Garrick, he occupied himself merely in counting the number of words uttered by this great actor. Zerah Colburn, on the contrary, manifests much intellect; he is prompt at repartee, and sometimes sarcastic. Some days before the visit of Mr. McNeven, a woman had amused herself by asking him how much are three zeros multiplied by three zeros? 'Precisely what you are,' he answered; 'nothing at all.'

"It seems to us greatly to be feared," says Mr. McNeven, "that the efforts of attention, to which Zerah Colburn gives himself, may fatigue or disorganize this young head, and intercept whatever might be hoped from it, if left to the natural course of his ideas and developments." It is also possible, that these developments may be arrested by a new freak of nature which has produced them, or even that these extraordinary faculties may exhaust and destroy themselves.* McNeven quotes the example of Mr. Van R.

* See A Memoir of Zerah Colburn; written by himself: containing an account of the first discovery of his remarkable powers; his travels in America and residence in Europe; a history of the various plans devised for his patronage; his return to this country, and the causes which led him to his present profession (theology;) with his

of the village of Utica, also living in the United States, who, at the age of six years, distinguished himself by a singular facility for calculating in his head; at eight years, he entirely lost this faculty without knowing how. At this moment Mr. Van R. calculates like other people, with his pen in his hand, neither better nor faster than any other person, and does not retain the slightest idea of the manner in which he performed his calculations in childhood."

The young boy of St. Polten also told me, that he saw the numbers on which he operated, as if they were written on a slate. This is the place to speak of the talent of the daughter of Lord Mansfield, whom Spurzheim saw at London, when she was thirteen years old. This young lady almost equals Zerah Colburn; she extracts, with great facility, the square and cube root of numbers of nine places.

Who is there, that will seek in these children their great facility for calculation in the faculties taken collectively, in a general faculty of drawing conclusions? All these difficulties disappear the moment we admit a peculiar organ for the talent, by which these individuals are distinguished. In this hypothesis, we conceive, that the organ of numbers may, in certain cases, receive a premature development and extraordinary activity, just as those of the instinct of propagation, of music, &c.

Besides, it is by no means rare, to find the talent for calculation in persons, whose minds have not been developed. A shepherd of the Tyrol, Peter Annich, had made himself famous by his astronomical calcula-

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peculiar method of calculation." Published, 1833. Colburn gives the following account of his introduction to Dr. Gall, (Mem. p. 76.) "Dr. Gall, well known as the author of the system of craniology, was then in Paris, and by means of his tutor, Zerah was introduced to him, without the doctor's having any previous intimation of the character of his visitor. Being requested by Mr. C. he proceeded to examine the cranium of his subject, and readily discovered on the sides of the eyebrows certain protuberances and peculiarities, which indicated the presence of a faculty of computation." [Ed.]

tions. His reputation induced father Hell to go to seek him; when this philosopher questioned the shepherd on his preliminary acquisitions, he learned, with astonishment, that the latter did not even know the name of mathematics or of astronomy. It is twelve or fourteen years since a negro caused a great sensation in London by the astonishing calculations which he made.

Schubler, counsellor of regency at Stuttgard, introduced us to Martini Hæfele, vinedresser of Alfaltrach, three leagues from Heilbrun. This man, who, of his own accord, applied himself to mathematics, and especially to the higher departments of algebra, made astonishing progress in several branches of the practical mathematics. Afterward, there were given him the works of Kaestner and Karsten, which he devoured; for ten years he had been making researches tending to improve the differential and integral calculus. So much for the evidence, that the talent for mathematics is innate, and has no necessary connexion with the other intellectual faculties.

It may even be maintained, that this faculty can, like other dispositions, be transmitted from father to son during several generations. The family of Bernouilli furnishes an example.

Mathematicians, so born, like all men endowed with very distinguished talents, manifest this faculty very early, and are led on by an irresistible inclination to cultivate it.

Mathematics had always a peculiar charm for Pascal. Thwarted in his passion for geometry, he became only more ardent to devote himself to it. On the simple definition of this science, he succeeded in discovering, by his penetrating genius, as far as the thirty-second proposition of Euclid. At the age of sixteen years he published a treatise on conic sections. From geometry he passed, with the same facility, to the other parts of mathematics. He was hardly nineteen when he invented the *Roulette*, a singular arith-

metical machine, by which may be made all sorts of arithmetical computations, without pen, and without counters, and even without knowing arithmetic.

Galileo had, from his infancy, so strong a passion for mathematics, that he may be said to have been born a mathematician. Joseph Sauveur and Ozanam learned geometry without masters. Lalande, when hardly nineteen, was appointed commissioner of the academy to go to Berlin, to determine the moon's parallax, in concert with La Caille, who went to perform the same operation at the Cape of Good Hope. Tycho Brahe had, from his infancy, an extraordinary inclination for the mathematics. Euler, likewise, at an early period, was led by an irresistible inclination, to mathematics.

When this talent is predominant in an individual, all the other operations of the mind take their character from it. I know a physician, gifted with a great development of the organ of calculation, who endeavours to bring home the study of medicine, and even the virtue of medical articles, to mathematical principles. One of my friends, a mathematician and philologist, has long sought a universal language, likewise founded on mathematical principles.

Faculty of Numbers in the State of Disease.

Two persons of my acquaintance, every time they had been engaged several days in succession in difficult calculations, felt a pain in that region of the head where the organ of numbers is found.

M. de Lagny, all whose works manifest a great geometrician, being on the point of expiring, Maupertius asked him what was the square of twelve; the dying man answered without hesitation, an hundred and forty-four. I saw in the asylum at Vienna a madman, whose insanity had degenerated into idiotism. His only occupation was to count, but he always

stopped at ninety-nine; I tried in vain; I never could induce him to say an hundred; he always began again to count one. Mr. L. A. Gœlis, in his excellent treatise on acute and chronic hydrocephalus, thus expresses himself: "The physiologist, will never explain how, by the side of a complete destruction of all the faculties of the soul, a single faculty may manifest itself in all its force. The son of a farrier, although stupid in every other respect, still, at his twelfth year, manifested an astonishing memory of numbers and a peculiar benevolence. These two qualities disappeared in proportion as his disease, the hydrocephalus, increased."

These are certainly unanswerable proofs, that the functions of the organ of numbers are independent of those of the other organs.

Seat and external Appearance of the Organ of Numbers.

The organ of the faculty of numbers is formed by the convolution XIX. Pl. IV. V. VIII. XIII. This convolution is a continuation of the lowest convolution of the organ of music, and it is placed on the most external lateral part of the orbitar plate, in a furrow or depression, which is the direction from before backwards. When this convolution has acquired a very favorable development, the external part of the plate is found depressed by it, in such a manner, that the superior orbitar arch is no longer regular, except in its internal part, and its external half represents a straight line, which decends obliquely. Pl. LXXXVII. fig. 3, portrait of Monge. Hence it follows, that the external part of the eyelid is depressed, and conceals the corresponding part of the eye. This character is still more infallible, when the external part of the orbit is found at the same time removed outwards, so that the salient angle of the superciliary arch extends

beyond the anterior parts of the temple, as is seen in the cranium of the celebrated mechanician, Voigtlænder, Pl. LXXXVIII. But this projection does not exist, when the lateral parts are rendered very prominent by a great development, either of the organ of music, or of that of construction.

After having acquired an exact knowledge of the form and place of this organ, let any one observe those men, who have distinguished themselves in the mathematics, by their creative genius. I know, personally, a great number of living mathematicians, and I have studied the busts, portraits, and engravings of many others. I find in all, without exception, the organ I have just described. Examine the portrait of young Colburn, Pl. LXXXVII. fig. 1. In him, the external part of the orbitar plate is so much depressed and pushed outward, that this conformation has not escaped the author of the first notices on this young man, inserted in the American journals. Let any one observe the busts and portraits of Euclid, Archimedes, Galileo; Pl. LXXXII. fig. 3; of Kepler, Newton, Leibnitz, Peter Gassendi, Huyghens, Sully, Descartes, fig. 5; of Euler, Roberval, Lagny, Bernouilli, Lagrange, Laplace, Tralles, Lalande, fig. 4; of Herschel, Olbers, Bessel, Boetzenberg, Egmeyer, Monge, Carnot, Jedediah Buxton, Pl. LXXXVII. fig. 2; of Bürgss, Body, of Messrs. Prony, Arago, &c.

When we know the physical conditions, under which the talent for mathematics has thus far constantly manifested itself, it may be concluded, without fear of mistake, that it will always manifest itself cereafter under the same conditions.

Some physicians of Paris, in order to try me, brought me three boys, one of whom was distinguished by an extraordinary facility for calculation; hardly had these children entered the room, when I pointed out the calculator.

It is not necessary to say, that the faculty of numbers and of magnitude, will find a different applica-

tion, according as it is accompanied by some organs greatly developed, or by others. It is according to these variations, that he who is endowed with them will be a geometrician, geographer, optician, astronomer, mechanician, maker of mathematical instruments, or composer of music. There is not, perhaps, any great composer, who is not endowed at the same time with the organ of the faculty of the relation of tones and that of calculation.

Usually, this organ is less developed in women than in men. Yet there exist examples of women who had great facility for calculation, and who have distinguished themselves in mathematics. Negroes have rarely strong dispositions for calculation and mathematics; accordingly their heads are almost always narrow, compressed in the region of the organ of calculation. Dr. Spurzheim believes, that the organ of numbers is generally developed in the English. Is this development the consequence of habitual exercise, or does the taste for commercial speculations belong to the development of this organ?

There exists, at Paris, a man whose intelligence, it is true, is in general limited enough, but who is so destitute of the talent of combining numbers, that it has always been impossible to make him comprehend that two and two make four, or that two and one make three. I have taken a cast of the head of this man, which is remarkable for the almost total want of development of the organ of the faculty of numbers.

Are Animals endowed with the Faculty of Numbers?

I will not decide whether animals count; whether they have a determinate idea of numbers.

"Beasts count, that is certain," says Leroy, "and although till now their arithmetic appears limited enough, perhaps one might give to it greater extent. In countries where they preserve game with care,

they make war on the magpies, because they carry off the eggs and destroy the hopes of the progeny. They therefore carefully mark the nests of these destructive birds; and in order to annihilate the ravenous family, they endeavour to kill the mother while she sits. Among these dams there are some restless ones, who desert their nests as soon as any one approaches. Then they are obliged to make an ambush well covered, at the foot of the tree on which the nest is, and a man places himself in the ambush to await the return of the sitting bird; but he waits in vain. If they have failed to kill the magpie in the first attempt, she knows, that the thunder must come from the cave where she has seen the man enter. While maternal tenderness keeps her sight fixed on the nest, fear deters her from it, until night can secure her from the fowler. To deceive this unquiet bird, the plan has been adopted of sending to the ambush two men, of whom one placed himself there and the other appeared; but the magpie counts, and keeps herself still away. The next day three go, and she sees that only two retire. Finally it is necessary, that five or six men going to the ambush put her calculation at fault. The magpie who believes, that this collection of men has only passed by, returns without delay. This phenomenon, renewed every time it is tried, must be placed in the rank of the most ordinary phenomena of the sagacity of animals."

Dupont de Nemours even maintains, that the magpie counts up to nine.

It is thought, that the hen counts her eggs, and the bitch her pups. It is certain that the bitch perceives when one of her young ones has been taken from her. But I do not suppose, that for this purpose she has any need of counting them. When we find ourselves in a company of few persons, and some one has retired, we perceive his absence without having counted the number of persons; the bitch might likewise have perceived the absence of one of her young, for the sole reason, that she knows each of them individually.

On the Faculty of Time. (*Zeit-sinn.*)

There are persons who have a great facility for retaining dates and epochs. They know the day of births, marriages, deaths, the epoch of all events, even the least remarkable. They commence all their stories by mentioning the year and the day. What they best know of history, is the periods. The jesuit Denis Peteau applied himself especially to chronology, and gained a name in this department, which eclipsed that of almost all the sages of Europe. In his portrait, the organ of numbers is very apparent. The senior Degmayer, at Augsburg, is generally known by his facility for retaining the dates of all events, the days of births, marriages, deaths, &c. From his infancy he had a decided inclination for mathematics; he has also the external mark of it very decided. I ask if this faculty belongs to that of numbers, of calculation, or whether it is necessary to seek for it a particular organ?

There are persons who in lying down are able to fix exactly the time they wish to sleep, and awake precisely at the moment they had fixed. Certain musicians, though they have a great talent for music, can never keep time: others, on the contrary, without having a talent for music, never miss it; so that this difference seems to constitute an essential difference between musicians. There are also individuals who have no perception of the rhythm of verses without rhyme. We see persons who find amusement in a collection of watches and clocks, and must have them all go with the greatest exactness. It appears, that there is no idea of time with those insane persons, who remain days and weeks fixed at the same place. A madman at Vienna had but one fixed idea, namely, that it was always the 17th of October. It often happens in mental alienation, as in other grievous diseases, that the idea of time is completely destroyed.

When these patients recover, they begin to count the time from the moment, when they regained the distinct perception of their existence. After twenty-seven years of seclusion and of mania, a lady experienced a revolution favorable to her moral state. Her delirium and madness continued during this space of time, to the extent of tearing her clothes, of remaining naked, &c. At the moment of the cessation of her delirium, she appeared to come out as from a profound dream, and asked after two young children which she had previous to her alienation, and could not conceive, that they had been married several years previous.

Can animals measure time ?

"Animals," says Buffon, "can have no idea of time, no knowledge of the past, no notion of the future."

C. G. Leroy has already well refuted this assertion of Buffon.

What constitutes in us the measure of time, is the succession of the ideas or sensations with which we have been struck, and which leave some trace in our memory. It is certain, that animals having fewer ideas than we have, there must be fewer degrees marked on the scale with which they measure time; but they must necessarily have some idea of it, since they foresee and mark its periodical returns.

All animals which rise at certain hours to eat, and there are many, are faithful to them, not however as a clock which strikes the hours, but with the modifications, which the circumstances of the season or even of the day may occasion in their will.

When the ground uncovered by the harvest now completed, has forced the pheasants to collect in the covers in which they are kept, that is about the first of September, they live collected in flocks, and then they leave the wood twice a day to seek their food, which is called going to pasture. Nearly all start together at sunrise. When the sun begins to appear above the horizon, they soon finish their repast, there being an abundance of food, the heat which is felt, invites

them to return to the woods. They leave them again between five and six o'clock, and their supper continues until sunset. If the heat is less intense, and provision less abundant, they take their departure so much the earlier. When food becomes scarce, and the days are shorter, the pheasants go out only once a day, between nine and ten o'clock, and their meal continues until sunset. How should these birds execute these regular processes, if they did not measure the intervals of time?

The red partridges, though less intimately united, have the same habits as the pheasants: and the experienced fowlers know whether to look for them in the woods or the plains, according to the hour. Rabbits have this peculiarity, that the experience of the past gives them in some respects, in a more marked manner, a knowledge sufficiently correct for the future. During the summer they usually go out of their burrows some time before sunset, remain out a part of the night, and rise again generally about eight or nine in the morning, when it is not warm. But if you find almost all of them gone out, at two or three in the afternoon, if they eat very eagerly, if the attention they give to this, makes them more bold and less cautious than usual, you may be certain, that it will rain in the evening or in the night. The marked avidity of the rabbits is therefore an act of prudence; that is to say, in consequence of a sensation, which they have experienced and which they still experience, they judge of the future by the past.

Domestic animals have likewise a measure of time. The knowledge of the past enables them to judge of the future. The hour for their supply of grain is marked by the impatient neighing of the horses. Those who are either feeble or of vicious disposition, do not fail to make the greatest efforts to pass out of the places, where they have been accustomed to repose. They have therefore the consciousness of their past existence. Dogs, especially those ac-

customed to be led to the chase at an early hour, announce the moment by cries of impatience whenever any delay occurs. That of the departure is hailed by the liveliest cries of joy. The hunter is often annoyed by them, and has much trouble to control their impatience, especially when armed with his gun, he intimates to them the return of the sport of which they have so lively a recollection. Who does not know, that dogs and all domestic animals mark with impatience the moment, at which they are accustomed to receive their food? It is certain therefore, that they measure time.

But is there a peculiar organ for this measure, and where is its seat? Spurzheim is inclined to think, that its organ is placed above that of order, and near melody, to which it furnishes especial aid. When we shall have collected numerous observations of persons, who devote themselves with ardor to the pursuit of chronology, to time and dates, and carefully compound them with those made on the arithmeticians, we shall be better able to form a judgment in this matter.

XIX. *Faculty of Constructiveness.* (*Kunst-sinn, Bau-sinn.*)

History of the Discovery.

The same thing has happened to me respecting the faculty of constructiveness and its organ, as in regard to the faculty and organ of music. When I was first engaged in this subject, I was not fully persuaded, that each quality and each faculty depended on a particular part of the brain. It was this which induced me to give my attention to the whole form of the head of great mechanics. I was often struck by the circumstance, that the heads of these artists were as large in the temporal region as in that of the cheek-bone. This was not indeed a positive sign, but I often found it, and I was at last more and more convinced,

that the faculty of mechanism is also a particular fundamental faculty.

I applied myself principally to discover a certain external development. I every where sought to make the acquaintance of distinguished mechanicians: I studied the form of their heads and moulded it. I soon met with some, in whom the diameter from one temporal to the other was much more considerable, than that from one zygomatic arch to the other. I finally met two very remarkable mechanics, in whom the temples were swollen into a large round cushion. These heads convinced me, that it is not the equality of the temporal and zygomatic diameters, which determines the genius for mechanics, but rather a large rounded protuberance placed in the temporal region, sometimes immediately behind the eye, sometimes a little above it. When I had assured myself of the seat of the organ and of its external appearance, I multiplied my observations; wherever I cast my eyes I found, both in our species and in animals, the most undeniable proofs, that the faculty of mechanics is a fundamental power. I will proceed to indicate the proofs.

Natural History of the Faculty of Constructiveness in Animals.

The tissue of the snail, the web of the spider, the hexagonal cells of the bee, the subterraneous galleries of the ant, of the mole, of the rabbit, the nests of birds and of the squirrel, the cabin of the beaver, &c., are so many masterpieces. What is the power which has created them?

The dog and the horse, so superior in many respects to the animals I have just named, have never, even in the moments of the greatest distress, manifested the least trace of instinct for building, or of any mechanical aptitude whatever. What, then, is the power which suggests to beings, so limited, the most inge-

nious means for their own preservation and that of their family?

Instinct? yes; without doubt an instinct; that is, an internal impulse; but it is not that instinct, which is the usual resource of closet philosophers and naturalists, in love with their own speculative ideas. It is a particular instinct, absolutely independent of every other species of internal impulse, and calculated expressly according to the peculiar relations, in which the animal is placed with the external world. The tissue of the snail is to secure it from the rain and the cold; the spider's web is to secure him his victim; the subterranean galleries of the mole are to serve for refuge and abode to her and her young. It was therefore necessary, that the organization of these beings should be in accordance with their wants, and reveal the primordial type of the works, which they were to execute abroad. Here again, therefore, there exists the same harmony between the laws of the external world and the internal organization of the animal, as in all the other fundamental qualities and faculties; here, again, we see in a small living organization, the type or the impress of a part of the external world.

Such is the only reasonable idea of the innate mechanical aptitudes. What would it avail the swallow and the thrush, to knead with water the clay which must give solidity to their nests, if the clay in drying was reduced to dust? It were in vain for the magpie to surround her nest with thorns, if the thorns did not prevent her enemies from approaching. It is the harmony, between the mechanical aptitudes of the animal and the objects without, which alone enables them to secure their existence against the dangers, which threaten them.

The action of this faculty, even in animals, is not subjected to the laws of a blind necessity. They vary, according to circumstances, the structure of their nests, of their galleries. The squirrels greatly modify their nests, and especially their habitations, in winter:

they vary in the choice of different materials, which they know each time how to bring into use in conformity with their purpose. In certain species, the mechanical aptitudes are reduced to inaction by captivity, and even by circumstances of little importance.

In others, they continue to manifest themselves, in a manner irresistibly, even under the most unfavorable circumstances. I have seen a weaving bird confined in a cage, who, at all seasons, interlaced the bars of his prison with hemp. The beavers, fed at Heilbrun near Salsbourg, and at Nymphenburg near Munich, chew branches of willow, amass them together, and cover them with mud.

What confirms the idea, that the aptitude to build is a particular faculty, is, that not only certain mammifera construct buildings for themselves and their young, and others do not, but that the same thing takes place among birds; the greater part of these last, it is true, build nests; but several, such as the horn owl (strixotus L.), the [effraie] (strix flammea L.), the screech-owl (strix ulula), the oyster-bird (hœmatopus ostralegus L.), the little sea lark of Buffon, do not build.

It is probable, that the climate exercises a peculiar influence on the organ of the instinct of building, as on several other qualities or faculties. It is maintained, that the beaver, which inhabited Gaul, did not build. The Lapland and Rusian beavers are content, as it is said, to dig two burrows, one above the other, below the level of the water, and to make a gallery between them. They assert, that in certain countries the cuckoo builds a nest, and hatches its young itself. But it is reasonably asked, if, in these cases, there is a certainty as to the identity of the species, or if it is really the result of the influence of climate? Is it true that the bees, which were transported to Barbadoes and into the other islands of the Levant, ceased to make honey after the first year, because they found, that it was not necessary to them?

Natural History of the Faculty of Constructiveness in Man.

Man knows less of himself than of any thing else; first, because he attributes all the qualities and faculties of animals to that pretended instinct, by which it is attempted to explain every thing; and secondly, because he insulates himself absolutely from all the rest of the animal kingdom, and thus deprives himself of all points of comparison. Man makes clothing to cover himself; by what impulse? By that of necessity, to secure himself from the inclemency of the air and the stings of insects. He raises a cabin, a house, palaces, temples, because he finds it more convenient to be sheltered than to live in the open air, and because he wishes to satisfy his pride, or render homage to a being whom he considers above him; he constructs machines, because his hands are insufficient to execute what he undertakes. All the productions of our industry are due to our intelligence and our wants. "Man appears to have nothing which resembles instinct; no existing industry is produced by innate images; all his acquirements are the result of his sensations, or those of his predecessors, transmitted by words, fertilized by meditation, applied to his wants and his enjoyments; they have given him all the arts."

Such is the language which all authors, if I except some philosophic observers, have held till now, in relation to all human action. If I were ambitious of the approbation of my contemporaries only, I ought to remain faithful to this routine.

In the first sections of the first volume, I have already proved, in general, the absurdity of this manner of regarding man; and each of the fundamental qualities or faculties, of which I have treated, have furnished me new proofs of it. The following reflections will convince the reader, that the spirit of the

arts and of mechanical inventions, has also been given to man by a peculiar organization.

If the impressions previously received, our wants, reflection, reason, were the sources of our arts, their progress ought to be in direct proportion to the number of impressions received, to the urgency of our wants, and to the activity of our intellectual faculties. But if we consider the arts, either in individuals or in whole nations, we shall find that these circumstances may well determine the nature, the direction of our arts and of our inventions, and favor their progress; but by no means, give rise to the talent for them.

If we observe children, even those of the same family, assembled in the same school, surrounded by the same objects, and seeing the same examples; while some are devoted to their several pursuits, others are busy in drawing with charcoal, chalk, or pencil, different objects on the walls, the floor, on tables or paper, in cutting or fashioning different objects in wax, or in repairing the utensils of the house. Boys, from four to six years of age, have been seen to make an admirably exact model of a ship of the line. Hardly has the young Vaucanson seen the motion of a clock through an opening in its case, when he makes a wooden clock, without any other tool than a bad knife. The son of Reichenbacher, engineer for mathematical instruments, at Munich, from the age of five years, had his lathe to himself, disdained all the sports of his age, and would absolutely employ himself in what relates to mechanics only: his father had likewise the same exclusive inclination from his earliest infancy. At Mulhausen, in Switzerland, the manufacturers will receive into their shops only those children, who from their tenderest age discover a great talent for the arts in drawing and cutting; because they know by experience, that such subjects alone become intelligent workmen.

Examine the history of great mechanicians, draughtsmen, painters, architects; you will not find one, who

has not manifested the traces of his innate talent, from his earliest age. Lebrun, at the age of three years, employed himself in drawing with charcoal; at twelve years, he made the portrait of his grandfather. Christopher Wren, at the age of thirteen years, had made an ingenious machine to represent the course of the stars. Truchet, the father, was yet a child when he executed small machines, which announced what he would one day become. Michael Angelo was born a painter; at the age of sixteen, he executed works which were compared to those of antiquity. In his tenderest childhood, they used to find Peter du Laar, surnamed Bamboche, continually employed in drawing every thing he saw. His memory recalled to him with fidelity, even after a long time, the objects which he had seen but once. John Laurent Bernin, at the age of ten years, was able to make a head in marble, which gained him the approbation of all the connoisseurs. André Montaigne was destined to become a shepherd; his genius led him to higher objects; he passed all his time in tracing figures on stone or paper.

M. Berré (John Baptist,) born at Anvers, son of a tailor, being left to himself, learned drawing without a master, and against the will of all who had authority over him in his early childhood. He first made flowers, then tried himself in the class of animals of the chase, dead animals. He came to Paris to improve himself, painted lions and other carnivorous animals, and finally attached himself to the school of Paul Potter. He excels in the painting of domestic animals, cows, horses, &c., which he places either in rustic situations, or in the midst of rural buildings. He himself prepares his means of study, by sculpturing models, and forming reliefs of cows and stags on a small scale, without having prepared himself for it by preliminary studies.

A young artist, who, at this moment gives evidence of a great talent for sculpture, while a child and with-

out any idea of the existence of this art, engaged in carving crucifixes for the use of the laborers, and thus gained a little income, to procure himself the means of improvement. Every body is acquainted with similar examples.

The greater part of the great artists have not received an appropriate education, but, on the contrary, have had to struggle against want and obstacles of every kind; while thousands of painters, sculptors, architects, and mechanicians, who have never raised themselves above mediocrity, have had as much, and often more aid than the Claude Perraults, the Poussins, the Raphaels, Pl. LXXXV fig. 5; the Truchets, the Michael Angelos, Pl. LXXXV. fig. 6; the Anthemiuses, Wrens, Mansards, Nanteuils, &c.

How often have men, whom external circumstances prevented from devoting themselves professionally to the occupations, to which their natural dispositions called them, made them an amusement even in the whirl of affairs of a very different kind? Leopold I., Peter the Great, and Louis XVI., made clocks; the monk Platt employed the dust of the wings of butterflies to paint birds; and his paintings deceive so completely, that you think you see a real bird. Peasants have been seen to make orreries, that is, machines indicating the course of the stars.

Father Vincent, a peasant who inhabits a cottage at a league from Plombiéres, having one day come into that city to sell some goods, heard from the street the sound of an instrument which was unknown to him. He asked permission to enter the house from which the sound proceeded; it was granted him; he was introduced into an apartment, where a lady was playing on the piano. Ravished into ecstasy, he wished to know this instrument in all its detail; they satisfied his curiosity; he examined it with much attention; and after having comprehended the whole and the different parts, he said that he could make one like it. In fact, without any other aid than some

coarse tools, such as a plane, a hammer, and a file, he made, alone, the case, the wires, the keys, and put all together with marvellous industry. The forms, the proportions were observed. He afterward made two others, which have not the elegance of the pianos of Erard, but which are worth many of those which bear the names of well-known makers.

This was not all; after this trial, he wished to have a clock. He examined one, and made all the pieces, which he joined, and gave them all the regularity which a good clock-maker could have done.

This success did not puff up father Vincent. Another would have quitted the spade and the plough; but this rustic Vaucanson continued to cultivate his field, contenting himself with employing his new talent in his leisure moments, and solely to procure himself some enjoyment, or to ornament his house.

We every where see men, occupying eminent places, relax themselves from their habitual occupations by working at the lathe or in drawing. This taste cannot be attributed to peculiar feelings, nor to necessity, nor to very distinguished intellectual faculties.

On the contrary, we often see men endowed with very distinguished intellectual faculties, who absolutely know not how to do any thing with their hands. Lucian and Socrates renounced sculpture, because they did not feel any inclination for this art. M. Schurer, formerly professor of physics at Strasburgh, broke every thing he touched. There are persons who do not know how to mend a pen or sharpen a razor. Two of my friends, the one an excellent instructer, the other a great minister, were passionately fond of gardening, but I could never teach them to graft a tree.

On the other hand, the greatest mechanicians are astonishingly limited in capacity as respects every thing else. The greater part of them, like all geniuses, are ordinarily great masters without suspecting it.

I close by making the remark, that the exercise of

the mechanical aptitudes takes place the more servilely, and in a manner the more invariable, as the animal is placed lower down on the scale of perfection; on the contrary, the higher he is placed, the more liberty has he in the exercise of these aptitudes. The nest of the squirrel offers much more variety than the envelope of the caterpillar; it is thus, that we see this apparent freedom go on increasing in the proportion of the organization in general, and of the organ of art in particular, until we arrive at length at the draughtsman, the painter, the sculptor, the architect, the mechanician, who believe, that in the exercise of their art, they have not subjected themselves to any fetter; yet the limits, assigned in this respect to the human race, do not escape the eye of the philosophic observer, who compares the works of one artist with those of another; the works of the ancients with those of the moderns; the works of one nation with those of another.

Finally, I am far from denying, that exercise and models serve to perfect the products of art, as well as every thing else. But, as Ferguson says, "All the skill which man acquires in the space of many ages, is only the development of the talent, which he possessed from the earliest times. The hut of the Scythian offers to the eyes of Vitruvius the elements of architecture; the bow, the sling, and the savage canoe, present to the armorer and the builder the original constructions of their trade."

Faculty of Constructiveness in Disease.

It is not rare to see idiots, who manifest an astonishing talent for mechanics.

Pinel relates the example already quoted of a madman, who imagined, that his head had been changed, and who made the most ingenious machines, which were the result of the most profound combinations.

Doctor Spurzheim mentions the case of a woman on whom the organ of constructiveness, whenever she became pregnant, was in such a state of excitement, that she had actually a mania for building. Doctor Rush cites two cases, in which the talent for drawing showed itself during madness, and adds that there is no insane hospital in which we do not find examples of individuals, who, having never before shown the least trace of mechanical talent, have constructed the most curious machines, and even ships completely furnished.

Seat and external Appearance of the Organ of the Arts in Man.

It is the convolution VII. rolled in a spiral, Pl. IV. V. VIII., which constitutes this organ. In Pl. VIII. it is almost half covered by the very considerably developed convolutions of the middle lobes. When it has acquired a considerable development, it manifests itself in the cranium by a protuberance in the form of a segment of a sphere, the base of which has an inch and more in diameter. It is placed sometimes a little higher, or a little lower, according as the neighbouring organs are more or less developed immediately behind the organ of music, and above that of numbers. An unpractised eye might easily confound it with the organ of the propensity to acquire;* but the form of this last is lengthened from behind forwards, and when the cushion which it forms is very considerable, it extends to the external edge of the superciliary arch. The protuberance formed by the organ of the arts is, on the contrary, round, and placed above that of the organ of the sense of property.* See Pl. LXXXV. fig. 5, the portrait of Raphael, and fig. 6, that of Michael Angelo.

* Acquisitiveness.—Ed.

We sometimes meet with great mechanical talents, which, instead of having the temporal regions as prominent as the zygomatic, have them rather contracted. This is in consequence of the deficient development of the organs, placed in the anterior lateral part of the forehead.

This protuberance gives to the temples a prominence equal to that of the zygomatic regions; on this account great mechanicians have a head apparently enclosed between two parallel planes. In very distinguished artists this region is extremely prominent, and appears like a cushion, which engravers, painters, and sculptors regard as a deformity, and therefore never express it in its whole development.

At Vienna, several very respectable men brought me a subject, on which they begged me to give them my opinion. I told them, that he must have a great genius for mechanics; these gentlemen thought I was mistaken, but the person in question was much struck by my decision; it was the famous painter Unterberger. To give evidence, that I had judged correctly, he declared that he had always had a passionate taste for mechanics, and that the art of painting, which he exercised, was only his trade; he carried us into his house, where he showed us several large apartments filled with machines and instruments, which he had partly invented, partly brought to perfection. Moreover drawing, so necessary to the painter, depends on the organ of constructiveness.

Doctor Scheel of Copenhagen had attended one of my courses at Vienna; thence he went to Rome. One day he suddenly entered my house when I was surrounded by my pupils, and presented me a skull in plaster, on which he begged me to give him my opinion. I immediately exclaimed, that I had never seen the organ of constructiveness developed to the degree, that it was in this cranium. Scheel continued to question me. I requested those present to observe a considerable development of the organ of

Physical Love, and that of Imitation. "How," continued he, "do you find the organ of coloring?" I had not paid attention to it, for it was only moderately developed. M. Scheel then declared, with all the marks of the most lively joy, that it was the cast of the skull of Raphael which he had just sent me, and that, during his residence in Italy, he had found my ideas confirmed by the study of the antiques.

Many of my hearers spoke to me of a man endowed with an extraordinary genius for mechanics. I described to them beforehand the form, which his head ought to have, and we went to find him. It was the skilful inventor of mathematical instruments at Vienna. His temples were swollen into two misshapen cushions. Before this, I had found nearly the same form in the head of the celebrated mechanician and astronomer David, an Augustine friar, and of the famous Voigtlænder, maker of mathematical instruments.

At Paris the Prince of Schwartzenberg, then minister of Austria, wished to put M. Spurzheim and myself to the test. At the moment when we rose from table, he led me into a neighbouring apartment, and introduced to me a young man without saying a single word. I went to rejoin the company with the Prince, and begged M. Spurzheim to examine the young man; during his absence I told the company what I thought of him. Spurzheim had hardly seen the individual, when he came to join us in the parlour, and likewise declared, that he thought him a great mechanician, or, a great artist in some similar department. In fact the Prince had induced him to come to Paris on account of his great talent for mechanics, and furnished him the means to prosecute his studies there.

At Vienna and in the whole course of our travels, we found among all the mechanicians, architects, draughtsmen, and sculptors, this organ developed in proportion to their talent: for example, in Messrs. Fischer and Zauner, sculptors at Vienna; Grosch,

engraver at Copenhagen; Plœtz, painter; Hause, architect; Block, at Wurtzburg; Canova; Müller, engraver; Danecker, sculptor at Stuttgardt; Baumann, maker of mathematical and astronomical instruments; in a young man, whose instruction the late king of Wurtemburg had confided to Danecker, because he had observed in him a great talent for mechanics; in Hœslein at Augsburg, who in 1807 had constructed, from description alone, an hydraulic engine, which, with an inclination of two feet, raised water more than forty feet; Ottony and Pfug at Jena; Hueber, drawer of insects at Augsburg; Baader and Reichenbacher, at Munich; Baron Drais, inventor of the velocipede, and of a new system of calculation; Bréguet and Régnier, at Paris, &c.

It is then on this organ, and not at all on the number and nature of the sensations, nor on the degree of the intellectual faculties in general, still less on the hands, that the talent of the artist depends; and Lessing is perfectly correct in saying, that Raphael would have been a great painter, even if he had been born without hands.

Observations on Constructiveness in the Arts, and its Organ in Man.

The reader will have no trouble to determine, what ought to result from the combination of the organ of the arts with the other organs. From its combination with the organ of numbers, which exists in friar David, Voigtlænder, Lindner, Bréguet, &c., results the talent for those branches of mechanics, which require great calculations; from that with the organ of music results the talent of the inventor and maker of musical instruments, &c. There are also those different combinations, which determine the talent of the engraver, painter, sculptor, &c., for such a department in particular, for history, battles, religious, voluptuous subjects, &c.

Climate appears to act on this organ as on the others; that is, sometimes it favors its development, and sometimes it thwarts it. The models and the lessons of a master will never be able to supply, what heaven has denied the pupil. Already, in the sixteenth and seventeenth centuries, many artists of all countries used to go to Rome; yet there never returned from that city a Raphael, nor a Michael Angelo, nor a Leonardo da Vinci, nor a Carracci, in regard to drawing. Even Rubens, notwithstanding all his genius, all the fire of his imagination, and the profound study he had made of the antique, of history, and anatomy, cannot be placed in the first rank for composition and drawing.

The Italians seem to be endowed with a talent for drawing, better developed than that of the inhabitants of more northern climes, as the Flemish, the Germans, &c. This is the reason, why Italy has more and greater painters of history, than any other country; for, in this department, the faculty of the arts is more essential than that of colors. Almost all the Italian painters have sketched their pictures either with white chalk, or with brown and white crayons; many among them have sketched them only with the pen; we often find the outlines corrected; we never find them colored; a very strong proof, that they have worked only by the inspiration of the faculty of the arts. Most of the Italian prints betray a very pure taste in regard to outline, as well as the study of anatomy; frequently the subjects are such, that it would be impossible to treat them, without being endowed, to a high degree, with the faculty of the arts.

We see, without difficulty, how far these observations may be extended; and how interesting it will one day be, to compare the heads and the skulls of different nations, in regard to their talents for the arts.

It is then proved by experience, that the faculty of the arts, as well as its organ, may have acquired a very high degree of activity from infancy, while the other qualities or faculties are much less developed; that

the faculty of constructiveness may, at every age, exist to a degree of activity very different from that of the other qualities or faculties; that it may continue to manifest itself, and even with energy, when the other faculties are degraded to idiocy; that it may manifest itself in mania, and even appear in all its integrity; an unusually active faculty of constructiveness may be transmitted from father to son, and even to the grandson; that certain species of animals are endowed with it, while other species, though placed higher in the scale, are wholly destitute of it.

The faculty of constructiveness must, therefore, be considered as a particular faculty, independent of all the others; that is to say, a fundamental faculty; it ought, then, to have its organ.

Now, then, if we cannot deny either the facts which I have just related, or the consequences which flow from them, it must be admitted, that the objects on which this organ is destined to act, exist without us; that, consequently, there exist laws of motion, drawing, sculpture, taste; in fine, that this organ of the faculty of the arts, is only the material condition, by means of which the Creator places us in communication with this part of the world, and by the aid of which, he has wished to reveal to us this fragment of the universe.

It would be, I think, very superfluous to prove, that these laws exist in the external world. Every person, who has studied the first elements of physics, knows the laws of equilibrium and of motion; and it is not expected, that I should develope the laws of painting, sculpture, and architecture.*

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* "Independent of Greek architecture which all nations have adopted," says Mr. J. F. Sobry, in his Practice of the Arts, p. 374, "there exist also many other kinds of architecture, such as the Egyptian, the Chinese, the Gothic, and the Arabesque.

"All these kinds of architecture are very distinct, and yet they all set out from the same principle, which is the primitive construction; they refer themselves to it in their details." And p. 584: The "Chinese, like all other nations, have palaces, gates, aqueducts, triumphal arches;

But what I have just said must convince every person, who is not irrevocably attached to received ideas, that the arts are not a product of our sensations and reflections; that, on the contrary, they are really an institution of nature.

Thus far, in speaking of the arts, I have made mention neither of composition nor expression; because these objects relate to other faculties of which I shall speak hereafter. It remains to me to speak of the organ of construction in animals.

Of the Organ of Constructiveness in Animals.

This organ, however little it may be developed, is most of the time very easy to recognise in man; but as in the great part of the animal species, sometimes these organs, sometimes others, exist or are wanting, in the anterior inferior region of the head, there must hence result many variations in the form of the regions where the organ of construction is placed. It must have, in the animal whose organs of localities, of music, and of construction are at the same time much developed, a different form from what it assumes in an animal which is endowed solely with the organ of construction, or with this organ accompanied with one only of the two preceding.

This organ in general is very difficult to distinguish in most of those animals, who burrow or build. Those who have not yet acquired full knowledge of comparative anatomy, must not commence the study of organology, either with the organ of the faculty of localities, or with the organ of the relation of tones, or with that of construction. In man, these organs are placed higher in the head, and have a perpendicu-

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and all the ornaments of these buildings are equally drawn from the primitive constructions; manner and customs in vain put differences in the forms; we find every where the same principle."

lar direction. In animals, as they are destitute of several intermediate organs, and in general their organs are smaller, these three are placed lower, and their direction is horizontal.

The practised observer, as I have already shown for the organs of localities and of music, will also discover the organ of construction in animals, and will not confound this with the other two. The organ of music in animals is placed towards the middle of the orbitar arch; that of construction is farther back. Moreover, the organ of localities is farther forward; and though sometimes, as in the mammifera, on the external angle of the frontal, it yet always occupies the superior region of the forehead; whereas the organ of construction is not only more retreating, but more depressed towards the sides.

In the hamster, Pl. LXXII. fig. 9, the marmot, Pl. LXX. fig. 7, the beaver, fig. 8, it is very easy to recognise the organ of construction. The crania, too, of these three animals greatly resemble each other in the region where this organ is placed. In general, we must seek it in all the *rodentia* immediately above and before the base of the zygomatic arch. The more highly these animals are endowed with the instinct of building, the more prominent is this region of the cranium.

Now, we shall find, without difficulty, the answer to the following question. Why does not the hare, which, as far as concerns his limbs, resembles the rabbit, burrow in the same manner? Compare this region of the cranium with that of the other, and you will be convinced, that in the rabbit it forms a prominence, while in the hare it is depressed. We find the same difference in the crania of birds who build nests, and those who do not. The best means perhaps to familiarize one's self with this organ, is to compare animals of the same genus, of which some species build, while others do not. Thus, in comparing the head of the rabbit with that of the hare, the species

of birds that build nests with those that do not, we gain a complete conviction of the existence and seat of this organ. In regard to the organ of music, I have said, that it was necessary to compare, not only the singing birds in general with those that do not sing, but especially the birds of the same genus, of which certain species sing, while others do not. For example, there is among the different species of tomtits, several which sing, and others destitute of this power. There are blackbirds that have no note, and others that sing marvellously well. Among the falcons, we know only a single species that sings well, the musical hawk, (*falco musicus.*) We shall obtain the same result in comparing the head of our beaver, which, left to its instinct, builds so well, with the head of another species of beaver, which is said to be destitute of that instinct.

Though the head of the badger and of the mole in the region alluded to, have a sensible prominence, it is, notwithstanding, very difficult to observe, unless one is very familiar with this organization.

The more we familiarize ourselves with the organization of the brain of the different species of animals, and the more knowledge we acquire in regard to their instincts, the more we shall be convinced of the truth of organology.

Several of my adversaries have declared themselves against the idea, that it is the same fundamental faculty, which leads the beaver to build his house, a milliner to invent her fashions, and Raphael to conceive his immortal designs. To put thee, divine Raphael, on the same ground with the hamster, the beaver, and the milliner! Professional wits may attach some importance to such observations, but the philosophic naturalist knows very well, that a power expressed in one instance by three, in another by a million, may be very different in its modifications, though its nature remains the same.

"May there not be," says Demangeon, "in some

unexplored region of the brain, bundles of fibres still unknown, and fit to explain the differences of mechanical industry? For, it is difficult to believe, that the little circular swelling which is perceived behind the organ of music, in the direction of the external angle of the orbit, is sufficient for the varied conceptions of the field-mouse, the beaver, the bird which builds nests, the architect, the statuary, the draughtsman, the machinist, the clockmaker, and of so ingenious a mechanism as that of the Vaucansons and the Maelzels. What surprises me is, that an organ, circumscribed in so small a space at the base of the brain, can control all those of which it requires the aid, to the extent of subduing them to itself and impressing its own seal upon them."

Demangeon finds it hard to believe, that a little circular swelling can suffice to the conceptions of the field-mouse, the beaver, the building bird, &c. Is it more easy for him to conceive, that the little brain of the ant, the bee, the spider, the field-mouse, the penduline, is sufficient, not only for their mechanical instincts, but also for their other instincts, so varied and so astonishing? How long has the philosopher thought himself justified in demanding of nature, what ought to be the dimensions of such or such an organ, in order to produce such or such an effect?

After having treated of the faculty of coloring, of music, of arts, of constructiveness, &c., it appears to me superfluous to notice at length, how much those are in error, who say of the sense of sight, that it becomes for man the source of sublime ideas and of several liberal arts, such as painting, sculpture, architecture, mimicry or pantomime, &c., and who attributes to the touch, our superiority over the brutes.

Intellectual Faculties and Moral Qualities, most of which essentially distinguish the Human Race from all the other Species of Animals.

The instincts, propensities, talents, or the moral qualities and intellectual faculties which I have hitherto considered, are all found, at least, in their rudiments, in animals. But it is only man, who unites them all, though no one is exclusively his property. All the organs of these faculties, as I have shown, are placed in the inferior anterior parts, and the inferior anterior lateral parts of the brain, and however elevated, in proportion to the extent of their functions, they may be above those of animals, however marvellous may be their results, we can point them out only under the denomination of organs of inferior intellectual faculties, which man has in common with a great number of brutes.

My readers, after having so long seen man associated with animals, will finally be impatient to know, what are then the moral qualities and intellectual faculties, which give to man his immense superiority over animals? What are the qualities and the faculties which constitute the essential distinctive character of humanity?

Nothing is so easy as the answer to this important question, for those who still love to believe, that animals are only machines, automatons, destitute of all perception, of all consciousness, of every moral and intellectual principle. On this supposition, man alone is endowed with an immaterial principle, and possessed of will and reason. It is the soul which gives exclusively to man the character of humanity. Every ulterior research is forbidden, and would tend to compromise the dignity of our species.

We cut short the difficulty in the same manner, when we consent to grant to brutes, consciousness, propensities, memory, judgment, but maintain, that all

their qualities and faculties are either material powers, or the result of an occult principle, of a vital principle independent of organism, a substitute for a soul; while the same powers in man emanate from a spiritual substance, equally independent on the exercise of its powers and on organization.

Those, on the contrary, who thoroughly examine things, and who desire to oppose truth to error and superstition, find the problem of the distinctive character of man, surrounded by the greatest difficulties. The more we have followed animals in the exercise of their instincts, inclinations, and faculties, the more the difficulty of determining the boundaries of their knowledge, increases. How often do the astonishing perfectibility and the mute acts of the dog, the elephant, the ourang-outang present the most illusory images of the intelligence and morality of man! Many philosophic naturalists have not feared to maintain, that the human species differs from the other species of animals, only in its capacity of knowing and adoring a God.

In order to obtain a reasonable opinion amidst this uncertainty, and not to engage myself in the search of primary principles, or in questions impossible to solve, the eternal obstacle to every positive discovery, I still limit myself to material conditions, having recourse to the comparative anatomy and physiology of the brain. We have already seen how much more voluminous the brain of man, in its anterior inferior parts, is than that of animals; we have also seen how much the functions of these cerebral parts are more extended and more perfect in man, than the functions of the same cerebral region in brutes. Now compare the anterior superior part of the forehead of man with the heads of animals. While the anterior inferior parts of the brain in animals fail only by the want of development, the anterior superior parts are entirely wanting in them. In man, the forehead rises to a height much more considerable, than in any of the

animals even the most perfect. Besides, the cerebral parts of this region, as well as the forehead, advance more or less beyond the orbits. What a striking fact, for those who are convinced of the intimate relation, which exists between physical and moral nature, between the cerebral organization and its most noble functions!

It is this region of the brain, that we are going to analyze; it is there, that we shall discover the material cause of the distinctive character of man. After having studied, one after another, each of the fragments of which the whole moral and intellectual character of man is composed; after having shown physically, that each new moral or intellectual power is constantly and necessarily accompanied by a new cerebral part proper to man alone; we shall be able to say with the satisfaction arising from the highest probability, here is the barrier between man and animal; it is here, that mere animal nature terminates, and humanity commences! And I shall have proved, that the surest and the most fruitful method of studying man, is the successive study of the organs of the brain.

We have said, elsewhere, that the frontal bone is divided in its anterior part, its superior part, and in its lateral parts. The organs, placed in the anterior inferior part and anterior inferior lateral part, have been explained in the first section. It remains to inquire, what are the organs which are placed in the anterior, superior, and the anterior superior lateral parts of the frontal bone. I begin by the examination of that which occupies the median line, and to which, consequently, nature appears to have attached the highest degree of importance.

XX. *Comparative Sagacity, Aptitude for Drawing Comparisons.* (*Vergleichender Scharf-sinn.*)

History of the Discovery.

I often used to entertain myself on philosophic subjects with a philosopher, endowed with great mental vivacity. Whenever he was embarrassed to prove the truth of his assertion, rigorously, he had recourse to a comparison. By this means he, in a manner, painted his ideas, and his opponents were often thrown off the track and led away; an effect, which it would not have been possible for him to produce by his arguments.

As soon as I perceived, that this custom was a characteristic trait with him, I examined the form of his head. I already knew, that we ought not to seek the external marks of intellectual powers among the organs of animal sentiment, but on the forehead; and I observed in the external superior middle part of the frontal bone, a great lengthened prominence, to which I had not given attention till that moment. This prominence commenced in the anterior superior middle part of the forehead, where it was about an inch broad, and contracting itself in the form of a cone, reached the middle of the forehead, where it touched the organ of educability.

I then sought for men who followed the same method in their discourses or writings, to see if they had the same organization. On the other hand, I ascertained the progress of the mind in persons, in whom I remarked the same protuberance. All my observations confirmed my supposition. I concluded, therefore, that there exists a connexion between the great development of the cerebral part placed under this protuberance, and the faculty of finding analogies, resemblances, &c.

At the same period I observed the heads of two ex-jesuits, both distinguished preachers, who were equally

esteemed by the educated and by the common classes. In their sermons, by the aid of combinations of comparisons and of parables, they rendered clear, and in a degree evident, the precepts, which they wished to inculcate on their hearers. At a later period I also examined the head of the famous father Barhammer, Pl. LXXXIII. fig. 2, a preacher much followed by the people. Arguments were not his forte, but in a style (*à la père Abraham*)* little elevated or refined, he knew how to keep the attention of his audience alive, by numerous comparisons, always taken from objects best known in common life. I have often seen half of the faithful assembled fall asleep, or at least remain very indifferent to the sermons of preachers, much more eloquent, but who made use of philosophical reasonings. The minds of men but little educated, are incapable of following a long series of arguments; but comparisons, parables, spread a gentle and beneficent light, produce the effect of conviction, and carry along the most clownish multitude.

In these three heads, the middle anterior superior part of the forehead was likewise vaulted into a conical eminence. The more my observations of this kind were multiplied, the more I was convinced, that the tendency of a mind to seek comparisons, analogies, &c., results from the favorable development of a particular organ.

Farther proofs that the Faculty of Comparison is founded on the Action of the Middle Cerebral part of the Anterior Superior Region of the Forehead.

In treating of the fundamental faculties, which exclusively belong to man, I have not at my disposal so many proofs, as for those which are common to man and animals. All the resources, which comparative anatomy and physiology afford me, to sustain

* Franklin, Almanac.

my assertion, in relation to the organs of which I have treated hitherto, now fail me; and I am obliged henceforward, to confine myself to man alone: and man being infinitely more complicated than animals, and consequently more difficult to observe, it becomes more than ever necessary to multiply facts, and to draw inferences with the most judicious reserve.

Sagacity and wit are commonly regarded as two faculties, not only very distinct, but even opposite. It is maintained that sagacity (*Scharf-sinn*) or *perspicacity*, consists in seizing contrasts, and wit, (*Witz*) in finding resemblances. But, as he, who has the faculty to discover resemblances between different objects, must necessarily also seize their contrasts, it follows that both of these faculties are modifications of the same fundamental powers.

The expression perspicacity, sagacity, spirit of comparison, seems to me to designate exactly this operation of our understanding. I remark in general, that persons, in whom this cerebral part has acquired a high degree of development, seize and judge well the relations of things, of circumstances, and events, and are generally well fitted for business.

Children, in whom this organ is considerably developed, prefer fables to all other subjects taught them. I own a bust of La Fontaine, in which this part is extremely developed, and the other parts are smaller than they appear in the prints. My bust coincides with that in baked clay, which is seen at the museum of French monuments.

I have often said to individuals in whom I found this organization to a high degree; *in your writings, and even in your letters, in your discussions, you make frequent use of comparisons.* After some moments of reflection, they acknowledged within themselves this peculiar tendency, which they had not till that moment suspected. On making at Frankfort the acquaintance of the famous preacher Hufnagel, (Pl. LXXXIII. fig. 1,) we saw, that he had this organ very

much developed; and it was with lively joy, that we saw it at Weimar greatly developed on the forehead of Goethe; accordingly we find analogies and comparisons, on every page of the writings of this fine genius.

This organ is in general of great use to poets; with it every thing becomes an image, so that certain poets attribute their talent entirely to the faculty of speaking by images, and have not the least idea of what really constitutes poetical talent. I find this organ much developed in the bust of those of the ancients, who have distinguished themselves by their sagacity; for example, in that of Cato, Solon, Pl. LXXXVII. fig. 6, Maecenas.

Saint Thomas Aquinas, (Pl. LXXXVII. fig. 4,) of all the scholars of barbarous times, was without question, the most profound, the most judicious, and the clearest; accordingly the organ of comparative perspicacity is very visible on his forehead.

The head of St. Francis de Sales (Pl. LXXXVII. fig. 5,) is in general very handsome, very elevated, high, and of an extremely noble character; but we observe especially a great development of the organ of comparative perspicacity, and large, depressed eyes, such as are usually found among philologists. Accordingly, he shows every where great erudition, and there is not a page of his introduction to a devout life, in which we do not find some analogies and even some sustained comparisons. I open the volume, I fall on page 164, and I read; "If we are punctilious for rank, precedence, titles, besides exposing our qualities to examination, to inquiry, to contradiction, we render them vile and abject; for the honor, which is noble when received as a gift, becomes mean when exacted, sought, and demanded. When a peacock spreads his tail to exhibit his fine feathers, he bristles up all the rest, and shows all his most inferior parts: the flowers, which are beautiful while planted in the ground, fade when handled. And as those who smell the mandrake

at a distance, and in passing receive pleasure from the odor, and those who approach closely become stupified and sick, so honors give a sweet consolation to him who smells them gently from afar, without amusing himself with them or caring for them; but to him who attaches himself to them and feeds on them, they become extremely offensive and prejudicial."

So true is it, that man betrays the secret of his organization in his thoughts and his writings.

On the Education of the Human Race.

What can have been the object of the Creator, or of nature, in placing this organ in the median line, where the most essential organs are always found? Let me be permitted here to make a philosophical digression; it may be pardoned, I think, to a man who is persuaded, that organization is the principal source of psychological phenomena.

I have said that, by the aid of the organ of comparative sagacity, man makes comparisons; that is, by the aid of this organ he recognises the resemblances and differences of objects. Now, it is certain that it is precisely by this means, that the education of the human race commences. Man has a natural propensity to compare his feelings with the impressions he receives from without, and the same impressions with the sensations he experiences within. By means of these comparisons his sentiments and impressions are converted, not only into ideas, but also into images and pictures; by this means his language does not limit itself to a collection of material sounds without life; it becomes an animated, and, if we may so speak, a personified language. By means of such a language, man is enabled to communicate, that is, to paint to his fellow men his feelings, as well as the impressions he has received; this is the spirit which reigns in all mother tongues; it is the organ of hieroglyphics, and

of all signs which imitate objects more or less; it is for this reason that, even now, the rudest men, in order to communicate their sentiments, make use of emblems, that they paint a heart with flames escaping from it, an arrow, &c. This, in fine, is the origin of mythology.

Man, in comparing together the impressions which he has received from abroad, endeavours to imitate them by his language; he becomes an imitator, a painter of the external world. The horse *neighs*, the lion *roars*, the sheep *bleats*, the frog *croaks*, the ox *lows*, the dog *barks*, the wolf *growls*, the cat *mews*, the turtle dove *coos*, the hog *grunts*, the hen *clucks*, the serpent *hisses*, the hand-bell *tinkles*, the thunder *roars*, &c.; words which imitate the sound they express. It is thus, that a number of words take birth in the parent languages, and have been transferred into those languages, which are derived from them.

Man acts likewise in regard to his own sentiments. He familiarizes himself with these, as easily as with impressions received from without. Why then do so many philosophers derive our first ideas from impressions on the five senses? The internal sentiments furnish the materials for our language, as early and as abundantly. The sentiments also require to be painted, and the images by which we depict external objects, are as often derived from these sentiments, as those, by which the sentiments are pictured, are from external objects. If we say, the blood *boils;* the heart *palpitates* and *beats;* the soul *burns* and *freezes;* beauty *fades;* that *tears* my soul; that *pierces* my heart; reason *seizes;* the mind *penetrates;* he has a *light*, a *heavy* understanding; *sharp* or *dull* faculties; a *narrow* mind; the heart *corrupted*, *hard*, *broken*, *tender; ripe* reason; the soul *prostrated;* a *flat* expression; we also say the vine *weeps;* the weather is *dull;* the sea *rages;* the billows *roar;* the winds *howl;* the oak *braves* the storm; he lifts towards heaven an *audacious*

front; rust *gnaws* the iron; the sun *vivifies;* nature *awakes;* the earth is *thirsty;* the willow *loves* moisture; the vine *fears* the frost, &c.

Almost all proverbs, and all popular modes of speaking, are but comparisons and analogies, arising from accidental observations. The singed cat fears cold water; to put the cart before the horse; to let the wolf into the fold; to strike while the iron is hot; to straighten the tree while it is young; a good name is better than a golden girdle; idleness is like rust, it consumes faster than labor; a rolling stone gathers no moss; you laugh in your sleep, but you will weep at your waking; what is not good for the swarm, cannot be good for the bee.

Now, it will be conceived, why those, who had it more at heart to render a service to humanity, than to gain the reputation of a brilliant eloquence in the instructions which they addressed to the people, preferred the form of the parable, and emblematic modes of speaking to every other. This was the vulgar language of the Egyptians, and Pythagoras enveloped his precepts of morality in the veil of allegory and apologue. Let us recollect the woman who seeks the penny she has lost, and who has such great joy in finding it;—the shepherd who abandons his flock to go and seek the stray sheep.—"Ye are the salt of the earth; but if the salt have lost its savor, wherewith shall it be salted? It is good for nothing but to be cast out and to be trodden under foot of men.—Ye are the light of the world; a city that is set on a hill cannot be hid; neither do men light a candle and put it under a bushel, but on a candlestick, and it gives light to all that are in the house, &c.—Behold the fowls of the air; they sow not, neither reap, nor gather into barns, &c.—Consider the lilies of the field, how they grow; they toil not, neither do they spin.—You shall know them by their fruits.—Do men gather grapes of thorns, or figs of thistles? A good tree cannot bring forth bad fruits, nor a bad tree, good fruits.—

The wise man built his house on the rock, and the rain descended, and the floods came, and the wind blew and beat upon it, and it fell not, for it was founded on a rock.—The foolish man built his house on the sand; and the rain fell, and the floods came, and the winds blew and beat upon it, and it fell, and great was the fall of it."—

"When a woman is in travail.....likewise you are now in distress."

"I have given you milk to drink, and have not given you meat; for you were not able to bear it."

We find on each page the most excellent comparisons, in which we manifestly see the intention. "I have spoken to you in parables." It is thus, that the most wholesome truths are best introduced under the veil of fable.

Æsop, who assumed the mask of allegory and the charm of fable, was more listened to at the court of Crœsus, than the austere Solon. A senator appeased the sedition of the Roman people by a fable, which the wisdom and authority of the consuls had not been able to repress. And the courtiers of Louis XIV. were more willing to be corrected by the apologues of La Fontaine, by the comic fictions of Molière, and by the poignant pictures of La Bruyere, than by the sublime and profound thoughts of Pascal.

What philosopher would have spoken better to the ambitious, than Petrarch, when he says to them: To look to power, in order to live in security and at rest, is to ascend a high mountain to avoid the winds and the thunder.

We may then maintain, that the education of the human race has been commenced principally by means of the action of the organ of comparative sagacity. Now we may conceive, why nature has placed it in the median line.

Metaphysical Depth of Thought; Aptitude for drawing Conclusions. (*Metaphysischer Tief-sinn.*)

I have a long time observed, that some men, to whom a great philosophic spirit is attributed, had the anterior superior part of the forehead singularly large and prominent. Such are Socrates, Democritus, Cicero, Bacon, Montaigne, Galileo, La Bruyere, Leibnitz, Condillac, Diderot, Mendelsohn, &c.

But the tendency of the profound genius in these men, is not the same in all of them. The domain of one, is the material world; the domain of another, is the spiritual. One wishes to know what is; endeavours to discover the conditions, under which that which is, exists; makes observation the basis of all his meditations, and investigates the relation of cause and effect; another, disdaining the material world, raises himself into the world of spirits; and, creating to himself a universe of ideal beings, contemplates mind in its effects as mind, and takes no account of the material conditions of its functions; he is occupied in the investigation of general truths, of general principles; and, according to him, all which exists here below ought to conform to these general ideas; such is the ideologist, the metaphysician.

In these heads two cerebral parts are developed, one on each side, XXIII. Pl. IX. at the side of the organ of comparative sagacity. In those the parts of the forehead which immediately touch these cerebral parts, are found prominent, and form, by themselves alone, or jointly with the organ of sagacity, two segments of a sphere, placed on each side of the forehead in the horizontal line.

At Vienna I knew men endowed with very distinguished intellectual faculties, zealous followers of Kant. The too great generality of the assertions, which constitute their doctrine, always convinced me, that it is without any practical utility. Their dogma,

for example, that time and space are only a form to which our understanding is subjected, appears to me so general, that it finds no application to any science or any art. It is on this account, that they and myself have never been able to understand each other. They reproached me, as the followers of the transcendental philosophy have since done in the rest of Germany, with not having raised myself above the lowest step in the ladder of observation. In return, I reproached them with losing themselves in the void beyond the limits of the sensible world; with wishing to determine the laws of the corporeal world according to those of the spiritual; and with constructing the whole external world with pretended materials, collected within themselves, instead of making observation the basis of their reasonings.

During our travels, they gave us a cast, moulded on the head of Kant after his death. It was with a lively pleasure, that we saw the extraordinary prominence of the two frontal parts which I have pointed out. See his portrait, Pl. LXXXII. fig. 3. Afterward, we became acquainted with Fichte, and found the same region of his forehead still more prominent than in Kant. We saw the same organization in Schelling; we need take no notice here of those numerous followers, who do nothing but repeat the words of their master.

It seems to be proved by experience, that so long as man is condemned to inhabit this earth, there is no advantage to be drawn by him from the speculations of this sublime philosophy, and consequently that we shall do well to confine ourselves within that sphere of activity, which the world of realities offers us.

Sometimes, it is true, we are forced to admire the depth of the human mind, when, at distant intervals, we see those men, if not by the sole force of reasoning, at least by induction from a small number of data, discover truths, to which the naturalist dares not give his consent till after a numerous and painful succession

of experiments. Still these results, as brilliant as rare, are bright rays of light, doubtless, but such as it is very difficult to distinguish from the meteors, which usually dazvle the mind of the metaphysician.

The ancients probably had already perceived the relation, which exists between this organization, and the tendency to be occupied with things beyond the reach of the senses, and consequently beyond the sphere of observation. They give to their Jupiter Capitolinus the same prominence in the anterior middle superior part of the forehead; a characteristic mark, which suits perfectly with supreme intelligence,

I am far from denying, that *interior intuition* may likewise become an object of observation; but when I see, that this intuition leads, in each individual, to different conclusions, and tends, consequently, to no certain observation; when I see, that in the midst of the corporeal world, in the midst of institutions founded on matter and on bodies, metaphysicians, as Berkeley did more than a century since, go so far as to call in doubt the existence of matter, by the most puerile sophisms, whether in the intention of repelling the charge of materialism, or because by a similar extravagance they pretend to raise themselves above the humble observer of nature; when I see in all ages the efforts as frivolous as profound, of the ideologist, to destroy and renew themselves by turns; when I see, that the metaphysicians by profession, affect an aversion for researches on man, such as he is; I doubt whether such an employment of the metaphysical spirit could ever pretend to any other merit, than that of simple speculation.

XXII. *Wit.* (*Witz.*)

A third peculiar manifestation of the intellectual faculty, is what the Germans have called *witz*, and the English, *wit*. I know of no French word which

accurately expresses the same idea. This faculty considers objects under a point of view altogether peculiar, finds in them relations altogether peculiar, and presents them in a manner altogether peculiar, which constitutes what is called *salt*, *causticity*, and sometimes *naïveté*. To give my readers a just idea of this faculty, I see no better means than to cite men whose dominant faculty was what I suppose this to be; such was Lucian, the Voltaire of the Greeks, both by his boldness and by the turn of his mind; Rabelais, Cervantes, Marot, Boileau, Racine, Régnier, Swift, Sterne, Voltaire, Piron, Rabener, Wieland, &c.

In all persons eminently endowed with this faculty, whom I have had occasion to examine, I have found the anterior superior lateral parts of the forehead considerably prominent, in a segment of a sphere.

When this organization predominates, it carries with it an irresistible propensity to ridicule every thing; to spare neither friend nor brother; and as there are persons who, for want of better subjects, rob themselves, so there are found those who, for want of other objects, launch their satire against themselves.

Aristophanes was so bitter, that he did not spare his own family. Socrates and Euripides were the butts of his sarcasms. Henry IV. has been blamed for being too fond of jesting; he has been reproached for his gaiety in the midst of a combat, for his jests in poverty and misfortune, and for the sometimes untimely sallies of his lively mind.

Baron Grimm said of Piron; "This poet was a machine for sallies, epigrams, flashes of wit. In examining him closely, it was seen that these things were entangled one with another in his head, came out involuntarily, urged themselves confusedly on his lips, and that it was no more possible for him to avoid uttering *bon mots*, and epigrams by the dozen, than it was to avoid breathing. Piron was a real study for the philosopher."

Mathurin Régnier showed, from his youth, his propensity to satire. His father chastised him several times to correct him. Punishments, prayers, all were useless.

Diogenes, the cynic, a biting wit, amused himself with all the follies of the age.

Cicero had an extreme inclination to raillery. Horace, a merry philosopher of the court of Augustus, usually manages his satire with delicacy. Juvenal, the unrelenting censor of the reign of Domitian, destroys all that he touches.

If we consider the busts and the portraits of Diogenes, Aristophanes, Henry IV., Cicero, Cervantes, Rabelais, Pl. LXXXIII. fig. 4; of Boileau, Racine, Régnier, Swift, Piron, fig. 5; of Sterne, fig. 6; Voltaire, Pl. LXXXIV. fig. 4; of Wieland, &c., we shall find in all of them, the anterior superior lateral part of the forehead projecting into two segments of a sphere.

Other persons want this talent, and sometimes to such a degree, that, like Crebillon, they hate and despise whatever is satire or epigram. In this case, the same region of the forehead is contracted. (Pl. LXXXII. fig. 5.)

It is therefore no longer permitted to doubt, that this talent is indicated by the organization, which I have described. The manner in which it manifests itself, whether by offensive sarcasms, or by jests without bitterness, the choice of its subjects, &c., all this depends on the greater or less development of other organs.

It is the convolutions, XXIV. Pl. VIII. fig. 9, which constitute the organ of wit.

"The spirit of wit," says Demangeon, "this Proteus of the understanding which assumes all forms to produce gaiety, marking with its seal all the sciences and all the arts, by striking contrasts, irony, raillery, ridicule, pleasantry, punning, buffoonry, satire, the grotesque, caricature, &c., this wit, which sports with all the faculties, has it really its principle in a single organ? I think it must depend on several cerebral apparatus

and that having gaiety for its essence, it is perhaps only the result of a happy organic symmetry, by which each faculty obtains its share of activity and satisfaction. It seems, besides, that this wit manifests itself only by contrasts or comparisons, and Mr. Gall admits no peculiar organ for comparison, nor for contrast of which he makes a common attribute. The thing then would be very well designated in French by the single word, *esprit*, under which we comprehend all the intellectual faculties, in whatever they present most prominent and least studied."

Thus Demangeon still reduces all the intellectual faculties to a single faculty, designated by the word *esprit*. It is apparently in the dictionary of the academy, that Demangeon has gained this information. We have the idle spirit, and the active spirit, the light spirit, and the heavy spirit, the easy spirit and the dull, the brilliant and the dry, the fruitful and the sterile, the unquiet, factious, turbulent, capricious, insinuating, supple; there is the spirit of gaming, of chicanery, of sophism, of business; there is a good and an evil spirit, an *esprit fort*, a *bel esprit;* one has much spirit, but little judgment; one has not the spirit to seize the spirit of a work, or of a discourse, &c. This *esprit*, therefore, suffices to give one all the moral qualities and intellectual faculties; hence, a single organ of *esprit* is the wonderful organ of the most opposite propensities and talents. But how happens it, that, with an abundance of *esprit* one so often has no decided talent? That with the most obstinate spirit of generalization, one has no exact knowledge, no precise notion? If the spirit of repartee depends on several cerebral apparatus, and having gaiety for its essence, is perhaps only a result of a happy organic symmetry, by which each faculty obtains its portion of activity and satisfaction; then every buffoon, every farce player, or harlequin, &c., must be a perfect man; and every man of talents must be more or less a buffoon or a farce player.

In all his objections, Demangeon forgets the reciprocal influence, which the different organs exert on each other. Certainly, according as the caustic spirit is accompanied with other faculties or other dominant propensities, it will exercise itself in a thousand modified modes on other objects, &c.

Causality, Spirit of Induction, Philosophic Head. (*Causalitæt, Folgerungs-Vermægen.*)

In discussing (VOL. II.) the means of knowing the measure of intelligence, I showed, that with the same volume of brain, different individuals may have very different moral qualities and intellectual faculties. If it be required to know, what are the most active qualities and faculties in an individual, the volume of the cerebral mass is no longer the object of consideration; it is necessary to know, what are the parts of the brain, which in this individual have acquired the greatest development. Already, sect. III. of the same volume, I had indicated the different results, according as the different regions of the brain are more favorably developed than others. I have likewise shown, that the more or less general contraction of the brain, involves the deadening of all the qualities and faculties; idiocy, more or less complete; a preponderating development of the organs, which belong to the functions common to man and to animals, subjects man to the empire of the animal qualities. Free will is the more restrained, as the faculties, proper to man, are less active. The propensities are only very feebly counterbalanced. If a man, with such an organization, distinguishes himself, it is by qualities of an inferior order, by brutal sensuality, by ambition, the love of conquest, the instinct of destruction, or by the rage for combats, &c.

Few men have been destined to play a great part, either in regard to animal qualities, or in regard

to intellectual faculties. In the greater part, the moral and intellectual powers are confined to a rather narrow sphere of activity. To beget children, to bestow the first cares upon one's offspring, to gain a livelihood by some labor, to cultivate the earth, to fish and to hunt, to obey the strongest, to defend one's property and country, to give himself up to gross enjoyments, these are the occupatious of the majority, and which require a very feeble exertion of the characteristic faculties of our species. Accordingly it is demonstrated by the most constant observation, that the frontal region, where we have seen the seat of the distinctive faculties of man, rarely surpasses a very moderate degree of development. How should elevated thoughts, profound views, a fondness for the arts and sciences, arise in these individuals? The propensities and the sentiments alone are keenly felt; because commonly their organs are much more voluminous, than those of the intellectual faculties. It is not reasoning, it is the propensities and the feelings, which influence their judgments and determine their actions. It is as easy to lead, as it is difficult to convince them. The too feeble development of the anterior superior cerebral parts, leads them to false judgments, to credulity, prejudice, and snperstition. Hence a blind confidence in the imaginary power of the most frivolous things, in talismans, amulets, (gris-gris,) scapulaires, dreams, oracles, favorable or unfavorable presages attached to the meeting of certain objects presented by chance; hence, the confidence felt in the cries of nocturnal birds, in the flight of a raven, in the entrails of an animal, in the auguries of fortune tellers, the power of socery and of witchcraft, &c. &c.

And if such weaknesses are rather the characteristic of the female sex, otherwise well-instructed, and very talented, the reason is, that usually the anterior superior cerebral parts acquire a much less development in women, than in men, and that, consequently they hardly realize, that there can be no effect, no event, without a cause.

In proportion as the cerebral parts, placed in the anterior superior region of the forehead, are more developed, the characteristic faculties of the human mind are more fully expanded. The man raises himself more and more, not only above the brute, but also above the crowd of his fellow-men.

We have just exhibited the results of the very favorable, but insulated development of the different cerebral parts of this region. These partial developments do not yet embrace all the extent of human intelligence. The views, although profound, are likewise still partial; and again, certain relations of things always escape these incomplete intellectual geniuses. These are the Pythagorases, the Heraclituses, the Anaxagorases, the Pyrrhos, the Democrituses, the Portas, Spinosas, Lockes, Malebranches, Berkeleys, Helvetiuses, and generally the authors of the most celebrated aberrations of the human mind.

But nature has not ordained, that our species should be always and entirely abandoned to error. No one, it is true, has the privilege of being secure against the assaults of illusion. Yet there sometimes exists an organization of the anterior superior cerebral parts sufficiently happy, to secure the best disposition of the intellectual faculties. In the same manner as, by an extraordinary development of certain parts of the posterior region of the brain, certain individuals gain the government over others, others again are called by a uniform and extraordinary development of all the organs placed in the anterior superior region of the brain, to constitute themselves the instructers of the human race. It is by means of this organization, that the true philosopher seeks the wisdom of the world. It is this organization, which involves the necessity and the faculty of discovering the relations which exist between an effect, a phenomenon, and its cause; of pursuing a long series of data: of embracing a vast field of observation; of subjecting some to others; of discerning the unknown by means of the

known; of comparing facts; of eliminating what is accidental, and recognising what is constant; of determining the laws of phenomena; of establishing principles and deducing their consequences; of ascending from particular facts and consequences to general laws, to principles; from effects to causes, and to descend from principles, from general laws to consequences, to particular facts; from causes to effects; of enriching nations with new truths; of spreading like a fire the beneficent rays of his light; of breaking the yoke of despotism and destroying the machinations of imposture.

It is *reason* then, the result of a happy development of all the anterior superior cerebral parts, which constitutes the essence of man, the true barrier which separates man from the brute. Though certain animals take advantage of the combination of events, they never elevate themselves to the discovery of general laws; they never gain general principles.

It is therefore, also, the different degree of development of the same cerebral parts, which, in respect to the intellectual faculties, distinguishes man from man. And if it has been given to the philosopher to penetrate the sanctuary of truth, he also acknowledges that the empire of prejudice, superstitions, and dissensions will endure for ever; since these moderate organizations must be perpetual.

My readers will now perceive how one may have a quality, a talent very much distinguished, be, for example, an excellent musician, mathematician, architect, poet, warrior, &c., and in regard to the philosophic spirit, be confined to the most absolute mediocrity.

The philosopher will direct his views to different objects, according as other organs still exercite a very energetic influence. Hence the class of pious philosophers, as Pascal, Bonnet, Montaigne, professor Sailer of Landshut; hence the natural philosophers, the poetical philosophers, Homer, Lucretius, Horace, Voltaire, &c.

Now examine the heads, portraits, busts of great philosophers of all ages, of Socrates, Pl. XCII. fig. 1; of Plato, fig. 2; of Bacon, Pl. LXXXII. fig. 6; of Galileo, fig. 4; of Leibnitz, Pl. XCII. fig. 3; of Wolff, Voltaire, Rousseau, Diderot, &c., and we shall no longer be astonished, that the artists of antiquity had already perfectly caught the organization or the form of the head of men, extraordinary for the development of their intellectual faculties.

Compare the cerebral organization of men, most distinguished for the development of their superior intellectual faculties, with the almost universal organization of women, and you will be satisfied that the inferiority of women, in this respect, is neither owing to the education they receive, nor to certain inconveniences peculiar to them; but solely to the less development of the cerebral parts placed in the anterior superior region of the forehead; this is the organic cause. As to its effect or physiological result, as I would not risk being disgraced with the fair sex, and as at 65 one stands more than ever in need of its good offices, I will adopt the words of a medical philosopher, who, for many years must have accustomed himself to dispense with the favor of the ladies.

"The differences," says Cabanis, "observed in the turn of ideas or in the passions of men and women, correspond to those, which we have remarked in the organization of the two sexes, and in their mode of feeling. There is no doubt, in their mode of feeling, a great number of things common to both, which refer themselves to human nature in general; but there are several essentially different, and it is these last which belong to the peculiar nature of the sexes. The point of view, under which objects present themselves to us, cannot fail greatly to influence the judgment we pass upon them; now besides, that woman does not feel as man, she finds herself in different relations with all nature, and her manner of judging is relative to other ends and other plans, as well as founded on other considerations.

"Judging differently of the objects which have not the same kind of interest for her, her attention does not make the same choice between them, she attaches herself only to those, which have relation to her wants to her faculties. Thus, while on the one hand she avoids painful and dangerous labors, while she limits herself to those which are more suited to her weakness, which exercise at the same time the delicate address of her fingers, the quickness of her glance, and the grace of all her movements; on the other hand, she is justly alarmed with those mental labors, which involve the necessity of long and profound meditation; she chooses those, which demand more tact than science, more vivacity of conception than force, more imagination than reasoning; those in which it is sufficient for a ready talent, to glance lightly over the surface of the objects.

"She ought also to reserve to herself that part of moral philosophy, which bears directly on the observation of the human heart and of society; for, in vain does the art of the world cover both individuals and their passions with its uniform veil; the sagacity of woman easily distinguishes each trait and each shade. The continual interest of observing men and her rivals gives to this species of instinct a promptitude and a certainty, which the judgment of the wisest philosopher could never acquire. If it be permitted so to speak, her eye hears all words, her ear sees all movements; and, to complete her art, she knows how to conceal this continual observation under the appearance of heedlessness or a bashful reserve.

"But, if the evil destiny of women, or the unfortunate admiration of misguided friends, urges them into a different path; if, not content with pleasing by the graces of a natural wit, by agreeable talents, by that social art which they doubtless possess to a higher degree than men, they wish also to astonish by displays of force, and join the triumph of science to gentler and surer conquests; then almost all their charm vanishes;

they cease to be what they are, in making vain efforts to become what they wish to appear; and losing the attractions without which beauty itself can maintain neither certain nor durable empire, they gain nothing of science but its pedantry and affectation. In general, learned women know nothing thoroughly; they ruin and confound all objects and all ideas. Their lively conception has seized some part, and they imagine they know the whole. Difficulties disgust them; and their impatience overleaps them. Incapable of fixing their attention long enough on one thing, they cannot experience the lively and profound enjoyment of deep meditation; and they are even incapable of it. They pass rapidly from one subject to another, and nothing remains to them but some partial incomplete notions, which usually form in their heads the most grotesque combinations.

"And for the small number of those who can obtain some real success in those departments altogether foreign to the faculties of their mind, it is perhaps yet worse. In youth, in maturity, in old age, what will be the place of those uncertain beings, who are not, properly speaking, of either sex? By what attraction can they fix the young man who is seeking a companion? What aid can infirm or aged parents expect from them? What pleasures will they diffuse over the life of a husband? Will they be seen to descend from the elevation of their genius, to watch over their children and their household? All these so delicate relations, which make the charm and the happiness of woman, then exist no longer. By wishing to extend her empire she destroys it. In a word, the nature of things and experience equally prove, that, if the weakness of her muscles forbids woman to descend into the gymnasium and the race course, the qualities of her mind and the part which she ought to play in life, still more imperiously forbid her to exhibit herself in the lyceum or the portico.

"Some philosophers have been seen, however, who,

making no account of the primitive organization of women, have regarded their physical weakness as the effect of the kind of life which society imposes on them, and their inferiority in the sciences and in abstract philosophy, as depending solely on their deficient education. These philosophers have sustained themselves by some uncommon instances, which prove merely, that, in this respect as in others, nature may sometimes by accident pass her own limits. Besides, woman belonging to that species of living beings whose fibres are altogether the most supple and the strongest, is assuredly very susceptible of being modified by habits contrary to her original dispositions. But the question is, if other habits do not suit her better; if she does not answer them more naturally; if, when nothing accidental and predominant controls her natural tendency, she does not become such as I have said she ought to be? What is certain at least, is, that these extraordinary women, whom they oppose to us, were all more or less unfitted for the purpose assigned them by nature, and for the functions to which they ought to confine themselves, in order to fulfil it. It is certain, that in the midst of all this parade, man hardly perceives that which alone can attract and fix him. Now, the happiness of women will always depend on the impression they make on men; and I think that those who truly love them, will have no great pleasure in seeing them carrying the musket and marching to the charge, or teaching from the elevation of a pulpit, and still less from the tribunal, where the interests of a nation are discussed."

XXIII. *Talent for Poetry.* (*Dichter Geist.*)

Every body allows that *poeta nascitur*, the poet is born a poet, because experience has proved that the poetical talent is not acquired. But it is of poetical genius as of the organ of the soul; every body agrees,

that the brain is the organ of the soul, and, from the moment when we attempt to define this assertion accurately, we constantly fall into contradictions. From the moment when I say, I am going to show that poetical talent is innate, that it is produced by the favorable development of a peculiar cerebral part, every body cries out against this idea, and the poets more than all the others.

For myself, I was for many years opposed to admitting this point of doctrine. I knew that poetical talent could not be acquired by studying the principles of the art; I knew that the poet found within himself the principles of his art, as the musician, without thinking of the laws of vibration and the relations of tones, reveals them in a manner, by the music which he creates; but I had a difficulty in conceiving, that there was a peculiar organ, whose exaltation determined the poetical talent. I saw in it only the result of the action of several other organs, endowed with great energy. If I had confined myself to this idea every body would have been of my opinion. Whenever I inquire of a poet, to what intellectual faculty he attributes his talent, he answers by enumerating a great number of faculties and acquisitions. A sure tact, he says, a refined taste, the faculty of representing by images, sentiments, ideas, events, and of offering an interesting picture of them, a fruitful and ardent imagination, invention, these are the elements which constitute the poet, and these elements themselves suppose several intellectual faculties.

But we must renounce this generally received opinion, if the most exact experience and observation belie it. I begin, then, by showing, that the poetical talent is not the result of several eminent intellectual faculties taken collectively; but that it depends on the energy of a peculiar fundamental faculty, whose manifestation may indeed be modified, but by no means determined from the first by other powers. Then I shall show, that a very favorable development of the

organ of this faculty is, in fact, met with in all the great poets.

Before all, however, I must observe to the reader, that we should not honor every versifier with the title of poet, as is too generally done. I well know that measure gives a certain charm to the subjects which poetry treats. I am not ignorant, that poetical genius ordinarily manifests itself in the first place by verses; but no one will deny that one may be a great poet in prose. The Telemachus of Fenelon, the Idylls and the Death of Abel of Gessner, are examples. The Iliad and Odyssey, translated by Bitaubé, the Paradise Lost, by Mosneron, are still poetry, though deprived of the charm of verse.

A Talent for Poetry depends on the great Activity of a particular Fundamental Faculty.

Poetry, like all other things for which we have received from nature a peculiar faculty, is subjected to certain laws. These laws have not been invented by man in order to be able to teach them to others; they are revealed to him by the aid of a peculiar organization. Whenever this organization has acquired all its fulness, or at least a considerable degree of activity, there result productions in which these laws are observed. Such productions only inform the observer of the existence of these laws, and they are collected for the use of those who are less happily organized.

This explains to us why certain individuals attain a high perfection in such or such a science or art, before having had the time to instruct themselves in its rules. It is thus with all poets possessed of great genius. The study of rules and models may modify the innate talent, and adapt it to circumstances and the taste of the times; but the talent itself is as independent of all these external modifications, as the

weight of the ball is independent of the shock received by the bodies, it strikes in its descent.

"This explains why there is no tribe of barbarians who have not their rhymes of passion or of history; why men, in the earliest periods of society, take delight in compositions in verse; why a savage, born a poet, clothes his conceptions with images and metaphors. 'We have planted the tree of peace;' says the American orator, 'we have buried the hatchet under its roots; we will hereafter rest beneath its shade. We will join to extend the chain, which unites our nations.' Such are the accumulated metaphors, with which the public harangues of these people are filled. Thus have they promptly adopted those lively figures, that liberty and boldness of style, which subsequently learned men have judged so proper to express the rapid transitions of the imagination, and the emotions of a passionate soul.

"In the earliest ages of Greece, priests, legislators, philosphers gave their instructions in verse; they joined to them the charm of music and of heroic fiction.

"That poetry should have been the first kind of composition among all nations, is a less surprising thing, doubtless, than to see a style, so different in appearance, and so removed from common usage, almost universally the first which arrives at maturity. The most admired of poets lived before the times of history, and, to use the expression, before the time of tradition. The artless songs of the savage, the heroic legends of the bards, have sometimes a beauty to which the perfection of language could add nothing, and in which the most refined criticism can find nothing to reform.

"Although in the conceptions of Homer the discernment is equal to the sublimity, we cannot go back beyond these times, and we see no light which announced the torch of his genius and the divine flame of his soul. What in others is invention, in him is inspiration; and we perceive, that it was not so

much reflection, as a natural instinct, which presided over the choice of his thoughts and expressions.

But, whatever be the propensity of men for poetry from the earliest times, whatever advantages they have for succeeding in this kind of literature, whether poetical compositions arrive first at perfection, only because they are the first cultivated, or whether poetry has a peculiar charm for those lively imaginations, which are best fitted to perfect the eloquence of their natural language; it is a remarkable fact, that not only in those countries, where all kinds of composition are indigenous, and arise according to the order of natural progression, but even in Rome and modern Europe, where they have been introduced from abroad, we find, in all languages, poets who are read with pleasure, while the cotemporary prose writers present nothing worthy of attention.

"In Greece, Sophocles and Euripides preceded the historians and the moralists. Among the Latins, not only Nævius and Ennius, who wrote the Roman history in verse, but Lucilius, Plautus, Terence, we might add Lucretius himself, were anterior to Cicero, Sallust, and Cæsar. Italy made her boast of Dante and Petrarch before she had a single good writer in prose. Corneille and Racine in France open the golden age of proasic composition; and England had not only Chaucer and Spenser, but Shakspeare and Milton also, while her essays in science and history were yet in their cradle, and deserve consideration only from the subjects to which they relate."

I have transcribed these passages, because they prove, that poetical talent depends rather on one active and independent faculty, than on any union of intellectual faculties. What Ferguson says of Homer is also applicable to Petrarch and Dante, who are perhaps as astonishing men as Homer; like him they had no predecessors, no rivals; like him, they came out already formed from the womb of that profound obscurity, in which their country was buried. It might

be said, that the day waited for them to appear, and then displayed itself suddenly in its full splendor.

It appears to me in general, that poetry is too jealous a divinity for art, study, imitation, to be able to supply its inspiration. I repeat it, study may enable the poet to conform himself to the taste of his age, and to avoid certain faults in execution; but this is all. There are very few examples of distinguished poets, who have not found out their talent at a late period by some accidental circumstance. La Fontaine, for example, at twenty-two years was ignorant of his talent for poetry. The beautiful ode of Malherbe, on the death of Henry IV., made him feel from that moment, that he was a poet. The tragical end of Henry only made him attentive to a faculty, which, though it had not manifested itself till that moment, did not the less exist in all its force; it did not create it.

Most generally the poetical talent manifests itself in early youth, or at least without any previous study relative to this subject, and in a great disproportion to the other intellectual faculties.

Pope, at twelve years of age, made an ode on rural life, which the English compare to the best odes of Horace. At fourteen, he produced some passages translated from Statius and Ovid, which they place by the side of their originals. At sixteen, he wrote pastorals worthy of Theocritus and Virgil.

Tasso, when only seven years of age, composed verses. At seventeen, he wrote his poem of Rinaldo. At twenty-two, he commenced his poem of Jerusalem Delivered, and finished it at thirty.

De la Grange-Chancel wrote a comedy in three acts at the age of nine years; his tragedy of Jugurtha, at sixteen.

Richardson, at the age of twelve years, sketched the character of a lady who enjoyed a high reputation, and whom he suspected of profound hypocrisy.

Metastasio, at the age of ten years, made verses which astonished the connoisseurs; he was only fourteen when he composed his first tragedy.

Voltaire made verses at the age of seven.

Billaud, a joiner known under the name of Master Adam, became a poet in his shop, without any knowledge of literature.

Every one knows the famous shoemaker poet of London. At Paris the shoemaker François, the author of the Siege of Palmyra, offers us a similar example. The latter had no sooner collected some historicalnotions on his subject, than he produced his tragedy in the style of Corneille. The productions of this astonishing man sufficiently prove, that he would have been a distinguished man in his nation, had not the ingratitude of his cotemporaries exiled him from Parnassus and confined him to his shop.

Neither in these last cases, nor in those where the poetic talent has shown itself from the earliest youth, can we say, that it is the union of several intellectual faculties, developed and cultivated by study, which constituted the genius of the poet.

The examples of men, who have withdrawn from their original destination, to devote themselves to poetry which they passionately loved, also prove, that this faculty is determined by a *tendency* of mind altogether peculiar.

Ovid was destined to the bar, but poetry possessed irresistible attractions for him. His father, fearing that his passion for verses would debar him from that fortune, which his talents promised him, wished in vain, that he should devote himself to speaking. Ovid was born a poet, and was such in spite of his father. *Et quod tentabam scribere versus erat.* Still, not to appear entirely to disdain the paternal counsel, he studied the orators and composed declamations. But his inclination for poetry predominated, and he reconciled himself to the muses.

Petrarch, also destined to the bar, soon conceived the greatest aversion to jurisprudence.

The friends of Cervantes wished to make him an ecclesiastic or a physician ; but he was born for poetry, and made verses in spite of them.

It was thus that Molière, subdued by his passion for verses and the theatre, triumphed over the opposition of his family, and became the first genius of his age.

Boileau, whom his father had placed with a notary, showing an invincible disgust for chicanery, it was proposed to him to become an ecclesiastic; but theology did not please him, and he resigned himself entirely to his inclination for making satires.

Schiller first studied jurisprudence, which he soon renounced in favor of surgery and medicine, with which he likewise became disgusted in a short time. Neither the remonstrances of his parents, the counsels of his friends, nor the absolute orders of his sovereign, could turn him from his dominant taste for poetry, the ancient languages, history, and the higher philosophy. He says in his works, speaking of himself; "Fortune, by one of her ridiculous caprices, wished to condemn me to be a poet in my native city. An irresistible inclination for poetry infringed the laws of the institution where I was educated, and thwarted the plan of its founder."

So much, adds the biographer, J. J. Berché, in men of superior genius, does all-powerful nature overcome the principles and even the object of education.

Whatever may be the talents and acquirements, which direct a distinguished poet in choice of his subjects, it is not the less certain, that these talents and acquirements do not constitute poetical genius; that, to make a poet, requires a particular faculty, independent of all others. But what constitutes the fundamental power on which this talent depends; that is, what functions does the organ of poetry fulfil in those cases, in which it has acquired only an ordinary degree of development? This I should not dare to decide. But I can affirm, that it is the considerable development of a determinate cerebral part, which produces poetical talent. I can indicate, with exactness, the region of the head where this cerebral part is placed, and de-

scribe the prominence, by which it manifests itself on the cranium.

Of the Poetical Talent in Mania.

"I was troubled, sometimes," says Pinel, "to follow the incorrigible garrulity and a sort of flow of unconnected and incoherent words of an old scholar, who, at other times, fell into a stern and savage silence. When any piece of poetry, in which he had formerly delighted, suggested itself to his memory, he became capable of continuous attention, his judgment seemed to regain its rights, and he composed verses, in which there reigned not only a spirit of order and of justness in the ideas, but also a regular supply of fancy and some very happy sallies." In another place the same author expresses himself thus:

"Certain facts appear so extraordinary, that they have need of being borne up by the most authentic testimony, in order not to be called in question. I speak of the poetical enthusiasm, which is said to have characterized certain paroxysms of mania, even when the verses recited, could nowise be regarded as an act of reminiscence. I have myself heard a maniac declaim, with grace and exquisite discernment, a longer or shorter succession of the verses of Virgil or Horace, which had been a long time effaced from his memory, inasmuch as, after his education was terminated, he had been twenty years absent in the American Colonies, given up to the pursuit of wealth, and the reverses, occasioned by the revolution, had alone thrown him into this distraction of mind. But the English author, whom I have already cited, attests that a yound girl of a feeble constitution, and subject no nervous affections, had become insane, and that during her delirium she expressed herself in very harmonious English verses, though she had before shown no sort of disposition for poetry. Van Swie-

ten also relates another example of a woman, who, during her paroxysms of mania, showed a rare facility for versification, though she had before been occupied with manual labor, and her understanding had never been enriched by culture."

We know that Tasso made his finest verses during his paroxysms of mania. How often are poets obliged to provoke inspirations by spirituous liquors, which they take to the extent of producing intoxication, or plunging themselves into a state of madness?

I have already spoken of one Leon, of Vienna, who, during the paroxysms of a nervous fever, made verses in the manner of Klopstock.

Seat and external Appearance of the Organ, whose great Development produces the Talent for Poetry.

The first poet, who struck me by the form of his head, was one of my friends, who often composed extempore verses when least expected to do so, and had thus gained for himself a kind of reputation, although, in other respects, an ordinary man. His forehead immediately above the nose, rose perpendicularly, then retreated and extended itself much laterally, as if a portion had been added to each side. I remembered having observed the same form of head in the bust of Ovid. In other poets, I did not always find this forehead first perpendicular and then retreating, so that I regarded this form of forehead as accidental. But in all, I remarked these prominences in the anterior lateral part of the head, above the temples. I began, thenceforth, to regard these prominences as the distinctive mark of poetical talent. Still I spoke of them to my hearers with the tone of doubt, and the more so, as I was not yet convinced at this period, that poetical talent was a fundamental faculty. I waited, therefore, before deciding definitely, till I had collected a larger number of observations.

Soon after, I procured the head of the poet Alxinger, in which this cerebral part, as well as the organ of attachment, is very much developed, while the other organs are only feebly so. Soon after the poet Junger died, I also found in his head the same prominences. I however saw these cerebral parts still more strongly developed in the poet Blumauer, who united to it the organ of sarcastic spirit. At this period Wilhelmine Maisch gained, at Vienna, a reputation by his poetry; I found in him the same enlargement above the temples. I found the same organization in Madame Laroche, at Offenbach, near Frankfort; in Angelica Kauffmann; in Sophia Clementina de Merken; in Klopstock; in Schiller, whose cast I own; we found it also very marked in Gesner, at Zurich.

When at Berlin, I spoke of this organ in my public lectures, always expressing myself with much reserve in regard to it; Nicolai invited Spurzheim and myself, to go and see a collection of nearly thirty busts of poets, which he possessed. To our great joy, we found in all, the region indicated, more or less prominent, according to the more or less decided talent of each poet.

From this moment I taught boldly, that, however improbable this assertion might seem, we must admit a peculiar organ for the talent of poetry, and that consequently poetical genius supposes a particular fundamental faculty.

All the observations, I had occasion to make afterward, confirmed this idea; and now I maintain without hesitation, that there never has existed, and never will exist a poet, in whom the cerebral parts referred to, are not very greatly developed.

At Paris I moulded the head of Legouve after his death, in which this part is likewise very decided. Spurzheim and myself opened the head of the late Delille, and pointed out to several physicians, who were present, the considerable development of the convolutions placed under the protuberances which I have

mentioned. They exceeded all the others. I have the cast of one of the hemispheres of his brain.

In a rather numerous company they asked me, in order to put organology to the test, what I thought of a little man at some distance from me. As it was dusky, I said, that in truth I could not see him very well; but however, that I distinguished, that he had the organ of poetry extremely developed; they then told me, with all the marks of astonishment, that it was the famous cordwainer-poet François. Afterwards I moulded his head, and I now exhibit his bust to my hearers, as having the external appearance of the organ of poetry.

In the brain it is convolution xxv. Pl. viii. and ix. which constitutes it.

By the considerable development of this convolution, there rises from each side of the cranium a prominence, which commences at about half the height of the forehead in front, above the temples, and extends obliquely from below upward, and from before backward, about two inches. These two lengthened protuberances give to the superior part of the head, a great breadth and so singular a form, that painters, engravers, and sculptors rarely venture to present them in all their prominence.

Now let us pass in review the portraits and the busts of poets of all ages, and we shall see, that this conformation is common to them all. I greatly regret, that the long hair of Corneille, and the ample perruque with which Racine is dressed, prevent our seeing these organs in them. But compare Pindar, Pl. xcii. fig. 5, Euripides, fig. 6, Sophocles, Heraclides, Plautus, Terence, Virgil, Tibullus, Ovid, Horace, Juvenal, Boccacio, Ariosto, Arétin, Tasso, Milton, Boileau, J. B. Rousseau, Pope, Young, Gresset, Voltaire, Gesner, Klopstock, Wieland, &c.

I found the same organization in the princess of Salm, in Messieures Andrieux, Pl. xcii. fig. 4, Lemercier, Dupaty, &c.

This is especially the form of Homer's head, which must strike every one; its superior lateral part forms two extraordinary prominences. I am not ignorant that some *savans* have expressed doubts in regard to the authenticity of this bust, and consider it as ideal.

But whether it be an ideal composition or a portrait, the existence of these prominences is nevertheless a remarkable phenomenon. Why should this form have been given to the head of the father of poetry, if this head were not really the portrait of the author of the Iliad? Doubts have likewise been raised in regard to the authenticity of Raphael's bust; but the extraordinary development of the organ of the arts, joined to that of the organ of imitation, seems to me to prove, that it is really the portrait of this inimitable artist.

After all, if the bust of Homer is ideal, how has the artist been able to divine that form which, of so many innumerable conformations which nature offers, is the only true one? Did he choose the most distinguished poet of his time, for the model of his bust of the author of the Iliad? In this case the observations of the artist would serve as a confirmation of my discoveries.

In a hospital I found this organ rather developed in an insane man; I said to the physicians who accompanied me, that I found in him the external mark which indicates a talent for poetry. He really had this talent; for, in his state of alienation, he continually made verses which sometimes did not want vigor. This man was of the lowest class and without any education. We saw in the collection of Esquirol, the bust of a mad woman, who was continually making verses; in this head the organ of poetry is considerably more developed than the others.

Now, if in all cases in which poetical talent is manifested to a high degree, the portion of the brain referred to is considerably developed; if, with a great mediocrity of the other talents, the poetical talent may manifest itself alone to a high degree, (and in this case the cerebral portion in question is strongly marked,) if,

even in mania, in the heat of fever, this faculty may exist alone, or be alone in a state of inaction; cases of which I have adduced examples above; one must be the blind slave of received prejudices, not to acknowledge, that poetical talent is a fundamental faculty, and that the organ of this faculty is placed in the region, which I have pointed out.

If I am asked why poets choose subjects so various, why one writes romances, another tragedies, comedies, idyls, odes, epic poems, &c., let us remember, that this question presents itself for all the fundamental faculties. The musician, the painter, &c. choose such or such a subject, according as other organs are suited to the predominant organ. Poetical talent, joined with the sense of elevation, produces the odes of Pindar and of J. B. Rousseau; with the sense of devotion the Psalms of David, the Paradise Lost; with the instinct of murder, the tragedies of Shakspeare and Crebillon; with the instinct of physical love, the Art of Love of Ovid and of Gentil Bernard, the sportive works of Piron, of Grecourt, of Arétin; with the spirit of observation, Lucretius's work on the Nature of Things and Fenelon's Telemachus.

The bust of Quinault, the author of Alcestes, of Theseus, Atys, &c., presents the organ of music to a very high degree. This explains why Lully prefers him to all the other poets; he found in him alone all the qualities which he sought; a delicate ear which chose only harmonious words, a great facility for rhyming, and an extreme docility, to lend himself to the ideas of the musician.

These observations also prove that even the highest degree of activity of the other fundamental faculties, does not suffice to present the objects, with which they are occupied, clothed in the charms of poetry, and to create the poet in their department; for, in this case, every epicurean, great general, ambitious man, would be a poet. It requires a peculiar and proper

power to animate all the others with the sacred fire of Apollo.

XXIV. *Goodness, Benevolence, Gentleness, Compassion, Sensibility, Moral Sense, Conscience.* (*Gutmethigkeit, Mitleiden, Moralisher-sinn, Gewissen.*)

As this faculty is common to our species and to brutes, I might have treated of it in connexion with the other qualities and faculties, which are common to us with them; but I have preferred to follow the same order, which nature herself has established, in the arrangement of the organs of man, the principal object of my researches. In this manner I shall hardly be liable to commit errors; whereas any division I might make of the qualities and faculties into determinate classes, might be subject to many modifications.

History of the Discovery.

One of my friends used often to say to me, as you are engaged in the researches of the external marks which indicate the qualities and faculties, you ought to examine the head of my servant Joseph. It is impossible to find goodness in a higher degree, than in this boy. For more than ten years that he has been in my service, I have seen nothing in him but benevolence and gentleness. This is astonishing in a man who, without any education, has grown up in the midst of an ill-bred rabble of servants. Though at this period I was very far from placing what is called a good heart in the brain, and consequently from seeking a mark of it in the head, the repeated solicitations of my friend at length awakened my curiosity.

I recalled to myself the constant conduct of a young

man, whom I had known from his tenderest childhood, and who distinguished himself from his numerous brothers and sisters, by the goodness of his heart. Though he passionately loved the sports of his age, and his greatest pleasure was to scour the forests in pursuit of birds' nests, as soon as one of his brothers or sisters was sick, a more irresistible inclination kept him at home, and he bestowed on the patient the most assiduous attentions. When there were distributed to the children grapes, apples, cherries, he had always the smallest part, and rejoiced to see the others better provided for than himself. He was never better pleased, than when any thing agreeable happened to those he loved; in this case he often shed tears of joy. He took care of sheep, dogs, rabbits, pigeons, birds; and when one of his birds died, he wept bitterly; which never failed to draw on him the ridicule of his companions. And even now, benevolence and goodness are the distinctive character of this individual.

His character has certainly not taken this turn from education. On the contrary, others, in regard to him, have pursued a conduct, which should have produced an opposite effect. I began to suspect therefore, that what is called a good heart, is not an acquired quality, but innate.

At the same time I spoke of the goodness of heart so highly extolled, of the domestic Joseph in a numerous family. "Ah!" interrupted the eldest daughter, "our brother Charles is precisely the same; you must really examine his head. I cannot tell you how good a boy he is," &c.

I had therefore in sight three subjects, whose goodness of character was well acknowledged. I took casts of all three: I put their busts side by side, and examined them till I had found the character common to these three heads, otherwise very differently formed. In the interval, I had applied myself to find similar subjects in schools, families, &c., in order to be prepared to multiply and rectify my observations. I also

extended these observations to animals, and I collected in a short time so great a number of facts, that there is no quality or fundamental faculty and organ, whose existence is better established than that of goodness, and the organ on which it depends.

Natural History of Goodness, Sensibility, Benevolence in Man.

Is man born good or wicked? This question, so often agitated by philosophers and moralists, has necessarily remained undecided till this moment, because the true sources of our propensities, the different motives of our actions, have remained unknown. The study of organization, and of its influence on the exercise of our innate dispositions, has been neglected; hence the vagueness and arbitrariness, which prevail in all discussions on the true character of the human race. Some are struck only by examples of wickedness, malice, persecution, oppression, injustice, vengeance, treason, infidelity, perjury, envy, ingratitude, calumny, imposture, selfishness, &c. Others are touched with traits of goodness, benevolence, justice, generosity, gratitude, pity, compassion, disinterestedness, generous pardon, resignation, &c. The former quote in support of their opinion the characters of Tiberius, Nero, Commodus, &c., &c. The latter boast of Marcus Aurelius, Antoninus Pius, Henry IV., &c., &c. Thus the detractors of our species are as well sustained in saying, that man is born wicked, as the partisans of the other opinion in maintaining, that he is born good. But, on either side, there is the mistake of embracing the one or the other of those opinions exclusively. Let us examine man under the double relation of his proneness to good and to evil.

The Creator has destined men to live in Society. It was therefore necessary to bind them strongly by the principle of sympathy. They had to share their pleas-

ures and their pains, and often to suffer more from the misfortunes of others than from their own. In this, Providence manifests itself in a striking manner. If the sufferings of our fellow-men excited aversion in us, the first thing we should do at the sight of an unfortunate or suffering man, would be to banish him from us, instead of running to his relief. This sympathy, this sentiment of benevolence, therefore, is the cement of human society, of public happiness.

We shall hardly find a family, however small, in which there are not some individuals distinguished by their good heart, by sensibility, by a benevolence resembling that, of which I have quoted some examples, in the history of the discovery of the external sign of this excellent quality: while other individuals shall give evidence of a disgusting insensibility, of selfishness, love of mischief, and sometimes even of a propensity to cruelty.

Every day I meet the sad spectacle of animals inhumanly treated; it may be a poor sheep struck with repeated blows, while dragging him to slaughter; it may be an unhappy horse, sinking under his load, while his pitiless driver mangles him with the lash, after having unmercifully overloaded him. But I am not the only one, whose heart bleeds at this inhuman treatment. Young and old, men and women, strangers and inhabitants, burst out with indignation against this cruelty. There is no one, who has not formed the wish, that the animals were taken under the protection of public benevolence. If, sometimes, the great find pleasure in putting at bay an unhappy stag, at least there is no flatterer so vile, as to have counted these remains of ancient barbarity, in the number of royal virtues.

Man is naturally rather good, just, and benevolent than wicked and unjust, especially when he is calm and not impelled by passion in a different direction. Men of simple manners, the easy peasants, the great mass of the people, industrious artisans, are very benev-

olent towards their fellow-creatures. We rarely see among them an orphan, who fails to find all the succour which his situation requires; and their custom is to treat him as their own children, often, even with more tenderness. Rarely does the poor man, who has knocked at their door, retire with his hand empty; in fine, the direct impulse is always that of benevolence for the unhappy.

Children are accused of cruelty, because they amuse themselves with tormenting animals, which insensible persons sacrifice to their wantonness; but they have no idea of the sufferings they cause to a bird, to an insect, because the signs of pain, in these beings, are neither sensible enough, nor sufficiently analogous to our own, for the commiseration of children to be excited by them. If they are playing with a dog, and he utters a cry of pain, their natural pity is almost always awakened. It is rare to see them resist this feeling.

The populace runs with eagerness to executions; they seek with ardor the spectacle of these bloody sacrifices. Perhaps we ought, in this case, rather to accuse them of coarseness than of barbarity. Abundant tears always attest the compassion of the greater number of spectators. The horror, which the criminal inspires, is often annihilated, to give place to pity alone. In this I perceive another secret motive; every power demands to be exercised. It is especially the sentiment of benevolence, which experiences this necessity. All tragic scenes attract a crowd of spectators; every one loves to stop, to become penetrated with pity, to identify himself with the sufferings of others. There are but a small number of beings so ill organized, as to enjoy the sufferings inflicted on their fellow-men.

Several moralists have already given, as an evidence of the benevolence of mankind, the universal tenderness with which men are seized at tragic spectacles, when a well managed representation gives a probabil-

ity to the events, which are exhibited. It is easy to observe all that is added to an impression generally felt, by the communication of feelings; and the rapidity, with which the emotion is propagated, does not allow us to suppose, that it is owing to any reference to one's self. In romances, when the situations are introduced in a natural manner, when a happy tissue of probable events has so attached us, that the fabulous has disappeared from our eyes, the personages interest us, and we share all the emotions by which they are themselves agitated. It results from this, that it is sufficient to make men forget their private interests, in order to restore them to nature, and consequently to pity. Here again is felt the necessity of exercising benevolence. In ordinary life, we rarely meet scenes so interesting, so sad, so touching, as tragedies and romances represent them. It is this same necessity, and not that of being moved in general, nor that of being occupied, nor is it always curiosity, which leads men to seek events calculated to excite compassion, and to take the part of an unhappy man; to interest themselves for those who are a prey to persecutions and all sorts of dangers: it is this same necessity of exercising the feeling of benevolence, which finally lends a peculiar charm to all great misfortunes, to all disastrous events.

A superficial glance on what ordinarily passes in life, might lead us to believe, that the care of subsistence, and interest in general, is the principal motive of human actions. In many persons it prevails, in fact, to the extent of not suffering the concurrence of any other object of attention or desire. But, if interest were an exclusive motive, an injustice which impairs our fortune, or a benefit which augments it, would produce in us the same emotions, as a torrent which lays waste our possessions, or a rain which fertilizes them. We should consider, in our fellow-men, only their influence on our interests. Now observe men, when they see others a prey to misfortune and

to suffering. We daily observe men precipitate themselves into water or rush amid flames, to save those who are threatened with destruction. Hardly have public calamities, such as conflagrations and floods, ravaged the property of our fellow-men, when every body is eager to repair their losses: we make collections, and give spectacles and concerts for the relief of the unfortunate. Those, whose means are too limited, often have a painful contest to sustain, between this want of power and the natural impulse, which leads them to do good. The child, that utters cries of pity when he sees his brother attacked with convulsions; the man who abstains from asking an office, when he learns, that his friend, burthened with a numerous family, makes the same request; the soldier, who presents himself to receive the fatal blow, which would have reached his commander; Saint Vincent de Paul, who had himself chained among the crew of galley-slaves, in order to restore an unhappy criminal to his wife and children, plunged in the most extreme misery, &c.; such beings, assuredly, cannot be suspected of having acted from selfish feelings, from a regard to personal interest.

Is there any one, who is not touched even to tears, when he learns, that measures have been taken to relieve indigence and misery? When he sees the innocent acquitted, pardon granted to an accused man more unfortunate than criminal, or the sick restored when apparently about to sink under the weight of disease? Are the saloons ever better filled, than when they give spectacles and concerts for the benefit of the unfortunate? And in those moments, when we ourselves are a prey to affliction, is there any thing which more calms and animates our hearts, than the recollection of the good we have done, and the compassion, with which we see others moved in our favor?

The pleasures derived from benevolence, are as personal to us, as those, which come from any other

desire whatever; and the exercise of this sentiment is one of the principal sources of our enjoyments. Every act of goodness or attention from parents to their children; every heartfelt emotion towards our friends or any other individual, are true pleasures. When we experience this tender sympathy, we cannot avoid approving ourselves; we rejoice in being so constituted; and this sentiment becomes an inexhaustible source of satisfaction. Pity and compassion themselves, regret and sadness, when they arise from sensibility, participate in the nature of the emotion which has given them birth; if they are not positively pleasures, they are at least sweet and noble pains, which one would willingly undergo for the satisfaction of aiding those, who are the objects of them. In this class of affections, even excesses in liberality and generosity, never draw after them those regrets, that remorse, which accompany hatred, envy, avarice, and wickedness.

When benevolence is threatened with becoming enfeebled towards those, who are neither our parents, neighbours, nor acquaintances, it deludes itself, and is converted into zeal for the public good, and enthusiasm for humanity. All the inhabitants of the world are then worthy objects of its attention and its exercise.

The simple recital of events, which happened in distant ages and countries, produces in us admiration, pity, or indignation. Benevolence makes an interesting spectacle of human life, and persuades without ceasing even the most indolent, to take one side or the other in the scenes, which have passed among our ancestors. It sheds pleasure on the present life, on domestic life, on all which surrounds us; and by the expression it gives to the physiognomy, it surpasses the charms of beauty; it is from this that the situations of life, derive what they possess most touching. The price of a favor has no longer any bounds, when it bears the impress of the goodness of the soul; and the misfortune, which is not the result of ill conduct,

is supported with resignation. By a spontaneous emotion, we grant our friendship to those, in whom we think we discover the marks of goodness. Even the hero, who sheds his blood for his country, appears to us to deserve our love and admiration, only so far as he is benevolent, compassionate, generous. Can one pronounce the names of Bayard, Duguesclin, Turenne, Scipio, &c., without experiencing that virtuous emotion, which awakens the idea of true goodness?

Benevolence extends even to posterity. The philanthropist sacrifices his personal well being to his heirs, to those who will see the day long after him. It is for them that he plants trees, that he bequeaths legacies to beneficent institutions. It is for them, that he labors day and night, that he braves insults, calumnies, persecutions, because he knows, that a time must come, when his works will be blessed for their beneficent influence on humanity. Without this sentiment of general benevolence, how many facts, how many useful discoveries would be buried under the weight of the envy, the jealousy, the bad faith, and the ingratitude of contemporaries!

In all ages, the pardoning of evil doers and enemies has been commanded by the most elevated morality. Man, endowed with an energetic sentiment of benevolence, is naturally disposed to that noble and virtuous resignation, to that self-denial, which to every one else appears so painful, that we regard such acts of generous pardon, especially when it goes so far as to return good for evil, as the most admirable and most sublime efforts of human nature. The sensitive man, when he is injured, experiences a primary emotion of resentment, of vengeance. No one is so secure from self-love, that he cannot sometimes be surprised into unworthy emotions. But hardly has the benevolent man returned to himself, when every project of vengeance disappears, as contrary to moral greatness; he pardons, and contents himself with pitying and despising the intrigues of baseness and malice.

The wicked man, on the contrary, charges the benevolent and generous with weakness; he boasts of that force of character which, to judge by what he says, is necessary to put in execution his vindictive conceptions. I shall call that man, so inclined to vengeance, *strong*, when he has learned how to conquer himself, and to renounce that satisfaction so sweet in his eyes, of rendering evil for evil. Was Marcus Aurelius weak, when he refused to see the head of the rebel Cassius; when he burned his letters, in order not to be obliged to punish those, who had been concerned in revolt, and pardoned all the cities which had embraced the same party? When Titus condemned all accusers by profession, to be scourged and sold as slaves; when he pardoned his brother Domitian, and loaded with favors two senators who had conspired against him, were these acts of weakness? Has Antoninus ever been judged weak, because he despised and banished informers; because he restored to Rome, by his goodness, a repose of which his predecessors had deprived her by their ill-conduct? Was Henry IV. weak, when he pardoned all the leaguers; when he answered to one who spoke to him of an officer of the League by whom he was not beloved, "I will do him so much good, that I will force him to love me, in spite of himself?" When he replied to those, who exhorted him to treat with rigor some places of the League, "The satisfaction, we derive from vengeance, endures only for a moment; that, which we draw from clemency, is eternal?" The modest and generous Turenne, when he contented himself with banishing from the army a wretch, who had come into his camp with the design of poisoning him, can he be accused of weakness? The élite of great men rise in mass to refute this paradox, invented and approved by the despicable genius of vengeance.

In fine, let us place benevolence on the throne; shortly it will be nothing but strict necessity, that will dictate imposts; the cities and villages afflicted by

calamities will be consoled; the patrimony of the prince will be consumed in acts of beneficence, as if he had renounced the right of property; acts of rigor will be reserved for the incorrigible offender; the love and happiness of the people, will be the principal end of government; informers will be despised and banished; conspiracies will be strangled in their birth, before they have time to draw in the imprudent to their ruin; war, almost always a public pest, will be avoided, and the life of a good citizen, preferred to the death of a thousand enemies; man, being attached to nothing so strongly as to the worship, which he has been taught from infancy to believe, the most acceptable to his Creator, there will be not only tolerance, but entire liberty of conscience. Credulity, superstition, error, imposture, charlatanism, slavery, chicanery, the seizure of the goods of orphans and wards, will be the only objects of reform and persecution. To soften brutal passions, and to dispose the people to honest enjoyments, moral, religious, and civil instruction will be imperative on all classes; even the malefactor will be judged worthy of compassion. Every where we shall see the institutions of benevolence multiplied; hospitals for the sick, for the insane, for the deaf and dumb, the blind, the incurable, old men, invalids, &c. The brothers and sisters of mercy will have the first claim to public esteem. We shall see asylums formed for lying-in women, for foundlings and orphans. Every where schools, academies, universities, museums, libraries will foster the arts, sciences, &c., for the purpose of increasing the happiness and ennobling the enjoyments of men.

Such are the precious results of goodness, benevolence, sensibility. Who then will dare to doubt, that this beautiful quality is inherent in human nature? Henceforth am I not right, when according to the example of Marcus Aurelius, I build to it a temple in the most perfect organization which exists on the earth? But is this the primitive fundamental

quality? Is not benevolence, as I have thus far represented it, rather the energetic action of another quality, which would be the primitive destination, and to which the organ in an ordinary development would be devoted, as happens with self-defence, the voracious propensity, and the sense of property?

Moral Sense, Sentiment of Justice and Injustice.

The reader will remember, that I have been able to determine the organs only in their extraordinary development, which has for its result a very energetic disposition. This disposition, when it becomes active, sometimes puts on a character, in appearance altogether different from its ordinary manifestation. The propensity to libertinage results from the undue development of the organ of propagation; and a too great activity of the sentiment of property, induces the propensity to theft.

It is the same with benevolence. The individuals, who had become remarkable by peculiar goodness and benevolence, offered also a very great development of the cerebral part indicated in the historical sketch. Consequently, goodness, benevolence, sensibility, are not the primitive destination or ordinary function of this organ, but the manifestation of its exalted function. Is benevolence, then, something more than the primitive function of the organ from which it emanates? What is this primitive function?

It being too difficult to make positive observations on the fundamental original destination of an organ, I am under the necessity of resorting to reasoning. I think I have reasons sufficiently plausible to establish, that the primitive destination of this organ is, to dispose man to conduct himself in a manner conformed to the maintenance of social order. I call this disposition the moral sense, the sentiment of justice and injustice. Let us first make some reflections on the ex-

istence of this sentiment, and on the difference, which is thought to exist between it and benevolence, and we shall then be led to the conclusion, that this last is only a more elevated degree of action of the moral sense.

Since man was destined to live in society, the moral sense has become indispensable to him. Without it no association, no family, no union, no nation could exist. If there is no obligation imposed on me towards you, you will acknowledge none towards me. We shall be obliged to isolate ourselves from each other; without reciprocal duty there can be no mutual assistance. Each one will set up as master; our relation will be that of the beasts of prey; eternal war will be our destiny. Now, since men have formed societies in all ages and in all countries, it follows necessarily that each one is convinced, that in his individual capacity, he is only a part of the whole, which demands all his regard; that nature has imposed on each a tacit condition of contributing to the public good; that is, that all men are endowed with a moral sense, with a sentiment of what is permitted, of what is duty, and of what is forbidden.

"The Author of Nature, in endowing man with free will has obviously destined him to be a moral agent; we have such need of morality, that the sentiment of justice and injustice ought to commence with our being, and precede the exercise of reason."

M. Laromiguiere maintains his position by an observation of Rousseau, who says:—

"I shall never forget having seen a young child struck by his nurse. He was immediately silent. I thought him intimidated; I was mistaken. The unhappy boy was suffocating with anger; he had lost his breath; I saw him turn purple. A moment after came shrill outcries. All the signs of the rage, of the resentment, of the despair belonging to his age were in his accents. If I had doubted, that the sense of justice and injustice were innate in the heart of man, this example alone would have convinced me. I am sure, that

a burning coal, dropped by chance on the hand of this child, would have been less sensibly felt than this blow, so light, but given with the manifest intention of offending him." (Emile, B. 1.)

"There is no one," continues M. Laromiguière, "who has not had an opportunity of making the same observation as Rousseau, and who has not adopted the same conclusion, which he draws from it."

Rousseau draws the inference, that the sense of justice and injustice, is innate. M. Laromiguière adopts this conclusion. "I will nevertheless," says he, "hazard one remark on the expression *innate sentiment.* Strictly, the sentiment of justice is not innate. There is in the soul something which precedes it, be it only for a moment. I place the period, at which this sentiment manifests itself, immediately after birth. The child must attribute a will to the external agent, but nothing is more natural to him, nothing more ready; since he hardly exists, before he perceives himself endowed with a will."

Does the moral sense then judge only of the actions of others, and are the faculties and propensities innate only for the reason, that their exercise supposes a will?

The object of the moral sense is not always so determinate, as that of benevolence. Its province is confined to generalities; to abstain from doing ill to others; to be just towards every body; to do one's duty; this is what the moral sense includes.

But the ideas of men upon what is good or evil, upon what is just or unjust, upon what is duty or not duty, are in many respects very different, often contradictory among individuals and among nations. It has been attempted to define all actions conformable to human nature as being *good.* Bad actions are those which are conformable to the will of one, who is governed by evil propensities. Even if we acknowledge as good, those actions only which accord with public expediency, it will still be extremely difficult to apply this principle to particular actions. The estimate of actions varies,

according as the degree of ignorance or knowledge, the different interests, habits, and customs of a nation change. How often have public morals and legislation been clothed with forms altogether different? This diversity not only marks the opinions and actions, which concern the different religious and political sects, but bears also on things which appear to interest morals exclusively. Theft, polygamy, polytheism, incest, adultery, suicide, and even parricide, have been regarded in turn either as crimes, or as acts permitted, and even meritorious.

In Italy and Spain, freemasonry is condemned as a criminal association. In Austria, it is regarded as dangerous to the government. In France, and the north of Germany, men boast of belonging to it, and it does no harm whatever, &c.

It is only when it is agreed, that such a thing is good or bad, just or unjust, &c., that the moral sense becomes the regulator of our actions. The command, to do well and to avoid evil, has been given to all men. All have the innate sentiment of this duty, and all agree in it. And accordingly, the moral sense is not the principle of a determinate act, but the principle of duty, in general.

Philosophers, who have neglected this essential distinction, have thought they could deny the existence of the innate moral sense, and have regarded this as the artificial growth of society. But in this they have committed the same error, that they would do in denying the existence of hunger, because this want can be satisfied by a thousand different aliments.

Perhaps I shall make the properties of the moral sense more evident by putting it in comparison with benevolence. This parallel will serve, at the same time, to show the analogy between these two sentiments. To abstain from doing evil, to do one's duty, is the law of the moral sense, and of justice. To diffuse happiness is the law of charity and benevolence.

Amidst the instability of the opinions and judgments of men, there are an infinity of things, which are gen-

erally acknowledged as just or unjust, and which, even before the origin of laws, impress on morality a uniform and immutable character. The just man has a detestation of oppression exercised on his fellow-men; of lying, perfidy, perjury, treason, informing, spying, hypocrisy, intolerence, calumny, cabal, usury, seduction, debauchery of every kind, counterfeiting, and all other thefts, cruelty, murder, &c.; in one word, for whatever wounds the order and peace of society. The just man feels himself obliged to observe even arbitrary laws, to obey his parents and superiors, to fulfil his promises and engagements, to pay his debts, to repair a wrong done to another, to restore a deposite which has been confided to him, to reveal no secret, to give no pernicious counsel, to maintain good faith and equity towards every body. He respects all property, not only moveable and immoveable property, but also those of talent and of mind; rights and privileges are equal for all men. Every law, which is not of urgent necessity, in his eyes, is an injustice, because it multiplies the cases of misdemeanours and crimes; he rejects violent means for forcing from accused persons uncertain confessions, &c.

Thus the moral sense is confined to things of the first importance, without which, the idea of society would be only a chimera; to things which man is not free to do or not to do; which are commanded him by the laws of nature, and the transgression of which involves culpability, and provokes the resentment of the social body. The moral sense is therefore the basis of all legislation and of the law of nations; it precedes laws. "For, if good and evil did not exist before laws, if they differed not widely from each other, right has no foundation, no justice. Laws would be the fruit of blind caprice, they would be attempts against the liberty of man; to submit to justice would be to submit to the yoke of a tyrant." *

* Anti-Lucretius, Vol. I, p. 179.

The object of benevolence, though less necessary, is of a more elevated nature. The just man does only his duty; his acts are not meritorious; he is not the object of love and admiration. The benevolent man forgets himself; he sacrifices his personal well-being to that of his neighbour, friend, wife, his children, his country, the human race. He exercises acts of humanity, of beneficence, generosity, heroism, magnanimity. These acts, without being the attributes of duty, are, nevertheless, more beautiful, meritorious, and virtuous than those of the just man. The omission of acts of benevolence is not always considered as a crime; their fulfilment, on the contrary, is always an object of approbation and reward. Even savages never speak of acts of benevolence and generosity with the impression of duty. To do an act of kindness is to satisfy a natural desire, an innate sentiment. It is admitted among men, that the marks of benevolence and affection are the touchstone of what is meritorious, and the rule by which we appreciate actions, is taken from the influence they exert on the general good.

In acts of pure duty, man is moved by no lively or exalted sentiment. This is the reason why, frequently, men, forgetting their duty and the most ordinary acts of justice, give evidence of the noblest benevolence, when unfortunate events have awakened their sensibility.

For the same reason, the misfortunes which interrupt the habitual happiness of certain men, become salutary to them and to others; reverses awaken them from lethargy, teach them the sufferings of others, and dispose them to acts of sympathy and compassion. We need to have been sick, to appreciate the delight, inspired by those who come to console us.

When benevolence gives too much latitude to wickedness, and this grows bold through indulgence, the sentiment of justice resumes its rights. It is not just, that gooodness should become the sport of envy, malig-

nity, and ingratitude. Experience has too often proved, that the wicked man is rarely touched by a generous act of pardon. It is just and necessary, that he be confounded, that his projects be defeated; that vice and crime be repressed and punished. As the wicked man is ever inclined to malicious constructions, and as he sets down to the account of weakness or insensibility that, which goodness has led him to experience, justice makes it a duty to repel his attacks with vigor, and to convince him of his own impotence by the force and superiority of an exact retribution.

Such are the shades of distinction between the moral sense and benevolence. But is it not essential always to avoid evil and to do good? Do we not see, that the difference is in the degree only, and that it must be permitted to presume, that goodness or benevolence is only a gradation of the moral sense, which is itself the primitive destination, the fundamental quality of the organ of goodness?

Further, I have remarked with pleasure, that all authors, who have treated of benevolence, as of a quality inherent in human nature, constantly confound acts of pure duty and justice with acts of benevolence; all regard this last as the source of all morality and all virtue. Let us examine the precepts of morality and moral actions, and we shall see, that beneficence constitutes an essential part of their nature.

If we consult history, she tells us, that the most moral and the most virtuous persons, have always been, at the same time, remarkable for their great benevolence. "Virtue alone equals men to gods; to need little one's self, and to do to others all possible good; to be severe towards one's self, and indulgent towards others; to bear with men such as they are, because we cannot make them such as we would have them." Such are some of the maxims of Marcus Aurelius, the author of the Gospel of the Pagans, of the most beautiful moral system of antiquity. Who does not know the goodness and the moral char-

acter of Socrates? Trajan, when reproached with being too good, replied: "I wish to do what I would have an emperor do toward me, if I were a private man." The benevolent Scipio, though passionately fond of women, honorably sent back the wife of Mardonius to her relations, and restored to Allutius his betrothed, whose charms he could not withstand. Bayard and Turenne, did they not also restore to their fathers, husbands, lovers, the most beautiful women, who had been brought to them as the reward of their valor? And L'Hôpital, Franklin, and Vincent de Paul, how many institutions of beneficence and acts of generosity attest their extreme goodness! In fine, the maxim, Do to others as you would that others should do unto you, did it not emanate from the founder of the most sublime moral system, from the source and fulfilment of all benevolence? This principle, founded on sympathy, on reciprocal regard, is the most conformable to our nature, the best felt, the most easy to interpret, and includes in a few words all human morality.

It is proved, then, that there exists the most intimate analogy between the moral sense and goodness, and that it is impossible to separate acts of benevolence from moral acts. Consequently, I am justified in deriving goodness, sensibility, benevolence, from an energetic action of the moral sense, and in admitting for these two modified sentiments only a single organ.

Of Conscience.

That pain or pleasure, which we experience within ourselves, in consequence of an evil or good action, or an action which we esteem wicked or otherwise, is called conscience. It is asked, if this sentiment, this internal judge, is a fundamental quality, belonging to a peculiar organ, or if it is solely a modification of

another quality, of another organ? I shall examine the nature or the natural history of conscience. It will appear, according to my reflections, that conscience is only a modification, an affection of the moral sense, of the sentiment of justice and injustice, of benevolence; as an agreeable or painful sensation is nothing but an affection, a modification of the organs of perception, in general.

Our judgment, whether such an action is good or bad, is determined according to two data of a very different nature. Either it is our natural disposition, or, it is the ideas received by the influence of external things, which make us judge a thing, an action, as permitted or forbidden, as good or as bad. In the first case, it is *natural conscience;* in the second, *artificial conscience.* This distinction will give us the facility of speaking pertinently and with truth, of a sentiment which, in the eyes of certain moralists, is a sure guide of our actions, and, in the eyes of others, is only a fruitful source of errors.

Let us first examine the natural conscience in all its shades, according as it is the product of different dispositions or of their different degree.

The natural conscience is always proportioned to the degree of the moral sense and of the sentiments of benevolence, with which an individual is endowed. Very benevolent and very sensitive persons have also a very delicate conscience. Scruples, repentance, and often the most keen remorse, pursue them after the most innocent action, provided they have induced consequences painful to their extreme benevolence. My father and mother, before they knew of inoculation, had witnessed the death of one of their children by small pox. Oftentimes I have found them bathed in tears, and examining with the tenderest inquietude, whether they could have any thing with which to reproach themselves. Yet there do not exist any parents who fulfil their duties with more exactness. I shall never forget the despair of a father

whom I had advised to inoculate his eldest son. Imbued with principles of metaphysics, he judged inoculation contrary to Divine Providence. A short time after, he lost this beloved child, a victim of this terrible pestilence. I fear that this father can never escape the remorse of conscience. His refusal of the benefit of the art, however, was founded on a pure and religious motive. — We are the innocent cause of a walk, which by accident proves fatal to a beloved friend; and then we reproach ourselves always, as if we had been the cause of misfortune to a friend. A physician loses his patient, after having made every physical and moral effort. Is it possible, perhaps, he will say, that I could have deceived myself? Perhaps if I had not done such a thing, if I had acted in such a manner, the patient would not have died. More than once I have succeeded in regaining my tranquillity of mind, only by opening the body of the deceased, that final test of our knowledge and of our errors.

How much more poignant will remorse be, when persons, still endowed with energetic moral sense, and great benevolence, allow themselves to be led into actions, in themselves bad or criminal. No sooner will they have regained the entire use of their habitually predominant characters, than the opposition, the contradiction between the action committed and their natural disposition, will make itself strongly felt, and the deepest remorse will seize their minds. Let a tender mother, abandoned by her lover and disgraced in the eyes of the world, in an instant of wildness and despair, lay a trembling hand on her first born, and deprive it of life; when the fatal concurrence of circumstances, and the frightful internal emotions have passed away, the innate sentiment of maternal love, the sentiment of horror at her act will revive. A terrible combat will arise between her natural disposition and her crime; the murder of her infant will always be present to her eyes, and will poison her existence. A good and honest man, in a violent paroxysm of anger,

had killed his wife; he was condemned to perpetual confinement. He would have preferred death a thousand times, because he felt, that for the rest of his days he should have his mind torn by the most terrible remorse.

What happens suddenly in these cases, fails not to happen sooner or later to those, who, being good and benevolent, are governed at the same time by bad propensities. It is these men, who do not always the good they would do, and who often do the mischief they would not do; it is an evil propensity which controls them; when they wish to do well, they experience another power which opposes it. There results from this a confusion of character and an alternation of action, which appears inexplicable to those, who are not familiar with the internal and often contradictory motives of our actions. The best men are sometimes a prey to the most deplorable vices, to the most shameful debauchery, to theft, &c. Did not Trajan and Adrian, both, dishonor themselves by irregular passions, in particular cases? To-day they walk in the high road of sinners; to-morrow they hide themselves in a corner among penitents; and it is thus, that the life of such is passed between vice and remorse, according as they consent to follow, sometimes this impulse and sometimes the other. When, in fine, they are worn out by irregular indulgences, or the illicit desires become appeased, they experience a salutary return to themselves; they sincerely disapprove their past life, and repair the evil and the scandal by a conduct, the more exemplary, as their sense of justice and benevolence inspires them more thoroughly.

When the moral sense is not warmed and enlightened by the gentle flame of benevolence, it should no longer be trusted. It gives itself up to the errors of reasoning, to the instigations of self-love and egotism.

Examples and customs lead it astray and serve it for rules, rather than the true notions of good and evil.

The symptoms of indifference, and of the change of the sentiment of justice and injustice, every where manifest themselves. Men do, they see done, and imitate, without regret or remorse, things evidently immoral. They no longer distinguish between good and evil, except as the law expressly commands or forbids. The laws are evaded; good faith is betrayed in transactions, provided they can adroitly escape the resentment of justice. In the intercourse with traders, artisans, agriculturists, &c., the beautiful words, "do to others as you would, that they should do to you," are considered antiquated notions; the confiding man is always the dupe of fraud, without any one pitying him, without any one blaming the deceiver; in the slightest undertaking it is necessary to envelope one's self with a thousand formalities; a rich harvest for chicanery and every kind of artifice; epigrams, scandalous reports, the retailers of calumny and malice, are the favorite objects of the public; to attack and blacken merit, and to take from it the means of defending itself, is one of the maxims in vogue; seduction of innocence is a sport; conjugal fidelity is out of fashion; mothers trust their children to mercenary hands, without any other reason, than that of following the torrent of fashion, and to free themselves from the too painful cares of education: children are ambitious to free themselves from the power of their parents. Thus much for the proofs of the enfeebling of the moral sense, by the spirit of the age!

Let us, finally, follow man, organized unhappily enough to be wholly a stranger to the sentiment of benevolence, and of justice and injustice, and who is, moreover, powerfully disposed to give himself up to acts opposed to duty and the public good. Rarely will such an individual find his judge in himself. The preverse inclinations are predominant; they compose his character; consequently, evil actions are in harmony with him, and rarely is the contentment of his mind ruffled by them. This view of depraved man will

perhaps displease those, who dream only of the dignity of the human race. But look at the usurer, the libertine, the villain, and you will see, that each of them finds himself happy, only in proportion as he satisfies his desires. I have made from my youth the sad and alarming observation, that the most perverse men take pride in their talents for deceiving and abusing, and that they always dwell with a feeling of delight, on the striking incidents of their criminal life. Go into the prisons, place yourself in the midst of their inmates, avoid the appearance of a person in office, in order not to be deceived by a feigned repentance, and inspire those men with confidence and frankness; with what internal satisfaction, with what vanity and joy in having done evil, will the great criminals recount to you, without forgetting the most insignificant details, both their crimes and the particular manner in which they committed them! If perchance one of them takes the trouble to speak of them with a pretended horror, he allows to escape him a malignant smile, which shows his hypocrisy. The greater part exert themselves to utter the gayest pleasantries on the most atrocious acts, and frequently at the moment they see you shudder with horror, they burst into a laugh. Count in the prisons all those who have been committed a second time, and you will see how few have repented.

Finally, examine the great criminals in judicial proceedings; follow them to the scaffold; with what obstinacy do some deny the most evident facts! with what surprising audacity do they insult the witnesses who accuse them! with what bare-faced effrontery, and what scrupulous exactness do others recount a series of frightful crimes. A soldier had committed robberies in twenty churches; he was led to the gallows where he expected to receive pardon; but in place of showing any repentance, he said to confessor Wiedemann, at Vienna: "I see clearly that there is no more to do here, I will try to go elsewhere." At Vienna a certain Z. assassinated his mistress with a

knife, in order to rob her of three hundred florins; he cuts up the body to hide it more conveniently in a box; then he goes to a ball, there passes the night, spends all his money, and gives himself up to all the excesses of grovelling enjoyments. M. Bruggmanns, at Leyden, showed us the cranium of the chief of a band of Dutch robbers. This man had thrown several persons into canals, merely to see them struggle for life. What can they do to me, he said, in his trial, am I not an honest man? Schinderhannes, and Hekermann, his accomplice, had extreme pleasure in recounting their crimes; their eyes sparkled during their recitals. All the accessary circumstances, which were calculated to place them in a striking light, caused them the most lively joy. A daughter, who had aided her mother to kill her father, never testified the slightest repentance. When spoken to about her crime, she shrugged her shoulders and smiled. Rossignol boasted of his barbarity. "Look at this arm," said he, "well; it has butchered sixty-three priests at the *Carmes de Paris!*" Having escaped several times from prison, he commenced and redoubled his robberies and cruelties, and the most disgusting debaucheries. There are some of these wretches executed, who, at the moment of their execution, in calling to mind all the enjoyments in which they had indulged during life, have boasted, that none equalled those which cruelty had caused them. About fifty years since a man, guilty of several murders, was broken upon the wheel at Lyons. After having his limbs broken on the wheel, he laughed immoderately. The executioner having asked the cause, he answered that he could not help it, thinking of the contortions which that tin-founder made, when he had poured the melted tin into his throat. Gabrino Fundulo, famous for his perfidies and cruelties, being condemned to be beheaded, said boldly to the confessor, who in vain urged him to repent of his crimes, that there was only one subject of regret he had in dying; it was, that he had not

hurled from the top of the tower of Cremona, Pope John XXIII., and the emperor Sigismund, when they had the curiosity to mount it with him. Read the biography of the tyrants, who have desolated the earth, and see if one among them has renounced his crimes, before public vengeance or death has cut him off from society.

The physiological study of great villains proves, therefore, that they are inaccessible to repentance or remorse. Why, said Cardinal Polignac, should vicious men, for whom crime has attractions, and who do not think themselves criminal, why should they repent?

To conclude our analysis, it is certain, that, in many cases, the moral sense does not enlighten us in relation to the morality or the immorality of an action; that it often deceives us in regard to the objects, on which it ought to be exercised; that, active in all its energy, or graduated to goodness, benevolence, sensibility, it often exaggerates to us an evil which does not even exist, and disturbs the tranquillity of our soul by trifling scruples and unmerited remorse; that, in individuals in whom this organ has received only a feeble development, and in whom, on the other hand, the evil propensities are predominant, it is silent, remains dead, does not produce even a shadow of its existence. What lesson must the moralist, the instructer, the legislator, necessarily draw from these observations? It follows, that it is necessary to dissipate the illusions of the too exalted moral sense, to rectify its wanderings, and to replace its absence by the creation *of an artificial conscience*, that is, that we must put in action all means to enlighten men, in relation to what is really good or bad, just or unjust, commanded or forbidden. It is here, that the maxim, "Ignorance is the source of all evil," finds its entire application. Man, instructed as to the influence of certain actions on his own interest and that of society, familiarized with the evil which menaces himself, and with that which he causes to his fellow-men, will no longer be the victim except

of just remorse; and, when his propensities are opposed to the principles of a pure morality, he will find in these a sure guide, a regulator of his actions; for there is no one who does not think himself bound to do good and to avoid evil, which constitute the sole end and principle of the moral sense inherent in our nature.

Must I again observe, that the artificial conscience becomes the more indispensable, as an individual is more disposed to do evil, and that it is against evil dispositions in particular, that all the efforts of moral instruction must be directed?

It follows, from all that I have now said on conscience, that it can by no means be considered as a fundamental quality; that it is really only an affection of the moral sense or of benevolence, and that, consequently, no particular organ can be assigned to it.

Seat and External Appearance of the Organ of Benevolence.

We have taken a view of the organs, which are placed on the anterior inferior, and the anterior superior, part of the frontal bone. We now come to the organs which have their seat under the superior part of the frontal bone. This superior part of the frontal bone divides again, in its relation to organology, into its superior anterior, and its superior posterior part. These two parts are covered with hair, however imperfectly it may be.

Within each of these two halves, in the median line, meet corresponding cerebral parts of the two hemispheres, and these parts, when greatly developed, form a lengthened protuberance in the anterior part, and a similar protuberance in the posterior. If, on the contrary, the organs, placed under this region, are only very moderately developed, in place of rising, either in its anterior or its posterior half, it remains flattened to the summit of the head, where it meets the anterior superior edges of the two parietal bones. (Pl. LIV. fig. 2.)

Now I have found, that all persons eminent for their benevolence, all those who distinguish themselves by very great philanthropy, have the superior anterior middle part of the forehead, or the middle part of the superior anterior part of the frontal bone, projecting in a lengthened protuberance, and, consequently, that the cerebral part XIV. Pl. IX. XI. XII. is the organ whose energetic action constitutes goodness, benevolence, the gentle character.

Since the discovery of this organ, hardly a day has passed, that I have not discovered confirmations either positive or negative of this truth.

Sooner or later, and sometimes on the slightest occasions, we shall discover in persons, in whom these cerebral parts have acquired only a very feeble development, mischievousness, a malicious, vindictive, hard, and ungrateful character, and a spirit of detraction. Let it be admitted, that it is so because, in this case, there exists no organ whose activity holds the balance against that of the other organs, and that in this manner selfishness becomes predominant; or let it be conceded, that the feeble development of this cerebral part itself involves these malicious dispositions; still, it is certain, that persons thus organized, when motives of a high order do not come to their aid, will never be capable of lasting benevolence. What I have said above of negative qualities, is again applicable here. As the appetite may degenerate into a disgust for food, the inclination for physical love into antipathy for the sex, the sense of tones into aversion for music; so benevolence and goodness may degenerate into wickedness, by the indulgence of joy at the misfortunes of others.

Compare all the personages, ancient or modern, who have distinguished themselves either by their benevolent character or by cruelty and wickedness; and we shall find between them a marked difference in the superior anterior middle part of the frontal bone. I confine myself to the recital of a small number of examples.

Compare Tiberius, Caligula, Caracalla, Nero, Catherine de Medicis, the Nero of the north, Christian, the cruel, perjured, and perfidious; Danton, (Pl. LXIX. fig. 3.) Robespierre, fig. 4, with Trajan, Marcus Aurelius, Antoninus Pius, (Pl. XCIII. fig. 1;)* St. Vincent de Paule, (Pl. XCIII. fig. 1;)† Henry IV., L'Hôpital, Camille des Moulins, John Baptist Cloots, Madame de Geoffrin, Dupont de Nemours.‡ Observe in general, all philanthropists, all men of benevolent character, and who are drawn without thinking of it into beneficence, confidence, loyalty, cordiality; and compare these men with the wicked, the vindictive, the perfidious, with those who every where seek and meditate fraud, cabal, the ruin of others, &c., and you will soon be forced to confess, that benevolence is a fundamental quality, independent of all others, and that its organ is placed in the median line of the superior anterior part of the frontal bone.

All the crania of the Caribs, (Pl. LXXIV. fig. 1 and 2.) which I have seen, as well as the crania of a tribe of negroes of the Carib islands, which is remarkable for cruelty, are depressed in the organ alluded to.

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* Adrian said, "Of all men whom I know, I know that Antoninus is the one who least desires empire: but I know also, that he is the most worthy of it." Accordingly we find the upper part of the head very high, the organs of ambition and of pride, on the contrary, very little developed.

† St. Vincent de Paule, founder of the establishment for foundlings, of the sisters of charity for the service of the sick poor, and to whom the hospitals of Bicêtre, Saltpetrière, la Pitié; those of Marseilles for criminals, and of St. Nom de Jesus for old men, owe the greater part of what they now are.

‡ I quote a single passage of this benevolent naturalist and philosopher. In speaking of the window swallows, he says; "When one of the couple dies, it is rare that the other does not follow in a few days. The sweet prattling has ceased; there is no more chasing, no more laboring. A dull repose, a mournful silence are the signs of grief to which the survivor falls a victim."

I apprise young people of this, who, though otherwise good and amiable, amuse themselves in shooting at these birds, because they are hard to hit. My friends, shoot at nuts in the air, which are more difficult still to hit, and spare these amiable birds. Remember, that every shot which takes effect kills two swallows; the last by a protracted torture.

According as this organ coexists with other organs likewise much developed, there must result different modifications from these different combinations. The robber, endowed with benevolence, gives to the poor a part of the fruit of his robberies. It is thus, that St. Francis de Sales cheated at play, that he might aid the indigent. The voluptuous man divides his fortune with women who are deserted; the devout does good works for the love of God.

As this organ is common to man and brutes, we might ask, why, in man, it is not placed immediately in connexion with those organs which are common to him with the other animal species? Why is it placed in him above the organs of the intellectual faculties?

This exception in the arrangement of organs, may serve as a proof to the reader, that I have not let myself be carried away by reasoning, but that I have taken facts for my only guide. In reflecting on it, we find, that nature may have had very wise reasons for thus placing the organ of goodness. Perhaps nature proposed to herself a very high purpose in thus combining the action of the organs of goodness, of benevolence, of generosity, of love of one's neighbour, of the moral sense, with that of the organs of the intellectual faculties. The Author of all which exists, was not ignorant that the judgments and actions of man are much more determined by his feelings and inclinations than by his judgment. It is also apparently for a similar reason, that the organ of the moral sense, of the sentiment of justice and injustice, is immediately followed by the organ, which leads man to the adoration of the Supreme Being.

Of the Action of the Organ of Benevolence in mania.

This organ performs, more frequently than is supposed, its particular functions in mania, both in madmen, who gave themselves up to all sorts of malice and mischief, and in those, who wish to overwhelm every body with kindness.

A hussar, who had always manifested the greatest goodness of character, became insane. He no longer allowed the slightest clothing on himself, but gave away every thing. He said unceasingly, that he wished to make every body happy; and in all his projects of beneficence he mingled the holy trinity. His cranium proves, that he had the organ of goodness and that of devotion, both extremely developed.

When I proved the plurality of the organs of the brain, and the natural independence of the moral qualities and of the intellectual faculties, I quoted several cases in which, by the side of an alienation or a complete imbecility in regard to all the other faculties, certain propensities or talents manifested themselves with great energy, such as the venereal desire, cunning, the propensity to theft, the talent of imitation, extraordinary verbal memory, &c. Others overwhelm every body with demonstrations of regard and attachment; others, on the contrary, are real demons in wickedness and malice, and break and tear whatever falls into their hands, maltreat and torment men and animals, and take vengeance for the slightest reasons. M. Spurzheim quotes two such facts mentioned by M. Haslam. "W. H. V., a boy aged about seven years, was received into the hospital the 8th of June, 1799. The mother, who often came to see him, mentioned, that about a month before she was delivered of this child, she had a severe fright. Immediately after its birth, the child was subject to agitations, and the least indisposition caused it convulsions. At the age of one year it appeared

more lively, and slept less than the other children. When it was two years old, the mother perceived, that she could not control it even by frequent corrections.

"All its physical and intellectual qualities developed themselves slowly. At fifteen months the teeth had not yet protruded; at the age of two years and a half, he could not yet walk alone; at four years, he just began to speak. On entering the hospital, at the moment when he left his mother, he shed some tears, but his grief was of short duration. He was placed near the women; the novelty of his situation appeared to be agreeable to him; each object excited his curiosity, without fixing his attention; constantly in a turbulent agitation, he was ever traversing the apartments of the house. His manner of conducting with the other patients had something in it rude and insolent; sometimes he gave them kicks, sometimes he made a thousand grimaces or spit in their faces. As soon as the guard appeared, he ceased his pranks and promised to be more tranquil. In vain did they try several times to make him understand the importance of truth: he could never be made to confess the faults he had committed; he always avoided the trouble by some falsehood. In a very short time he gained great skill in the art of mimicry; he practised himself in mimicking the sick in their paroxysms of derangement, and particularly those who were shut up, because he could do it with impunity.

"In the space of three months he made progress in knowledge, but he borrowed his language from all those who swore or made use of obscene expressions. It was in vain, that they attempted several times to teach him the alphabet. The lessons displeased him continually, and nothing could stimulate him, whether they employed gentleness or made use of violence; he could not fix his attention long on the same object, though he could learn and retain the names of arbitrary characters.

"At the age of thirteen years he had grown much,

and enjoyed good health. He immediately recognised Mr. Haslam, and repeated to him the words *school, Moorfields, bad medicine.* At this period he had made comparatively great progress in language. He knew the names of common things, and could pronounce and point exactly the name of the street, and the number of the house, where he lived. Having contracted at the hospital the custom of making use of a vessel for his natural wants, he obstinately preserved it. His disgusting filthiness went so far, as to soil his own room with all sorts of excrements. It was always with extreme pleasure, that he saw other children give themselves up to any excesses in their sports. Incapable of uniting himself with them, he took no part in their recreations. When he was calm and in his natural state, he appeared to love his mother tenderly; he was often seen even to caress her: but in his paroxysms of mania, his heart was closed against fear and tenderness. Twice he threw his knife at her. Every bright object fixed his attention, but more particularly the sight of soldiers and warlike music, of which he so well knew how to retain the notes, that he whistled them correctly. His phrases were short, and he never employed particles to unite them; he always spoke of himself in the third person, and never made use of pronouns. His attention was never awakened, except by strong tones, or striking causes; to ordinary things he was insensible.

"In the month of July, 1803, I was consulted for a boy of ten years, who had been sent here accompanied by a young man of gentle manners, charged with his superintendence. The parents of the child did not recollect, that any member of the family had ever experienced any mental affection. This child at the age of two years became so wilful and intractable, that they were obliged to banish him from the house of his father, and sent him to his aunt. There they satisfied all his desires, but he did not correct himself, and, at his ninth year, had become an obstinate and

capricious child, the plague of his family. At this period, by the advice of a physician, he was placed under the care of a stranger, and a different system of treatment was adopted. His superintendent was advised to correct him for every fault that he committed. He then refused to dress or undress himself, though he was still capable of it. If his hands were free, he tore his clothes, broke every thing which surrounded him, or which he could reach; and often refused to take any kind of nourishment. Constantly in opposition to the advice which was given him, he answered only by caprice to the questions, which were addressed him. For several months his superintendent treated him as had been agreed on, perhaps, however, not using all the severity which had been recommended; for, it is to be presumed, that, after some instances of severity, the voice of humanity prevailed over the orders of the physician. When the child became the subject of my observation, he enjoyed good health, and his head was well formed. Several distinguished anatomists, to whom he was presented, concurred in this opinion. His tongue, though excessively thick, did not prevent his articulating words very distinctly. His physiognomy evidently betrayed idiocy: he was of small stature, but strongly made; his soft and clear skin was destitute of sensibility. He bore the whip and the cane, manifesting less sensibility than other children. His pulse was natural, and his bowels regular. He had a good appetite without voracity. He could bear the privation of food for a long time without complaining. He appeared to need much sleep.

"Almost insensible to pleasure, he could, nevertheless, render a sufficiently exact account of what was agreeable to him. As he could not bring to any subject a sustained attention, and his attention could be excited only by lively and deep impressions, it may well be supposed, that he had not learned the letters of the alphabet, and still less, the art of copying them,

Several times they tried to send him to school, but he could never raise any favorable expectations in the masters, to whom he was intrusted, although they were distinguished for their patience and the vigor of their discipline. We may conclude, therefore, that under the discipline of the schools, he had derived all the benefit which could result to him from privations of every kind, and the most severe corrections.

"At our first interview he found means, in the space of three or four minutes, to break a square of glass and to tear the bosom of my shirt. Sworn enemy of all frail vessels, he broke all those which came within his reach. During his walks in the street, his superintendent took the precaution to place himself inside of him, for if he came within reach of windows, he broke the glasses, though so adroitly, that he never wounded himself. It was not without experiencing extreme joy, that he tore the lace and the most elegant fabrics of women; finally he scarce ever went out without turning to profit some occasion of satisfying his destructive propensities.

"Incapable of attaching himself to any feeble animals, far from having for any of them the friendship, which children usually lavish on them, he treated them with savage ferocity. An oppressor of every feeble being, he avoided those whose strength he feared. Having convinced himself of the superiority which he had over his cat, he tore out her whiskers with inconceivable barbarity, whenever she approached him; and, to render his own expression, said, 'I must tear out her beard.' When he had thus tortured her, he threw her into the fire, or out of the window. If a little dog approached him he kicked him away; if he happened to be large, he did not look at him. The sports of childhood had no attraction for him; and accordingly he took no part in them. Ignorant of the ties of friendship, he treated all children, without distinction of sex, with the same cruelty, and would have bitten or struck a girl, as soon as he would a boy.

Insensible to the marks of interest which were lavished on him, if an orange was given him, or any fruit, he received it as a favor, and threw it in the face of his benefactor.

"He appeared endowed with a kind of attachment to his guardian. If he went out of the apartment, or pretended to wish to leave it, he uttered cries, saying, 'What will become of me if he leaves me. I love him because he carries the cane which makes me a good boy.' In spite of these protestations, his preceptor often declared the intention of ceasing his superintendence when he should become older, persuaded, that he would kill him, when he found the means and the occasion.

"Sensible of his disease, he was often heard to express the desire of dying. 'God,' he said, 'had not made him like other children.' If he was irritated, he manifested a desire to destroy himself. Being led one day to the asylum at Bethlehem, when they showed him a subject more turbulent than the rest, and more closely confined, he was heard to say with emotion; 'Here is a place which would suit me wonderfully well.' We shall omit a number of other details, for which we refer to the work of Mr. Haslam."

These really curious facts, which cannot be accounted for, on the common principles of philosophy, may readily be explained by our *physiology of the brain*. In fact, some idiots are gentle and others malicious; and this is a rule common to all beings. In idiots, some of their faculties are capable of being developed with extraordinary rapidity, while others, on the contrary, may be, so to speak, annihilated; and, as attention is the result of the activity of the faculties, it is possible, that this attention may be developed in some respects, and remain dormant in others. The second child, of whom Mr. Haslam speaks, directed his attention towards all the objects, which could satisfy his destructive propensity, and remained insensible to the

pleasures of friendship and to the sufferings of other creatures. Malicious idiots are not very rare; and Dr. Halleran speaks also of several idiot children who, he was assured, had this propensity from their birth, and who, since they have been subjected to his observations, have continued to give unequivocal evidence of derangement.

The automatic functions, of complete or incomplete idiots from birth, are often without energy, and operate with more or less pain, especially as it concerns the functions of the intestines; still those of automatic life are altogether natural, and often operate with vigor.

Complete idiots are rare in comparison with the incomplete; and among these last, there are a thousand different degrees. The natural language always announces the degree of idiocy. The most idiotic are remarkable for the stupidity of their physiognomy; they habitually gape, the saliva continually escapes from their mouths; they have a silly look, and turn their head from side to side continually. The characteristic traits of incomplete idiots are a vague and wandering look, which nothing can fix, a continual agitation, and an absolute impossibility of collecting their ideas, or of combining the impressions which they experience; but, in proportion as their intelligence is developed, their language becomes clear, and has more sense and expression.

Natural History of Benevolence and Docility in Animals.

There is a great difference in animals, both as respects species and individuals, in regard to benevolence and docility of character. Some species and some individuals have naturally a good and gentle character; others are malicious, and on all occasions bite, kick, butt, and strike with the horns. The chamois has not so gentle a character as the goat and the

sheep; the tiger is more cruel than the lion; the hyena, more to be feared than the wolf; the wolf, more than the dog; the angora cat is more gentle than the common cat. And among monkeys, what malice exists in the baboons, and what gentleness of character, in the ourang-outang and several varieties of apes! The same difference is manifest in birds. The speckled hen (pintada) is much more malicious than the hen of our farm-yards; the cuckoo, though destitute of weapons, becomes very malicious as soon as he is irritated. There are varieties of parrots which we cannot by any means keep from biting; there are others, which caress every body, and always wish to be caressed.

Let us now extend our comparisons to individuals of the same species. Who does not know bulls, cows, oxen, sheep, goats, dogs, cats, cocks, extremely mischievous, without our being able to attribute their wickedness to any external circumstances, as education, &c.? I have already spoken of two of my dogs, of whom one was as good as the other was wicked. They came from a litter of five pups. Before their eyes were opened, I remarked in them a very different conduct: one, when you took him in your hands, testified by his motions, that he was pleased; the other growled, cried, and resisted till he was restored to his place. Hardly were they fifteen days old, when one testified by the movements of his tail his contentment and good will, not only to the other little dogs, but to all persons who approached him. The other, on the contrary, growled without ceasing, and bit whatever came in his way. From that time, I attentively observed these two animals. As I was not ignorant, that men attribute such differences of character to education, I charged all those who habitually approached these dogs, to lavish caresses on both of them equally. I took all imaginable pains to soften the character of my little wicked one; but nothing could change him; he even bit his mother, if she disturbed him ever so little. In their sixth month,

they were attacked with disease, and gently as both were treated, the wicked one did not cease to growl until his death, and to bite whatever approached him. The other, on the contrary, did not cease to his last moment, to show marks of attachment and gratitude to all who took care of him. Even my domestics were extremely struck with the difference of manner in these two dogs. All persons who have raised canary birds, must have remarked that, in the same covey, there are found some of a malicious and fretful character, and others, who are kind and gentle.

It is wrong to say, that nothing but the element of goodness exists in animals, and that this sentiment in them is limited to a passive gentleness. It is certain, that many animals are so controlled by this instinct, that they even risk their life to aid each other, when in the most imminent dangers. Swine, monkeys, dogs, several maritime animals, several species of birds, lend each other mutual assistance, and warn each other of danger by cries of alarm. Dupont de Nemours relates the following fact: "I saw a swallow," says he, "who had unhappily caught her claw in the running knot of a cord, the other end of which held to a gutter of the college of the Four Nations. Her strength being exhausted, she hung and cried at the end of the cord, which she sometimes lifted in attempting to fly away. All the swallows of the valley between the Tuilleries and the Pont-neuf, and perhaps some from a greater distance, had collected to the number of several thousands. They came in a cloud, uttering the cry of alarm and pity. After a long hesitation and a tumultuous council, one of them hit upon the means of delivering their companion, communicated it to others, and commenced the execution. They took their position; those who were nearest flew by, (as in the game, *running at the ring*,) pecking at the string as they passed. These blows, directed to the same point, succeeded from second to second, and even more rapidly. An half-hour's labor suf-

ficed to cut the cord, and set the prisoner at liberty. But the flock, only a little thinned, remained until night, still twittering, but without anxiety, as if addressing to each other their mutual congratulations."

I have observed a similar fact. A bee was caught in a spider's web stretched near the hive. Immediately several bees threw themselves on the web and on the prisoner, until their unfortunate companion was released. A thousand examples prove that animals practise arts of compassion, and of the most active benevolence, not only towards their fellows, but also towards mankind. Do we not every day see dogs throw themselves into the water, to save persons who are in danger of drowning, and attack robbers with fury in order to preserve the lives of their masters? It would not be difficult even to prove, that several species of animals are furnished, to a certain degree, with a moral sense, with a sentiment of justice and injustice. Elephants, dogs, horses, monkeys, offer frequent examples of this, as well in their conduct to their fellows, as in that towards men.

External Development of the Organ of Benevolence in Animals.

This organ has its seat, in animals, as well as in man, on the median line in the superior anterior region of the upper part of the frontal bone; it likewise forms in them a lengthened protuberance from before backwards. But we must not forget that the anterior superior part of the forehead is wanting in animals; which causes their foreheads to be much shorter then that of man. Besides, as I have said elsewhere, this superior anterior part in many animals, has a different direction from that in man. In the horse and the ox, in general in all animals who carry the head so that the mouth is directed downwards, the superior part of the frontal bone is directed forwards; which causes us to call it the forehead; but

in fact it is the part, which in man corresponds to the superior anterior part of the head. By placing a horse's head on a table, one may easily convince himself, that what in him is called the forehead, is only the superior part of the head. In animals who carry their head like man, in such a manner, that the mouth is in front, the organ of goodness is situated as in our species.

Examine the region alluded to of the head or of the cranium of animals, who are distinguished, either by the savageness or the gentleness of their character, you will find it much more level in the tiger than in the lion; in the hyena and in the wolf, much more level than in the dog; in the common cat, more level than in the angora cat; absolutely flat and depressed below the level of the eyes in baboons. (Pl. LXVII. fig. 1. and 2.) You will see it, on the contrary, prominent in the ourang-outang, (Pl. LXXIX. fig. 4,) and in all the species of monkeys of a gentle character, (fig. 1, 2, 3.) When I see a forehead thus formed in a monkey, I do not hesitate to approach him.

A collection of heads of different individuals of animals of the same species, collected with reference to the benevolence or wickedness of their character, or the close observation of living animals made with the same purpose, furnishes undeniable evidence of the truth of what I advance. The adversaries of organology are as little disposed to form a collection, as to make observations; still, so long as they will not adopt this course, their objections will have no weight. It is only facts, such as nature offers, which are decisive.

Since a collection, such as I have indicated, may be of the greatest utility, even for economy both domestic and rural, I will give the reader some directions about it.

In the horse, the organ of benevolence is placed in the middle of what is called the forehead, three fingers breadth above the eyes. When this region is sunken

or retreating, we may be sure that the horse is vicious, unsafe, and disposed to bite and kick. (Pl. LXIV. fig. 1.) Gentle, docile, good horses, on the contrary, have this region on a level with the eyes, or even prominent, (fig. 2.) I have made thousands of observations on this subject, and have never found an exception.

Jockeys have another mark by which they distinguish the character of the horse. A gentle and docile horse stands with confidence, however spirited he may be in other respects, with his fore feet perpendicular, and the eye directed in such a manner, that we cannot see the white of the ball. A vicious horse, on the contrary, takes a position which indicates distrust; he places his fore-feet a little obliquely forward; when his conformation permits, he holds his head raised and a little retreating backwards; the direction of his eyes is consantly such, that a part of the white is visible. These signs are just; but they are not the organic cause of the good or bad character of the animal; they constitute only its representative.

I requested Col. Henry, director of the stables of the military school, to procure me two heads, one of a horse remarkably docile and good, the other of a horse remarkably vicious. The Colonel had the politeness soon to oblige me. Neither Mr. Henry nor the assistant veterinary surgeon saw any marked difference in the two heads; yet in my lectures they serve to demonstrate the character of the two opposite organizations. In that of the docile horse the region referred to, is arched nearly an inch higher than in that of the other.

A coachman at Neuilly bought, at a low price, a horse, which no one could use because of his extreme viciousness; but he was an excellent courser. In the first week, he bit off from his driver two fingers and an ear. This man hoped to correct the horse by beating him severely; but chastisement only rendered him still more mischievous; he therefore resolved to treat

him with gentleness; this plan succeeded to a certain degree. The region indicated is much depressed in this horse, and the same conformation will be found in all those, to whom we are obliged to apply muzzles to prevent their biting.

If, besides the characters which I have just described, is added, that the two ears are close together, the horses are at the same time skittish and vicious. (Pl. LXIV. fig. 1.) It is of these that we should be particularly careful; those that are mild, but good, are less dangerous.

The excellent princess of Schwartzenberg, who met so tragical an end at Paris, one day conducted me into her stables at Vienna, and begged me to point out to her, according to my organological discoveries, which of the thirty horses which were there, was the most gentle. The one which I pointed out was found to be the saddle horse of the princess herself; he had been reserved for this service on account of his extreme gentleness.

At Berlin, at the stables of M. de Beyme, the minister of state, M. Spurzheim and myself pointed out, among forty cows, those that were most vicious.

M. the Marquis de Boisgelin presented me with the head of a tame wolf, which, from its birth, had been remarkable for his gentleness. Even at the moment when he was set at bay by sending him out with the hounds, he licked his master's hand, as if to implore his pity. In the region above described, his head is much more prominent, than that of wolves generally.

The heads of the two dogs, of which I have spoken, are distinguished by the same characteristics as the heads of the two horses first mentioned. One is prominent in the anterior part; in the other, there is, on the contrary, a depression in the same region. One may infallibly distinguish, by this sign, between a snarling dog and a gentle one. Snarling dogs, especially when more than a year old, always exhibit a lengthened

depression in the middle of the anterior superior part of the head, which in other respects is flat. (Pl. LXX. fig. 4.) Good dogs on the contrary, have this region prominent, and the anterior superior part of their head especially is much rounder. (fig. 3.)

I possess a considerable collection of crania of dogs. The formation of each of these has confirmed the observations, which I had made on the living animal; but I would here observe, that we must not confound ill-humored dogs with vicious ones. There are dogs who always seek to fight, who growl continually, but never bite; there are among men similar characters; benevolent tormentors. What appears at the first glance to be malice, is a restive, odd, and testy humor, rather than malice, strictly speaking; traits by which Xenophon has characterized Xantippe: all my numerous heads of cats, whose dispositions I have known in regard to gentleness or viciousness, confirm my observation. The heads of the vicious cats are always much more depressed and flattened in the anterior superior region, than those of cats of a mild, social character.

At the king's garden, we made observations in this respect on the tiger, the panther, the hyena, and on wild animals of various species, which are perfectly satisfactory. Those animals, which have the region alluded to the most depressed, are always the most wicked, and the most intractable. Compare the head of the Indian hog possessed of a very gentle nature, (Pl. LXVI. fig. 6,) with that of the wicked hamster, (fig. 7;) the head of the latter is so much depressed, that it seems to be broken.

The brown bear has the head much more elevated than the extremely ferocious and savage white bear. Among pigeons, the most vicious columba nicobatica, crested pigeon, has the most flattened head.

Amphibious animals, crocodiles for example, as well as ravenous fishes, such as the pike and the shark; the eagle, (Pl. LXIV fig. 11,) the falcon, the chamois

(Pl. LXXIII. fig. 1.) have this region sometimes flat, sometimes depressed. The sheep, the goat, the roebuck, (Pl. LXV. fig. 3 and 4,) on the contrary, have it swelled into a lengthened protuberance.

In the cock, the canary bird, and many other species, whose character I have long observed, this fact is likewise confirmed. This character may generally be referred to for all animals, in which the internal table of the frontal bone is parallel to the external, as in the horse, the monkey, the dog, and several species of birds. It is otherwise when the internal table of bone diverges from the external. It is therefore necessary to know the structure of the cranial bones in the species, on which one wishes to pass judgment. In the elephant, the hog, &c., we cannot infer from the contour of the cranium, the form of the brain. In the bull and the cow, the internal table diverges indeed from the external, but they are parallel in the region where the organ of benevolence is placed; on that account, when a bull or a cow has this region depressed, we may conclude, that they are mischievous, and that they are gentle, when this region is flat or even prominent. The same thing takes place in cats.

What I have said above explains, why the character of animals, that have received the same education, and been placed in the same circumstances, may yet totally differ. The reason of this difference is not such as we have seen it in external objects; it depends on a peculiar cerebral part, of which the greater or less development does not itself depend on external circumstances, but on a law of original organization, which is still unknown to us.

XXV. *Faculty of Imitation, Mimicry.*

History of the Discovery.

When I was talking with one of my friends, respecting the forms of the head, he assured me, that his own had a very peculiar one. He then directed my hand to the anterior superior part of his head; I found this region considerably bulging; and behind the protuberance, a depression, a cavity, which descended on each side, towards the ear. At this period, I had not observed this conformation. This man had a peculiar talent for imitation. He imitated in so striking a manner the gait, the gestures, the sound of the voice, &c., that the person was immediately recognised. I hastened to the institution for the deaf and dumb, to examine the head of the pupil Casteigner, who had been received into the establishment six weeks previous, and who, from the first, had fixed our attention by his prodigious talent for imitation. On Shrove Tuesday, when a little theatrical piece is usually represented in the establishment, he had imitated so perfectly the gesture, the gait, &c., of the director, inspector, physician, and surgeon of the establishment, and especially of some women that it was impossible to mistake; a scene, which amused the more, as nothing like it was expected from a boy, whose education had been absolutely neglected. To my great astonishment, I found in him the superior anterior part of the head, as prominent as in my friend Annibal.

Can the talent for imitation, I asked myself, be dependent on a peculiar organ? and I sought opportunities for multiplying my observations. I visited families, schools, &c., and examined the heads of individuals, who possessed the talent for imitation in an eminent degree. At this period, M. Maix, secretary to the minister of war, had gained great reputation by several parts, which he played in a private

theatre. I found in him the region of the frontal bone alluded to, as prominent as in Casteigner, and Annibal. In all the other persons, whom I examined, I likewise found this region more or less prominent, according as they were endowed with the talent of imitation to a greater or less degree. They relate of Garrick, that he possessed a faculty of imitation so astonishing, that he forgot nothing of the retinue of the court, composed of Louis XV., the duke d'Aumont, the duke d'Orleans, of MM. Aumont, Brissac, Richelieu, the Prince of Soubise, &c. All these personages, whom he saw but once passing by, were fixed in his memory. He invited to supper the friends, who had accompanied him; Garrick, impatient to amuse his friends, says to them: "I have seen the court only an instant, but I am going to prove to you the accuracy of my eye, and the excellence of my memory." He then arranges his friends in two lines, goes out, and an instant after returns to the parlor. All the spectators exclaimed, "There is the king; there is Louis XV.!" He imitated in succession all the personages at the court; they were all recognised. Not only had he imitated their gait, their walk, their figure, but even the lines and the character of their physiognomy. I soon perceived, that this faculty must constitute a considerable portion of the talent of the comedian. I therefore examined the heads of the best actors which we then had; Müler, Lange, Brockmann, Schræder, Baumann, Koch, and his daughter, &c. In all I found the region alluded to prominent. I procured the head of Jünger, the poet and comedian. His cranium serves me now for demonstrating the organ of imitation.

In our travels, M. Spurzheim and myself found the same organization in all the great comedians, that we had occasion to examine; in Ifland, Madame Bethmann, Nagelman at Berlin; in Ochsenheimer at Leipsig; in Kruys at Amsterdam; Madame Brede at Bremen; Manteufel, Talma, &c.

Examine the portraits of the great comedians, that

have the region of the head alluded to, bald, and you will see, that it is very prominent; as in Shakspeare, (Pl. XCIII. fig. 3,) and Müler, (fig. 4;) or even when this region is covered with hair, the hair forms a tuft which rises perpendicularly, by reason of the protuberance on which it grows, as in Lekain and Garrick. In others we remark distinctly, that the superior part of the frontal is prominent, as in Clairon, Boran, Molière, Corneille, Pylade, Préville, Siddons, Eckoff, Molé, Messrs. Fleury and Larive, &c.

In the house of correction at Munich we saw a thief, who had this organ rather developed. I told him, that he was a comedian; surprised by this discovery, he confessed, that he had for some time made part of a strolling company. In the establishment they were entirely ignorant of this circumstance, which, until that time, he had carefully concealed. Since then I have so greatly multiplied these observations, that I think myself authorized to admit, that the talent of imitation, the talent of mimicry, that is to say, the faculty of personifying, in some measure, ideas and sentiments, of representing them with justice by gestures, is a proper fundamental faculty, which is dependent on a particular organ. This organ contributes without question to make of the poet, a dramatic poet, such as Terence, Shakspeare, Corneille, Molière, Voltaire, &c.

There is no doubt, that it is to this organ, that we are indebted for comedy.

This talent for imitation will manifest itself with so much the more energy and extent, as it is accompanied with a greater vivacity of feeling, and a greater number of other distinguished faculties. The variety of other organs, which accompany that of imitation, constitutes the difference in actors. The parts of waiting-maids, valets, simpletons, buffoons, fops, lovers coquettes, tyrants, sharpers, demand, each a peculiar energetic disposition. And if an actor is equally great in opposite parts, we must conclude, either that he has a complicated talent, or, that he is indebted rather to study, than to nature, for his success.

Confirmation of the Existence of the Fundamental Faculty of Imitation, and of its Particular Organ.

Most of the great comedians were originally destined to a different employment, but have withdrawn themselves from their primary destination, to devote themselves to this art, toward which they were drawn by an unconquerable passion. Garrick quitted the counting-room of a merchant, to join a company of strolling players; Lekain was first occupied in making surgical instruments; Clairon, born of a poor cook, and not disposed to follow the career of her mother, embraced the theatrical profession. Molière, son of a valet-de-chambre, upholsterer of the king, left his trade, feeling himself drawn by an irresistible passion to the theatre. Corneille was destined to the bar.

This talent is often manifested in a very active manner from the most tender age, and at a period when the other faculties are by no means developed. William Henry West Betty was fourteen years old, and had yet received no instruction in acting or in declamation; when he appeared in public for the first time, he had never seen but a single representation; he had seen the death of Rolla played in a small town. Jackson, the manager of the Edinburgh theatre, asserted, that he had never seen his equal. West Betty was often playing in the streets with the boot-blacks, and they were obliged to go and seek him in the midst of them, to make him appear on the stage. The faculty of imitation is exercised sometimes even in idiots and madmen. "A young idiot," says M. Pinel, "whom I have long had under my eye, has the most marked and irresistible inclination to imitate all that she sees done in her presence; she repeats mechanically all that she hears said, and imitates with the greatest fidelity the gestures and actions of others, without much regard to propriety. I would refer here to the

history, which I have already quoted from Mr. Haslam, of the malicious idiot, who, a short time after he was received at the hospital, showed a great talent for counterfeiting the insane.

Cabanis reports the history of a man, so restless, that he was forced to repeat all the movements and attitudes of which he was a witness. "If he was prevented from yielding to this impulse, either by seizing his limbs or by making him take contrary attitudes, he experienced insupportable agony; here," adds Cabanis, "as we see, the faculty of imitation is carried to the extent of disease."

All the phenomena, which I have related, are inexplicable, unless we admit, that the imitative talent is a fundamental faculty.

This organ is in general more useful, than it appeared at the first glance. It is of great use to the orator, inasmuch as it animates his discourses by just declamation, and by accompanying them with gestures appropriate to his words.

But, it is especially in the arts of design, that this faculty is important. It is that, which gives expression and life to the works of art. I have already said, that I have found the organ of imitation extremely developed in the cranium of Raphael, who, in regard to expression, holds the first rank among painters. I find it likewise very decided in Dominichino, in Rubens, Poussin, Lesueur, who distinguish themselves particularly by the force of expression.

I know several persons, women especially, who have the talent of imitation to a very high degree, and who are never more happy, than when an occasion presents itself for masking. It is the same with children thus organized, who are usually the mimics of the family.

I have even observed in monkeys, a singular propensity to disguise themselves. One of my monkeys, a male ape, had no greater pleasure than to throw a

towel over his head, and then spring thus muffled on his female, or on persons whom he wished to terrify.

External Development of the Organ of Imitation.

It is to be remarked, that the organ of imitation does not always manifest itself under the same form. In most cases, it forms a prominence in the shape of the segment of a sphere, a little higher than the organ of benevolence. But sometimes, also, it forms two lengthened prominences, which extend from before backward, placed by the side of the organ of benevolence. The cause of this difference is as follows.

By the side of the two convolutions, which constitute the organ of benevolence, are found placed the two convolutions XXVI., Pl. VIII. IX. X. As the two last are very near the two first, they elevate all the middle of the superior anterior region like an arch, or segment of a circle; this happens especially when the organ of benevolence has not acquired any considerable development. Generally, the organ of imitation is distinguished from that of benevolence, inasmuch as it is placed a little higher, and has a more rounded form. Yet, as I have just said, it also happens, that the last, by a great development of the convolutions which constitute it, presents itself under the form of two prominences; probably because the two convolutions are more distant.

Of Visions.

Certain persons have apparitions of the dead or absent. How happens it, that frequently men of much intellect believe in the reality of ghosts and visions? Are these visionaries, fools; or, are they impostors? Is there a peculiar organization in man, which thus deceives? How can this deception be explained?

Let us commence by giving the facts.

Socrates used often and very willingly to speak to his disciples, of a demon or genius, which he pretended served him as a guide. What was this familiar demon, this divine voice, this spirit, which answered constantly, when he consulted it? I know well how persons, who do not understand the peculiar organization of which I am going to speak, explain this genius: "It was nothing but the force and justice of his judgment," &c. But what reasons could Socrates have for imposing on his disciples? Even in his defence, he still expresses himself in an enigmatical manner. "As to the particular genius, of which I hear the inspiration, it is not a new divinity, it is the eternal instict, the eternal genius of morals. To guide themselves, some consult sybils, others, the flight of birds, others, the hearts of victims. For myself, I consult my own heart; I question my conscience; I converse in secret with the spirit which animates me." These words, if you wish it, prove that he was persuaded, that his genius dwelt in himself, but by no means that he had confidence in any thing but the soundness of his own judgment. Besides, he tried to justify himself, also, for not admitting the divinities of Athens. If Socrates himself had not believed in this genius, the generally diffused opinion, that he had one, would have been lost after twenty-three years, when Aristophanes made it a subject of ridicule, and this genius would not have been reproduced among the points of accusation.

Nicolas Gabrino, (Rienzi,) as well as Cromwell, is quoted for a hypocritical impostor, making religion serve as a cloak to his designs, and putting in operation revelations and visions, in order to gain authority from them. I every day hear similar charges made by persons, who do not reflect that others, with the best faith in the world, may have different sensations, impressions, sentiments, from themselves, and consequently, believe in something different from the objects of their own faith.

Joan of Arc was still in the flower of her age, when, with a disposition of mind already exalted by preceding circumstances, she imagined, that she saw on her right, and from the side of the village church, a great light, whence proceeded an unknown voice. Some time afterward, the same voice was heard, and celestial beings offered themselves to her observation. St. Michael said to her, that God had taken pity on France, and ordered her to go and raise the siege of Orleans, and then have king Charles VII. consecrated at Rheims. Her visions induced her parents to present her to Baudricourt de Vaucouleurs. . . . . .

The Jesuits Maffey and Bouhours certainly were right in attributing visions to St. Ignatius.

Tasso pretended one day to have been cured by the aid of the holy virgin, and of saint Scholastica, who appeared to him during a violent paroxysm of fever. In the historical notes, which accompany the life of Tasso, we read the following anecdote taken from the memoirs of Manso, marquis of Villa, published after the death of his friend Tasso.

"Tasso, in his delirium, thought he conversed with familiar spirits. One day, that his friend the marquis tried to get this idea out of his head, Tasso said to him:

"'Since I cannot convince you by reasoning, I will convince you by your own experience: you shall see the vision in which you will not believe.'

"I accepted the offer, and next day, while we were sitting, talking near the fire, he turned his eyes toward the window; and looking fixedly, appeared so much absorbed, that, when I called him, he did not answer. 'There it is,' said he, at length, 'that familiar spirit which does me the favor to come and talk with me.' I looked with all attention, and saw nothing pass into the room. During this time, Tasso entered into conversation with this mysterious being. I saw and heard Tasso only. Sometimes he questioned; sometimes he answered; and by the sense of his

answer, I comprehended what he had heard. His discourse was so sublime in its subject, so lofty in its expressions, that I felt a sort of ecstasy. I dared not interrupt Tasso, or address him any questions on what I did not see, and it was a long time before the spirit disappeared. I was informed of this event by Tasso, who, turning towards me, said: 'In future you will have no doubt.' That is, said I, I shall have more than ever, for though I heard many marvellous things, I saw nothing whatever. He replied, smiling: 'You have perhaps heard and seen more than' — He stopped there, and fearing to importune him by questions, I let the conversation drop."

Swedenburg thought himself miraculously called to reveal to the world the most hidden mysteries. "In 1743," says he, "it pleased the Lord to manifest himself to me, and to appear to me personally, to give me knowledge of the spiritual world, and to put me in relation with angels and spirits, and this power has been continued to me until this evening." Swedenburg, say the authors of the English Biography, was the most sincere man in the world, the most extravagant of enthusiasts; an opinion in which I fully concur.

Doctor Jung Stilling, whom we saw very often at the late grand duke of Baden's, was in his youth, a tailor, then an instructer, afterward doctor of medicine, moralist, religious writer, journalist, illuminati, visionary. He believed firmly in ghosts, and wrote a work in which he seriously lays open his doctrine. We shall see, in regard to this man, that his whole life bears the impress of his organization.

I have already spoken above of the fanatic, who was pointed out to us in the house of correction, at Berne. Hardly had I seen him descend the stairs, when I exclaimed, they are bringing me a visionary. He was the same, to whom Jesus Christ appeared in the midst of a light, as brilliant as if it had been

formed by many thousand suns, to reveal to him the true religion.

A man, who is admitted into the best society at Paris, wished to know my opinion of his head. The only thing I told him at the first view, was, that he sometimes had visions, and that he believed in ghosts. He leaped from his chair in astonishment, and told me, that he often had visions, but that, until this moment he had never spoken of it to any one, for fear of being thought over credulous. I said to the physician, Dr. W., that I saw by the form of his head, that he had a great propensity for the marvellous, and the supernatural. "For this time," he answered, "you are mistaken, my dear Doctor, for I have a rule for myself, never to admit any thing as true, which is not mathematically proved." After having conversed with him on several subjects of science, I turned the conversation to animal magnetism, which appeared to me a very proper test, by which to appreciate the mathematical rigor of my estimable brother. He became very animated, and again assured me, that he regarded nothing as true but what was mathematically demonstrated; but that he was convinced, that a spiritual being acted in magnetism, and that this being acted at great distances; that there was not, in fact, any distance which was capable of preventing his action; and that by reason of this, he could sympathize with persons placed in any part whatever of the world; "it is the same cause," he continued, "which produces apparitions. Apparitions and visions are indeed rare; but they undoubtedly exist; and I well know the laws, according to which they take place." I said to myself: Here organology has not been at fault.

I have also spoken above of one Hallerau, of Vienna. This man was constantly accompanied by his familiar genius; he saw him and conversed with him. When he had reached his sixtieth year, it seemed that his genius wished to quit him. There

were afterward only certain days in the month, when he had the good fortune to see him.

I knew at Gersbach, near Durlach, in the Grand Duchy of Baden, a curate, who was put in durance because he had likewise a familiar spirit. There is at Manheim, a man, who always thinks himself accompanied by several spirits. Sometimes they walk by the side of him, in visible forms; at other times, they accompany him only under ground. Pinel speaks of a very dangerous maniac, who was calm only during the day; but who, during the night, believed himself always surrounded by ghosts and phantoms; who converses in turn with good and evil angels, and who according to the character of his visions, is benevolent or dangerous, inclined to acts of kindness or to acts of barbarous cruelty.

History, both ancient and modern, furnishes a great number of examples of the same kind.

If it be ridiculous to admit the reality of apparitions, demons, and familiar spirits, it is also unjust to accuse of imposture, those who pretend to have had them. There are few persons in whom one can suppose address and wickedness enough, to counterfeit fraudulently those phenomena, which the observer alone knows in all their shades. I shall show, that these men are the sport of too energetic an activity of a part of the brain.

Organization which Disposes to Visions.

In the first fanatic whom I saw, I was struck with the rounded prominence of the superior part of the frontal bone. This prominence does not form in the middle of the head a lengthened protuberance, as the organ of benevolence; neither is it the elliptic protuberance of imitation. Here all the part of the frontal bone is prominent in the form of the segment of a sphere.

Between convolutions XXV. which constitutes poetical talent, and XXVI. formed by that of imitation, is placed another convolution, Pl. VIII. IX. X. of which the considerable development involves probably the disposition to visions. Does this convolution make part of the organ of imitation, and does its excessive development exalt the talent for imitation, so as to cause it to give to ideas of its own creation, an external existence, and make them appear as coming to us from without? Or does this convolution at the same time make part both of poetry and imitation? Or, in fine, does it constitute a particular organ? This is what further researches alone will be able to decide.

As it is very possible that visions are only the blended result of an exalted action of one of those two organs, or of the two together, I have not thought it necessary to consider it as a particular organ.

Now let the reader examine the heads of all those persons who, without being attacked with a mental malady, were peculiarly disposed to visions. Let him compare the portraits and the busts of Socrates, Pl. XCII. fig. 1; of Gabrino, Pl. XCIII. fig. 5; of Joan of Arc, of St. Ignatius, fig. 6; of Tasso, fig. 7; of Cromwell, Pl. XCV. fig. 4; of Swedenburg, &c.; the same organization, which they there remark, is found likewise in Jung Stilling, in Hallerau, in M. de F., and in Dr. W.

Till now I have mentioned only facts, and in what I have said, have had nature alone for my guide. I shall now give an explanation, the value of which the reader will judge.

Explanation of Visions and Inspirations.

The explanation which I have given of dreams, Vol. II. p. 506, opens to us the way for the explanation of visions and inspirations. During dreams, all that we see, all that we hear, as passing in the external

world, is in fact passing within us. The furious horses and the carriage, with which we are thrown over a precipice, the torrent which sweeps away our child, is ourself. That, which in the state of waking, would be a lively impression, a clear idea, becomes, during sleep, the very object which produces the impression, which gives rise to the idea. It is thus, that the man who dreams, becomes for himself the most perfect comedian. The animal and the man during waking, have the faculty of distinguishing the impression and the idea from the external object, which produces it. This faculty is lost during sleep. Now, as we cannot have the consciousness of these objects as existing within us, by virtue of a law of nature, we place them without ourselves. In this sense, every dream is a vision, an apparition.

Whenever, in health or disease, the sentiments and ideas are produced with such rapidity and vivacity, that we cannot distinguish them from the objects which produce them, (in consequence of the laws of our sentiments and our ideas,) we give to them external existence; or personify them and have a vision.

When this extreme activity of the internal senses is temporary, when the person has time to recollect himself, when other feelings and other ideas come to weaken the first, when certain movements which are performed involuntarily, give a different course to the circulation of the blood, and recall us to ourselves, the vision or apparition disappears; we again distinguish the sentiment or the idea, from the object which produces it; the dream we had ceases when we wake. In this case, this state is a temporary alienation which, however, for the most part, leaves such an impression, that it is very difficult to undeceive persons who have had such visions. In certain persons, these visions are periodical, and take place usually at the periods of an accession of irritability, of hemorrhoids, of the menstrual discharge, &c.

In others this state is more durable, in proportion to

the duration of the excitement. An habitual nervous excitement, an exertion of mind too long continued and fixed on the same object, fasts, prolonged watchings, plethora, suffice to excite it. Nervous or plethoric persons, endowed with the organization in question, are usually those who pretend to have a familiar spirit. As they do not feel themselves ill, it is very evident, that they place in the external world, what really exists only in themselves. They are in the same predicament with madmen, who seem to embrace the object of their affection, to fight against robbers or against the devil. And as it is impossible to convince a maniac that he is insane, so also is it impossible to make a visionary understand, that he is deranged.

Now it would appear, that an extreme development of the convolutions, placed between the organ of imitation and that of poetry, disposes to this excessive irritability. And what is there in fact more analogous than the poetical talent and the talent for imitation, and the tendency to visions? I am not far from believing that the exaltation of the organ of propensity to religion contributes, at least in many cases, very much to visions. These visions explain, why all visionaries carry in their outward demeanour, the impress of sanctitude, exaltation, inspiration, something in fact more than human.

It appears, that inspirations must not always be referred to the same source. In many cases, they are only the effect of the irregular and involuntary activity of a single organ, by means of which man feels a violent impulse, which seems to him to act independently of himself, an impulse which he attributes to a force without himself, and which, on that account, he must regard as an inspiration, an order, a command received from elsewhere. We must pardon the ignorance and superstition which seek, in the impulse of beneficent spirits or malicious demons, what the naturalist finds in the vicious action of an over-irritated organ.

Visions are not rare in mania. "Nothing is more common in hospitals," says M. Pinel, "than the nightly or daily visions, experienced by certain women attacked with religious melancholy. One of them thinks she sees, during the night, the Holy Virgin descend into her cell in the form of tongues of fire. She asks to have an altar built there, to receive in a worthy manner the sovereign of heaven, who comes to converse with her and console her for her sufferings. Another woman of a cultivated mind, whom the events of the revolution have thrown into profound melancholy and a maniacal delirium, goes constantly to walk in the garden of the hospital, advances gravely with her eyes fixed towards heaven, thinks she sees Jesus Christ with all the celestial court, march in order of procession in the upper air, and warble songs accompanied by melodious sounds; she herself advances with a grave step to accompany the procession; she points it out, fully convinced of its reality as if the object itself struck her senses. She gives herself up to violent passion against all those, who would persuade her to the contrary." *

This would be the place to treat of animal magnetism; but as this singular subject would be too long an interruption of the exposition of the organs, I shall defer it to the sixth volume of the work.

XXVI. *God and Religion.*

God and religion have always been objects so important to man, that all, which can be said on this subject, seems exhausted. There are no ideas relative to these subjects, from the grossest superstition to atheism, which ignorance or the different sects of philosophy, have not tried either to accredit or to refute. According to certain philosophers, it is man, terrified by the great phenom-

* Of Mental Alienation, 2d, ed. p. 108, 109, § 122.

ena of nature, who has referred their cause to omnipotent beings; according to them, the doctrine of the existence of God is the work of human prudence, an artifice of legislators to lead the people by fear, imposture, and superstition. Interrogate the history of nations on the origin of their belief; there is not one, which does not boast a supernatural origin, a divine revelation of its religious mysteries.

Not wishing to treat this noble subject, except as a naturalist and physiologist, I shall limit myself to examining whether man, by means of his organization, has been prepared for belief in an independent intelligence, in a God, religious sentiments, and worship.

History of the Discovery of the Religious Sentiment, as a Fundamental Quality, and of its Organ.

There were ten children of us in the house of my father; my brothers and sisters and myself all received the same education, but our faculties and tendencies were very different. One of my brothers, from his infancy, had a strong tendency to devotion. His playthings were church vases, which he sculptured himself, copes and surplices, which he made with paper. He prayed God and said mass all day, and when he was obliged to miss service at church, he passed his time at the house, in ornamenting and gilding a crucifix of wood. My father had destined him to commerce, but he had an invincible aversion to the business of a merchant, because, he said, it forced one to lie. At the age of twenty-three years, he lost all patience; having lost all hope of pursuing his studies, he fled from the house and turned hermit. Five years after, he took orders, and, till his death, lived in exercises of devotion and penance.

I observed in schools, that, independently of other faculties, certain pupils had no susceptibility for receiving religious instruction, while others were very eager

for it. I had also remarked in all the classes, that those, who designed themselves for the ecclesiastical profession, were either studious, pious, decent young persons, or idle, indolent, and without talents; these last had no other intention than to be supported at the expense of their fellow citizens; the first, on the contrary, felt an inward call to the profession to which they aspired. This inclination was born in them, without its being known how, and without its being possible to attribute it to example, education, or surrounding objects. Most of these young persons devoted themselves to this career, contrary to the wishes of their parents and their instructers.

Afterwards, no sooner had some fundamental qualities or faculties fixed my attention, than I recalled the observations, which I had made in my infancy on myself and on my fellow pupils. I examined the form of the head of persons, who were distinguished by their devotion, for, I was then already persuaded, that the tendency to piety and to the exercises of devotion, is innate. I visited the churches of all sects, and devoted myself especially to observing the heads of those who prayed with most fervor, or, who were most absorbed in their pious contemplations.

I was first struck by the circumstance, that the most fervent devotees I had seen, were almost always bald. Yet, I asked myself, what can baldness have in common with devotion? Women are rarely bald, yet they are more devout than men. I soon observed, however, that bald heads often rise gradually to the top, and that it was precisely this form of head, which had first struck me. As soon as I was convinced by a considerable number of observations, that most devout persons have their heads so formed, I visited the monasteries and observed the monks, taking care to collect, at the same time, exact informatin in relation to their moral character. My observations were confirmed in those who performed the functions of preacher and confessor, but not always in the servants, as the butlers, cooks,

&c. I made the same investigation with regard to the heads of other ecclesiastics. I was especially struck with the difference of conformation, which existed among several ex-jesuits. All those, who applied themselves to the exercises of devotion, had the head greatly elevated toward the crown. I could therefore presume, that I had discovered the organization which disposes to devotion, and which gives birth to religious sentiments.

I have remarked, at the same time, that the portraits of ecclesiastics, known by their zeal in their religious functions, have always the head greatly raised in the crown.

The ancient artists represented high-priests and sacrificers, with venerable heads thus formed.

Before citing my last observations, which I have always continued to multiply, I will describe the natural history of the belief in God, and of the disposition to religious worship. I hope in this way to produce in my readers the conviction, that the sentiment of these two august objects, is inherent in our nature: that consequently, it is a fundamental sentiment, to which a part of the brain of man is particularly adapted.

Natural History of Man, in Relation to his Belief in God and his Propensity to Religion.

Every where and in all ages, man, urged by the feeling of his dependence upon every thing around him, is forced continually to acknowledge the limits of his strength, and to confess to himself, that his fate is controlled by a superior power. Hence the unanimous consent of all nations to adore a Supreme Being; hence a necessity, ever strongly felt, of recurring to Him, of honoring Him, and of rendering homage to His superiority.

Men necessarily formed to themselves very elevated

conceptions of the First of powers. The idea they necessarily formed, was that of a Being superior to all others, of a spirit diffused throughout the universe, which animates all, which sustains every thing by its presence, which is the principle of generation and production; it was the idea of a flame ever burning, of Omniscience whose providence watches without ceasing over all, and extends to all; in a word, of a Being to whom, by reason of his independence and his superiority, they had given different names, but always corresponding to some one of his infinite perfections, and which ever bore the character of that sovereign dominion, which belongs only to the Great Ruler of all things.

To this idea of the ancients, correspond perfectly those of the idolatrous nations which still exist; the terms of their language manifestly designate a Superior Being. It is not only cultivated nations, which have these marks of the knowledge of a First Cause, such as, among the Chinese, *Tien-Chu*, that is, Master of Heaven, and the *Xang-ti*, the sovereign emperor and sovereign master; among the Indians the *Kertar*, he who makes all things, and the *Serjenhar*, the creator of the world. Among the tribes of Peru, the *Pachacamac*, or the Supreme Being, and the *Viracocha*, which is the God, Creator. The same traces are likewise seen among all the nations, which pass for barbarians. Generally, all those of America, whether wandering or sedentary, have strong and energetic expressions which can refer only to a God; they name him the Great Spirit, sometimes the Master and the Author of Life. Even down to the Ouraoars, (*Ottawas*,) who, among all these nations, appear the most brutal, and least refined, there are none who, in their invocations and their apostrophes, do not often name him the Creator of all things.

That great spirit, known among the Caraibs under the name of *Chemiin*, under that of *Manitou*, among the Algonquins, and under that of *Okki*, among those

who speak the Huron language, is designated in a manner the most singular, and applicable only to the Supreme Being, by the name of Areskoui, among the Hurons, and by that of Agriskoue, among the Iroquois.

Such then is the sense of the Divinity, that there is not a single nation, however barbarous, however destitute of laws or of morals, it may be, which does not believe, that there are Gods. The belief in God is as ancient as the existence of the human race. Nature herself has engraven the idea of God in all hearts; and this idea is too sublime for man to have been able to conceive it, if Nature herself had not conducted him to it.

Now the sense, or the knowledge of a Divinity, infallibly brings with it a religious worship, that is, an assemblage of duties, by which man makes to it an humble confession of his dependence, by the homage which he pays to the dignity of its being, by his obedience in submitting himself to the laws which it prescribes to him, by his gratitude for the benefits he receives from it, and by the recourse he is obliged to have to it, for the benefits he receives, and those he hopes for.

This is the reason why the means, which men put in operation to render themselves agreeable to the Divinity, are as ancient as the belief in a God; and to prove the universality and high antiquity of this belief, is to prove the universality and the remote antiquity of religious worship. Moreover, as every religion supposes the idea of a Supreme Being, whoever shall prove the universality and the high antiquity of any religion whatever, will also show the generality and high antiquity of a belief in God. Men always have been led by an instinct, by a secret impulse, to acknowledge an omnipotent Being.

But the human mind, too limited, has not been able to collect under a single point of view the infinity of

the attributes of God. It was obliged to make a kind of division, to represent each one by different names, emblems, of which each one marked only the perfections which it attributed to him. Man can only see God in a mystery, as St. Paul says; he figures him to himself under sensible images, which are so many symbols raising themselves to him by degrees.

Hence, however, results the origin of idolatry, and of the well merited reproach, that man is a superstitious animal. In fact, man adores every thing, fire, water, earth, thunder, lightning, meteors, grasshoppers, crickets. The Mexicans adored Viziliputzli, the God of war, and Tescaliputza, the God of repentance. The negroes and the savages of America have the worship of the gods Fetiches; it has for its object animals or inanimate beings, even the most absurd. The striped snake is the natural divinity of the nations of Judah. Several American tribes have crocodiles for gods, as the Egyptians, or salt water fish, as the Philistines. In the peninsula of Yucatan, children are placed under the protection of an animal chosen by lot, which becomes the tutelary divinity of his person. The Laplanders and the Samoïedes render divine honors to several species of animals, to stones, which they anoint, as formerly in Syria they adored the stones called boetiles, and as in America they still adore conic stones. The ancient Arabians had for their Divinity a square stone, and the god Casius of the Romans, whom Cicero calls Jupiter-Lapis, was a round stone cut in halves. Jacob himself erected and anointed a stone in the place, where God had manifested himself to him in a dream. The Hebrews, like most other nations, had a great veneration for mountains, *high places*, and woods. The ancient Germans, had, for their Divinity, tufted trees, fountains, and lakes; they adored, as the Laplanders now do, shapeless trunks, which they regarded as the representation of the divinity. The Francs adored wood, water, birds, and beasts. These first forms of worship established

among the Egyptians, Hebrews, Germans, are again found among the ancient nations of Greece, and one cannot but be struck by the conformity. Stones, shapeless trunks, rude cippi, were afterward the principal gods of the Greeks. The Venus of Paphos was a white pyramid; the Diana of the isle of Eubœa, was an uncarved block of wood; the Thespian Juno, the trunk of a tree; the Athenian Pallas and the Ceres, a simple stake which was not stripped; the Matuta of the Phrygians was a black stone with irregular angles, which was said to have fallen from heaven to Persinun, and was afterward carried to Rome with much respect. Men, besides these absurd national divinities, have had different peculiar objects of worship, from whom they expected peculiar and individual protection. Such were the Mannikins of Laban, the household gods among the Romans. In the kingdom of Issini, one chose for his Fetiche a block of wood, another the teeth of a dog, of a tiger, of an elephant. The seas were peopled with Tritons, with Nereids, with Divinities of different orders. The country was filled with Nymphs and Fays; the forest, with Dryads and Hamadryads. Every stream, every fountain, village, and city, had its divinities. All agreed in thinking, that these divinities exacted honors, that they were easily irritated, but that they were appeased by bloody sacrifices. Barbarity was every where urged, even to the immolation of human victims. Add to all this, the adoration of trees, the idols of the Chinese, the palladium of the Trojans, the sacred buckler of the Romans, the universal confidence which men have in talismans and amulets, in divination, dreams, and oracles, in the meeting of different objects presented by chance, as, for example, the unexpected encounter of a dead body, of a cat, in the cry of nocturnal birds, in the flight of birds, in penitences and mortifications of every kind.

This hasty sketch shows us plainly enough, that from east to west, from north to south, the people have

not only the same objects of adoration, but nearly the same manner of worship, and a uniform practice of the same maxims. "The divinity offers himself under the moral relations, which constitute his essence, only to men enlightened by elevated instruction; but the ignorant man, in all countries and ages, will naturally be an idolater, naturally an adorer of idols and of supernatural things, because they arrest and fix his attention, because they act upon the mind rather than upon the sight; because, in fine, they make him think and reflect." *

Yet, however degraded man may appear in this light, he perhaps deserves our pity as much as our blame. His ignorance, and his natural tendency to superstition, have converted into sensible images, abstract ideas and truths, which are beyond the reach of the ordinary intelligence of ignorant men, and have caused him to address to the creature, the worship due only to the Creator. Fear has made as many idols as there are objects of terror. But the essential point, namely, the acknowledgment of a Supreme Being, and of religious worship, has always remained invariable.

The sun, honored by a peculiar worship in Peru, among all the nations of America, and by the chosen people, was always regarded as the most expressive symbol of God. The Divinity became sensible to them in this globe, which animates the world, and every where produces a happy fruitfulness. The sun was so much the hieroglyphic symbol of divinity among all nations, that all the names given to the gods of paganism, are referred to the sun. This was the first of the works of God, which attracted the attention of men, and in which they were naturally led to honor their sovereign master. The chosen people turned toward the rising sun to address their prayers to the Highest. Even the Scripture makes

* Poetry of the Arts, by J. F. Sobry, p. 36.

use of the expression, that God has placed his tabernacle in that body.

How should nations so different from each other in their characters, so widely opposite in their modes of thinking, who, in things the most necessary to life, have conceived ideas so entirely at variance, how should they yet have been able to agree on the existence of a Supreme Being, and on a religious worship, if the Author of the universe had not graven the sense of these things in the hearts of all men; if God had not impressed them upon the organization of the human race?

Notwithstanding these undeniable proofs of the universality of the belief in God, and of the tendency to a religious worship, we still meet with men, who deny, that these sentiments are innate in the human species. There are, say they, nations in which we discover not the least trace of religion, nor the least trace of an idea relative to a Divinity.

I will not contest the possibility of the fact. Climate and the concurrence of other circumstances may impede the development of the cerebral part, by means of which the Creator has willed to reveal himself to the human race, just as climate and other influences may favor the development of the same organ. In Egypt, the cradle of so many religious sects, this organ had received a high degree of development, and of activity; the contrary occurs among the Caraibs, the Hottentots, &c. If there existed a people, whose organization was altogether defective in this respect, it would be as little susceptible of religious ideas and feelings, as any inferior animal. Such a diminution of any organ whatever would involve the same result in regard to its function. These are actually partial imbecilities.

But I know no people that is in this situation. Some travellers, seeing among certain nations, neither temples, nor altars, nor idols, nor any religious worship, have concluded, that the mind of these men did

not go farther than their monuments, and have pronounced too lightly, that they lived like brutes, and rendered no divine homage to any thing visible or invisible. We know that we find nearly the same customs in regard to divine worship, not only in the island of Crete, in the isles of the Archipelago, in Phrygia, in Thrace, in Asia Minor, but also in Colchis, in Bactria, as far as the Caspian gates and the Indies, which were, for the ancients, the farthest limits of the known world. We know also, that the Caraibs have their great spirit Chemiin, that the Hottentots and the Pampoux pay homage to the gods Fetiches. It is therefore certain, that the sense of the existence of a God, and of the need of a religious worship, has always been an attribute of all nations.

It is still objected, that ideas relative to God and religion, never arise among the deaf and dumb; and hence it is concluded, that there is not in man any natural disposition to these ideas.

But can it be believed, that the man of the most cultivated mind could arrive at those ideas of God and religion, which we have, if he had not been brought up in these ideas? The faith of sectarians is the work of education, of arbitrary instruction, and the ideas, which the philosopher forms of God, are the fruit of the most elevated abstractions. We cannot expect either the one or the other from a deaf and dumb man, whose education cannot have been directed towards this point; but from what we see all rude people do, we might divine what the deaf and dumb would do, if living together in tribes; for, the want of hearing does not prevent the deaf and dumb from forming to themselves, the same idea of the external world, which other men form of it, and from drawing the same deductions from the events, which pass under their eyes.

I have presented the successive developments, the shades and the modifications of the religious sentiment and of the idea of a divinity, in an inverse order

from that which is adopted by most authors; it is ordinarily supposed, that men, uncertain as to the nature of the powers, the secret influence of which they feel every moment, at first attributed these powers to animate bodies, to Fetiches, for example, and afterwards to living creatures. It could only be after they had attained a certain degree of culture and civilization, that they would rise to the adoration of beings. Afterwards, in this supposition, they adopted tutelary gods for each individual, villages, cities, and even for rivers and forests; and, after many efforts and combinations, they ended by conceiving the abstract metaphysical idea of an independent intelligence, of a God, the sole creator and master of the universe.

The order in which I have explained the progress of nations, in regard to religious ideas and sentiments, appears to me more conformable to tradition and reason. Experience teaches us, that in all ages, just ideas on the nature of the Divinity have degenerated into superstition and idolatry. The Hebrews knew Jehovah; but, notwithstanding the prohibitions of God, their inclination for idolatry was such, that they always relapsed into it. They could not abandon the great veneration they had like other nations for mountains, high places, and woods.

Since the Christian era, and the solemn proclamation of a true God, they have not been able to limit the worship to the Most High alone; they must still have secondary divinities, they still need images, relics, amulets, tutelary angels, saints, so many beings in whom they suppose a particular power, and whom they invoke in the confidence of a special protection.

In other respects, whatever hypothesis we adopt, it will always be difficult to keep clear of the obstacles, which oppose themselves to the direct proof of the advance, which nature has led mankind to make, towards his most important interests.

Whatever opinion we adopt, it still follows, that men have always instinctively recognised superior

beings, either beneficent or malicious. Under whatever form they have represented these powers, it is always the idea more or less obscure, more or less refined, of a superior being, which constitutes the basis of all creeds, and of all forms of worship, even the most absurd. Men were not long content to adore their household gods; they devoted temples and altars to them. "The first edifices," says M. Sobry, "which social order demands, are temples. Men wish to assemble, to render to God a service which consoles, unites, reconciles, and improves them. It is a duty, a want, a necessity. All ages, nations, and places, are subjected to this sacred custom, as ancient as the world, as widely diffused as the human race."

Now, it is not difficult to conceive, why it is with the belief in God, and with religious worship, as it is with all the qualities and faculties, which have been given to man by means of his organization. No one has invented the propensity to physical love, the love of offspring, attachment; men will never think of seeking in the records of history, the first who gave combat to one of his fellow-men, the first who made war, and who created the spirit of domination to raise himself to the head of a tribe or nation. No one has the glory of having invented painting, music, calculation, the mechanic arts, eloquence, poetry. So there is no one, neither legislator nor conqueror, who can be quoted as the first author of a religion, before whom it can be shown, that there was not any received religion. There was one before Numa, among the Romans. Moses, whose writings are anterior to any other work we have, shows, evidently, a religion coeval with the creation. If we read his books, we shall there see a religion formed among all the nations of which he speaks, particularly among the Egyptians and Canaanites; we shall see a religion already changed and corrupted among these ancient nations. What was the golden calf, if not the symbol of Isis, and one of those monstrous divinities of Egypt, already idolatrous?

Even in the time of Abraham, Chaldea was infected with idolatry. Religion being natural to men, it should be coeval and coexistent; and I repeat it, the idea of God is too sublime for man to attain by reasoning, if it were not inherent in his organization.

But some timorous devotees are alarmed by the assertion, that there is an innate disposition to religious ideas; because, say they, to seek within man the source of religious ideas, is to render revelation superfluous.

If God had resolved to reveal a peculiar religion, man should be made susceptible of receiving it by means of a natural disposition. Let one try all imaginable means of giving to an idiot ideas of God and religion, it is wishing to make of a brute an architect or a poet; the natural disposition, the susceptibility is wanting in both. Thus the seed of the sublime lessons of revelation had fallen upon stony ground, if man had not been rendered susceptible of profiting by the dispositions, which the Creator has given him. Revelation has guided his steps in the way, where his natural tendency to idolatry was bewildering him in darkness; it has purified and fixed the idea, which he formed to himself of God and his duties. Thus, then, the natural tendency of men to religious ideas, not only is not in opposition with revealed religion, but revelation would have been absolutely impossible, if the human race had not been prepared for it by means of its organization.

It is remarkable, that even those, who derive every religious idea from the personal intercourse of God with the first men and with Moses, make use, as by instinct, of the same expressions which Seneca and Cicero employed, to account for the universality of the belief in God. They all say, that this sentiment is engraven in the heart of all men, the most ferocious as well as the most humane.

This hypothesis explains how uniformity, in the fables relative to the existence of God and to certain

moral principles, and uniformity of rights, indicative of the same or similar principles, is found among men, in spite of partial changes introduced by different nations.

On the same supposition, it is still easy to conceive how religious ideas must have passed from generation to generation, as a heritage common to all.

As this organ coexists with other organs, likewise very active, devotion combines itself, in different ways, with the qualities or faculties, which result from them. The devout warrior, as Gustavus Adolphus, and the bloody Suwarrow, will invoke God before battle, to obtain victory from him, and will urge his soldiers to prayer. The cruel devotee, as Louis XI., Philip II., and others, will prove his pious zeal by arming the inquisition, by making auto-da-fés, and by performing with his own hands, the duties of the executioner. The devout artist, as Philip Champagne, will scrupulously avoid all that is licentious, and will represent only sacred subjects. The devout philosopher and naturalist, as Newton, Bonnet, Kleinjogg, and Clarke, will every where see in nature the finger of God, and in every thing render honor to the Creator, or even like Malebranche, will derive all our ideas from God, and will maintain, that we see God in all. The devout poet, as Milton and Klopstock, will sing the mysteries of religion.

I know a devout libertine, who pays public women by giving them prayer books. In this man the organ of devotion and that of propagation, are both greatly developed.

These combinations are infinitely various, for the organ of devotion as well as for all the rest; in health as well as in mania.

As all propensities may become the source of evil, so the most elevated propensity of the human race, is not altogether exempt from every inconvenience. If men are limited in their capacities, they cling to objects of veneration of their own creation, and to which they attribute a supernatural power. A con-

stant phenomenon, observed in all nations, proves that this tendency too often degenerates at the expense of the moral sense. Every where and in all sects of religion, men consider themselves much more obliged to fulfil the duties, they impose on themselves towards the idols of their imaginations, towards Fetiches, &c., than to meet the obligations of pure morality. A man may be on his knees before an image, be the slave of blind fanaticism, and endure penances as painful as ridiculous, while he makes no scruple of infringing the laws of society and of nature. Who has not seen that, where the ministers of religion entertain the people only with mysteries and dogmas, there intolerance, fraud, perjury, theft, murder, rape, incest, &c., are committed with deplorable indifference. One would rather lose his life, than break the vow of a certain abstinence.

The mind of the people is not sufficiently exercised to be able to embrace sentiments and ideas of a different nature. Once imbued with sterile dogmas, it is entirely devoted to them; it is more strongly impressed by them, than by precepts drawn from social life. In the first case, he supposes himself connected to omnipotent beings by mysterious and invisible forces; in the second, to human laws alone, the strict observance of which often demands a resolute self-denial and a repression of inclinations, the most dear and the most imperative. Preach up maceration, abstinences, fanaticism, mortifications, mysteries, &c., and the crowd will follow you; but exact a severe morality in action, and you will be abandoned. It costs much more to be virtuous, than to be devout.

Religious Propensity in Mania.

"Nothing is more common in hospitals," says M. Pinel, "than cases of alienation produced by too exalted a devotion, scruples carried to fatal excess, or religious terrors."

As this species of mania often occurs without there being any lesion of the other qualities or faculties, physicians ought long since to have concluded, that it belongs to the lesion of a peculiar cerebral part.

In the hospital of Amsterdam we saw a madman who was tormented with the idea, that, contrary to his will, he was forced to sin, and that he could not be saved. He has the organ of devotion greatly developed.

I have spoken elsewhere of an ecclesiastic, who despaired of his salvation. Another madman also had the idea, that he was condemned to eternal fires. The organ of devotion was greatly developed in both.

A female was brought to me, named Elizabeth Lindemann. I saw, at the first glance, that she had the organ of devotion unusually developed. She stood upright before me, raising from time to time her eyes to heaven, and testifying, in all her gestures, sadness and anguish. From her youth she had devoted herself excessively to prayer; for some time past she had been subject to convulsions, and maintains that she was possessed: the devil, she said, entered into her heart through her mouth, and tried to draw her into hell.

"A young man, at the epoch of the revolution, was astounded at the overthrow of the catholic worship, in France, and, overcome by religious feelings, he became a maniac and after the usual treatment at Hôtel Dieu, was transported to Bicêtre. Nothing can equal his gloomy misanthropy; he speaks only of the torments of the other life, and thinks that, in order to escape them, he must imitate the abstinences and the macerations of the ancient anchorites; thenceforth he refused all nourishment, and towards the fourth day of this invincible resolution, his state of languor induced fears for his life. Friendly remonstrances, pressing invitations, all are in vain; he rejects with harshness the soup which is served him, and even throws off the straw from his couch, to rest on the board." (*Pinel*, p. 207, &c.)

"A madman of mild character unceasingly invokes his good guardian angel, or some one of the apostles, and is satisfied with nothing but macerations, fasting, and prayer. I was fond of conversing with a devout madman, who, like the ancient diciples of Zoroaster, rendered peculiar worship to the sun, prostrated himself religiously before this body at its rising, and consecrated to it, during the day, his actions, his pleasures, and his pains." (*Pinel*, 118.)

In the collection of M. Esquirol, I have seen the casts of the heads of three persons attacked with religious mania. The organ of the religious sentiments is extremely developed in all the three. I have quoted analogous examples when speaking of the organs of murder and of poetry. If M. Esquirol continues to take casts of the heads of the insane and to preserve their crania, he will not fail to be one of the most zealous and most learned followers of organology.

I knew a peasant named Michel Schayer, and his sister; both were subject to periodical attacks of religious mania. The organ of devotion is unusually developed in both.

As, in health, this organ performs different parts, as it coexists with such or such other very active organs; so, likewise, in the state of disease, these different associations produce different species of pious mania.

"We remark a singular gradation," says M. Pinel, "in the moral affections of young melancholic subjects, endowed with an ardent temperament; they usually run into the most exalted piety, and address to heaven the most fervent prayers, to combat the propensities of nature, and to come out victorious from this painful struggle.

"A young girl of sixteen, brought up in rigid principles, is placed with an artisan to learn embroidery; she there first receives the attentions of a young man of the same age, and finds herself exposed to all his fascination; the sentiments of piety, which she owes to her education, awaken in all their force, and there

is established a sort of internal struggle with the affections of the heart. Melancholy succeeds with all its fears and its perplexities; she can no longer eat or sleep, and a furious delirium manifests itself. Conducted to the hospital, and given up, alternately, to convulsive movements and to all the estrangements of reason she seems assailed by the most incoherent ideas; and often uttering inarticulate sounds and broken phrases, talks of God and of temptation.

"A waiting maid, from her youth lively and passionate, at the age of thirty years experienced all the development of an ardent temperament, though otherwise very prudent and very pious; and there arose a kind of painful struggle between the propensities of the heart, and the severe principles, which she had for a long time observed. These internal combats, and the alarms of a timid conscience, plunged her sometimes into despair, and made her seek for means of destroying herself, such as taking poison or throwing herself from a window. In her extreme perplexity, she had recourse to an enlightened and compassionate confessor, who sought to restore her courage, and often repeated to her, that she must attach herself to God, in order to regain her peace of mind. 'But I feel myself,' answered the girl with simplicity, 'inclined rather to the creature than the creator, and that is precisely, what causes my torment.' The good priest persevered, addressed to her consoling language, and urged her to *await with resignation the triumphs of grace, after the example of many saints and even of a great apostle.* Thus, far from inspiring her with fears in regard to the future, he sought to bring back calmness into this agitated soul, and to oppose the best remedy for the passions, patience and time; but disquietude and prolonged watching ended by producing a mental alienation, which was treated at Salpetrière according to the same moral principles, and which was of short duration." (*Pinel*, 270.)

It is not at all rare, that the organ of devotion and

that of physical love, are found injured together, and hence the reason why cases of mania, compounded of erotic and religious insanity, are so frequent.

Religious mania may become exceedingly dangerous, when a propensity to murder is joined to it.

I have seen a man, in whom the instinct of murder and that of devotion, were both extremely developed; he had already had two violent attacks of mania, in which he threatened to murder all who did not profess the catholic religion, though he himself was a protestant.

Sometimes the propensity to suicide is joined to religious mania. A man of Weil in Suabia, well constituted, had been very religious from his infancy; for some years he had given himself up, more and more, to religious fanaticism, and ended by experiencing terrible agony. He was tormented with an idea, that he could not be saved, because he was possessed of the devil. In spite of all resistance to these melancholy ideas, which beset him, he finally fell a victim to his propensity to suicide; the first attempt he made to destroy himself was unsuccessful, but he finally ended by cutting his throat. This man was reasonable in every other respect; in examining his head, I found the organ of devotion and that of circumspection, extremely developed.

A huzzar, of whom I have spoken in connexion with benevolence, and who had always been of a very good and humane disposition, fell into a state of derangement. In this state he manifested a desire to effect the happiness of the whole human race, and in all he said and did, he constantly called to witness the holy Trinity.

Very frequently the lesion of the organ of devotion is accompanied with a lesion of the organ of pride. The wife of a tailor passed a part of the day in churches with her well dressed children, treated her very complaisant husband with the greatest disdain, and ended by demanding, that he should serve her on his

knees, and see in her a privileged soul, endowed with supernatural powers. Another woman of high birth, whose husband had fallen into misfortune, thought to find consolation, first in long meditations and very fervent prayers, then in her ecstasies of delight, in which she believed herself raised to the bosom of the divinity, and which were the prelude of decided insanity.

M. Pinel says of these madmen, that, "We cannot deny certain difficulties in dissipating this sort of illusion, which belongs to a very exalted devotion or to fanaticism. How can we bring back to sanity a madman, puffed up with pride, who thinks only of his high destinies, who considers himself a privileged being, an envoy of the most high, a prophet, or even a divinity? What arguments can counterbalance the effect of mystic visions and revelations, of the truth of which the madman is angry, that others can form the least doubt?"

It is then shown by the state of disease, as well as by the state of health, that the sense of the existence of a superior being, and the propensity to religious worship, are fundamental qualities of the human race, and that consequently, they must belong to a peculiar cerebral organ.

Let us still add some proof as to the external appearance of this noble organ.

External Appearance of the Organ of the Sense of the Existence of a God, and of the propensity to Religious Worship. Continuation.

If we consider the busts and the portraits of men who, in all ages, and in all sects, have been most ardently attached to religious ideas, we find in them the organization, which I have pointed out in the history of the discovery of this organ. We constantly find in them, that the great development of the cere-

bral parts xxvii, Pl. viii. ix. xi. xii. makes the posterior mean part of the superior half of the frontal, project considerably. Of the great number of examples that are known, I will cite only the following: Constantine, Pl. xciv. fig. 1. Antoninus Pius, Pl. xciii. fig. 1. Marcus Aurelius, St. John, Chrysostome, St. Ambrosius, St. Athanasius, St. Stephen I., king of Hungary, Pl. xciv. fig. 2. St. Brun, St. Bernard, St. Dominic, Aubusson, St. Ignatius de Loyola, Pl. xciii. fig. 6. Charron, St. Francis de Sales, Pl. lxxxvii. fig. 5. Gustavus Adolphus, Pl. xciv. fig. 4. Charles I. of England, Louis XIII. Pl. xciv. fig. 5. Bourdaloue, Malebranche, Antonine Arnauld, Benoit Joseph Labre, Pl. xciv. fig. 6. Joseph of Paris, Pl. xciv. fig. 7. The philosophers and naturalists, Newton, Montagne, Pl. xciv. fig. 9. Bonnet, Kleinjogg, Clarke, Lavater, Sailer, Pl. xciv. fig. 10. The poets, Milton, Pl. lxxxiv. fig. 2, and Klopstock. The pious artist, Philippe Champagne, Pl. xciv. fig. 3.

This organ is very remarkable on the head of the priest, who gives the communion to St. Jerome, when dying; a painting of Domenichino, exhibited in the gallery of the museum.

The small cranium, Pl. l. is of a very devout woman, very superstitious, a fortune-teller, who favored two lovers at the same time. The cranium, Pl. xxx. is of an ex-jesuit, an excellent preacher, who unites the organ of devotion with that of comparative perspicacity. The author of *Indifference in Religion*, the Abbe F. de la Mennais, Pl. xcv. fig, 2. Combine a great development of the organ of devotion and of that of the sense of localities, and you will have the missionary James Leonard Perocheau, Pl. xcv. fig. 3.

How much all these elevated heads differ from that of the atheist Spinosa, flattened on the top! Pl. xciv. fig. 8.

I have intentionally chosen men, whose occupation and duties varied greatly. We see, that it is sufficient

to have the part of the brain referred to, much developed, in order that they may devote themselves to religious sentiments, whatever may be their habits in other respects.

We shall no longer be supposed to see the same conformation in the heads of the Christ of Raphael. In the same heads, the posterior parts are flattened, and consequently, the organs of the qualities common to man and to animals, are very inactive. The organs, on the contrary, placed under the median line of the anterior superior and superior posterior parts of the frontal bone, are greatly developed; whence it follows that these heads convey the expression of sagacity and of penetration, of benevolence and of the sense of Divinity; in fine, of the source of the purest morality.

But, has this divine form been invented, or can we presume, that it is the faithful copy of the original?

It is possible, that artists may have imitated the form of the heads of the most virtuous, the most just, most benevolent men, in order to give a character to the head of Christ, which they wished to represent. In this case, the observation of these artists would confirm mine. Yet this course supposes some idea of organology, or, at least, more circumspection than appears to me probable.

It is more probable, that the general form, at least, of the head of Christ, has been transmitted to us. St. Luke was a painter, and, in this character, why should he not have wished to preserve to us the features of his master? It is certain, that this form of the head of Christ is one of very high antiquity; we find it in mosaics, and in the most ancient paintings. The Gnostics of the second century possessed images of Jesus and of St. Paul; so that neither Raphael nor any other more ancient artist, invented this admirable configuration of the head of Christ. Pl. xcv. fig. 1.

When devotion is found in men endowed, in other

respects, with qualities different from it, or which are even diametrically opposed to it, we usually charge such men with hypocrisy, or at least, with sinister motives. We are slow in believing that Gustavus Adolphus, Pl. xciv. fig. 4, and Suwarrow, could, in good faith, on the eve of a battle, have performed themselves, and imposed on their soldiers, the most severe religious exercises, prayers, fasts, &c., either to obtain a general absolution, or to gain a victory.

Gabrino Rienzi was generally accused of being an impostor, a hypocrite, and of making religion serve his purposes, by putting in operation revelations and visions, to authorize his ambition and his cruelty. The inspection of his portrait, Pl. xciii. fig. 6, explains all the contrasts of his conduct.

Now, that we understand how the most revolting contradictions may exist in the same individual, we shall no longer be astonished to see the devotees Lewis XI., Pl. xciv. fig. 11, and Philip II., Pl. xciv. fig. 12, commit all acts of cruelty, make auto-da-fés and perform, with their own hands, the office of the executioner. It is organology alone, which gives the most reasonable explanation of the horrors of the inquisition.

The life of the conqueror Cromwell is an enigma for most of his biographers. Was his devotion real? Was it a calculation of hypocrisy? The following is the manner in which M. Villemain explains himself, in speaking of the mysticism of Cromwell.

"That official mysticism, so to speak, employed by Cromwell, in the communication he addressed to Parliament, is found at the same time in his private letters. Must we, on this ground, suppose as Voltaire does, that Cromwell was for a long time, sincerely a fanatic, and that he became a hypocrite in proportion as his mind was refined by the progress of his power? Or, must we believe that Cromwell, like Mahomet, made his first dupes in his own family, and commenced by the delusion of his own friends, the deception which he wished to extend to those about him?

"Besides, here are some of the religious letters which Cromwell, when already powerful and celebrated, wrote to his family. The first, dated 1646, is addressed to his daughter Bridges:

"'DEAR DAUGHTER,

"'Your sister Claypole is tormented by some unquiet thoughts (I trust in the mercy of the Lord) she sees her own vanity and the carnal disposition of her mind; she laments it, and seeks him who alone can purify her. Thus to seek, is to belong to the happiest sect, to that which finds, as every humble and faithful seeker will find. *Happy seeker! Happy finder!* Who has ever tasted how sweet the Lord is, without experiencing some returns of self-love and of weakness? Who has ever tasted the sweetness of God, and can become less zealous in his desire and less anxious to obtain the full enjoyment of the Lord? My dear friend, always seek the Lord; let neither your husband nor any thing in the world, weaken your affections for Jesus Christ. I hope that he will be for you an occasion of exciting them the more, that which makes thy husband most worthy of thy love, is that he bears in him the image of Jesus Christ. There fix your eyes upon that, think it is what you must love above all things, and all things for that,' &c.

"Another letter of Cromwell to his wife, presents the same character, and is not less curious:

"'MY DEAREST,

"'It rejoices me to know, that thy soul prospers, and that the Lord increases more and more his favors to thee. The great good, which thy soul may desire, is that the Lord may shed on thee the light of his protection, which is better than life,' &c.

"I submit to the reader these ascetic letters which seem to me more worthy of madame Guyon than of a conqueror: if there is not is them a cant and an intention of deceiving, which is powerful, only when it

is constant, we may conclude, that Cromwell was an honest man. Independently of the various proofs which I have opposed to this opinion, and of the testimony of the enemies of Cromwell, who, whether fanatic or not, accused him of hypocrisy, I can cite the authority of an impartial and indifferent witness. Debordeaux, the ambassador of France, wrote on the subject of the zeal, which Cromwell manifested for protestanism: 'The reports which they spread of the general, are not true: he affects great piety, but by a peculiar communication with the holy spirit; he is not so weak, as to allow himself to be led away by flattery. I know that he laughed about this with the ambassador of Portugal.'" (*Thurlow's State Papers*, vol. i. p. 256.)

M. Villemain says, in a note of the 11th book of his *History of Cromwell:*

"We find in a letter, written after the death of Cromwell, by a man who was intimate with him, some details respecting his character and person, which serve to make known, what he was, and what he appeared. The most curious trait in this picture shows apparent tendernsss of feeling, often remarked in the life of Cromwell, and which makes Whitelock in his memoirs say, that the protector was a very good man; *a kind of sensibility, sometimes altogether physical, which does not reach the soul, and which is compatible in certain men with the cool blooded contemplation of the greatest cruelties.* The following are the terms of this letter: "The protector was of a powerful and robust constitution; his height was under six feet, (two inches I believe,) *his head so large, that you would believe it must contain a vast treasure of intellectual faculties; his temper excessively inflammable;* but this flame fell partly of itself, or was soon extinguished by the moral qualities of the protector. He was, by nature, compassionate to beings in suffering even to the degree of weakness. Although God had given him a heart, in which there was little

room for the idea of fear, except that which he himself inspired, yet he carried to excess his tenderness for those who suffered; he lived and died in perfect union with God, as judicious persons, who were near him, have observed.'" (*Thurlow's State Paper*, vol. i. p. 766.)

In fact, the form of the head of this extraordinary man, Pl. xcv. fig. 4, proves in an indisputable manner, that this devotion, as well as his other qualities are in harmony with his organization. In general I do not think, that sovereigns, especially when they are powerful, take great pains to appear different from what they really are; and we shall never fail to find the explanation of their most singular contrasts, and their apparent hypocrisy, in a peculiar combination of organs, developing themselves simultaneously with great activity.

We see how essential it is, that artists should renounce their mannerism in taking the portraits of the men, whom they wish to hand down to posterity; since they can furnish, by an exact resemblance, the means of ascertaining the true motives of their actions.

Proofs of the Existence of God, taken from Organology.

After all I have said, it can no longer be doubted, that the human race is endowed with an organ, by means of which it acknowledges and adores a God of the universe; this is the noblest prerogative, which man possesses above the brutes. Man was to be the only really free creature of the earth; consequently man alone was to be capable of motives of action of a high order: he alone was to have the faculty of weighing and appreciating moral motives, before deciding upon actions prompted by his propensities; moral good and moral evil have an existence for him alone: and, as his own strength is not always sufficien-

to control the disorderly workings of his desires; as he too easily finds means to elude the laws of society; and, in fine, as there exists no check for those, whom their power or even the social compact has placed beyond all responsibility, it was necessary, that eternal Providence should place another powerful law in man himself; it is necessary for the human race, that each individual should find and fear in himself a secret censor, a censor, which supposes a supreme judge, from whom it is impossible to escape. Let us apply organology to this innate sentiment, and let us take possession of it, as of a new proof of the existence of God.

All our senses are in relation with certain external objects; of what use is the mouth, the sense of taste, of hearing, of smell, of sight, if, in the external world there did not exist objects of touch, molecules, emanations, vibrations, and light, fit to produce savors, odors, tones, and visions? The natural history of the five senses would therefore be incomplete, if we abstracted external objects, and the reciprocal action of the two on each other.

In the same way, all the propensities and faculties of man and animals, are predicated on external objects, with which nature has established an immediate relation. The male and the female are the objects of the instinct of propagation; young ones and children satisfy the love of offspring; the instinct of self-defence combats the enemies of one's preservation; the carnivorous instinct every where meets animals to prey upon; the imperious man finds individuals and nations to subjugate; the organs of place, painting, music, calculation, mechanics, are exercised on the laws and the relations of space, colors, tones, &c.

Thus all these propensities and faculties, and their organs, would be without object, if there were no external objects, on which they might operate. Nature would have trifled with man and with animals, if, in giving them instincts, propensities, faculties, she had

refused them external objects to satisfy them. Their state, at the first moment of their existence, would be a state of privation, of painful inconsistency; the second would be that of their death. It is, therefore, certain, that nature has created no sense, no organ, without having prepared for it beforehand, in the external world, the object of its function.

Now; it is certain, that, in all ages and all countries on the earth, the organization of man has led him to the knowledge of a Supreme Being: it is certain, that, in all ages and all countries, man feels his dependence on a first cause; that he feels the necessity of having recourse to a God, and of rendering homage to Him. Who would dare to think, that this single sentiment, this single organ was deprived of its object in the external world? No; nature cannot so far wrong men in their most important interest! There is a God; because there exists an organ for knowing and adoring Him!*

XXVII. *Firmness, Constancy, Perseverance, Obstinacy.*

The character of man depends much more on his feelings, than on his faculties. The feeble, undecided man, and the man of firm character, cannot know why the former wavers from one project to another, nor the man of firmness, why he maintains strongly the ground

* If certain philosophers would consider well, what I have just said on the innate feeling of the existence of a Supreme Being, and on the natural propensity to religious worship, they would see the necessity of modifying entirely their specious arguments, which they support by historical notions not less rash in favor of atheism. According to their view, would they not also find means to explain the origin of the propensities to propagation and to murder, of the love of offspring, of the sense of property and of pride, of the talent of music, calculation, architecture, poetry, in general of all the propensities and faculties? Such illusions are inevitable whenever, in order to explain the phenomena of living beings, we disregard their organization, and their internal powers.

he has taken. Cicero, that orator and philosopher, always uncertain, and wanting firmness, neither knew how to adopt an opinion promptly, nor to maintain firmly that which he had adopted. As he allowed himself to be intoxicated by success, so was he liable to be cast down by reverses, and he passed rapidly frem the excess of confidence, to abject despair.

Cato of Utica, on the contrary, discovered, from his youth, that inflexibility of character, which he exhibited through the whole course of his life. Pompedius jestingly begged of young Cato his recommendation of him to his uncle. The child kept silence, and manifested by a look and an air of discontent, that he would not do what was asked of him. Pompedius insisted, and wishing to urge the child to his purpose, took him in his arms, and carried him to the window, threatening to let him fall if he persevered in his refusal; but fear had no more effect on him than prayers. — He afterwards killed himself to escape submission to his enemy.

Children daily offer us examples both of firmness and of softness of character. Some are self-willed and obstinate; *when they have set their hearts upon a thing*, nothing can turn them from it. Others are supple, have no will of their own, cannot say no; such are the first traces of their future character; and in neither case has reflection the least influence on their manner of action.

Properly speaking, firmness is neither a propensity, nor a faculty; it is a mode of being, which gives to man a peculiar impress, which is called character; he, who wants it, is the sport of external circumstances, and of the impressions which he receives; he is a weather-cock turned by every gale. To-day he cries huzza for the republic, to-morrow, huzza for the tyrant. He lends faith and homage to every kind of idol. Constant only in his inconstancy, he quits, with astonishing rapidity, one standard for another; he is the man of all parties, and consequently the object of contempt to all.

The immoveable man is he, who is endowed with firmness to the highest degree. As he is unchangeable in his mode of viewing objects, we may calculate beforehand what will be his conduct, if a given event takes place. He is a man in whom we can have confidence; he undertakes difficult things in preference: difficulties and obstacles, which would deter feeble minds, are only encouragements which redouble his ardor. *Tu ne cede malis, sed contra audacoir ito,* is his motto. He does what he considers his duty; example for him is nothing: it is as difficult to mislead as to correct him; menaces and dangers improve his firmness into audacity; he repeats with L'Hôpital; *si fractus illabatur orbis, impavidum ferient ruinæ.*

Firmness and obstinacy flow from the same source. The weakheaded man, the child, are obstinate, intractable; the reasonable man is constant, immoveable, persevering, firm. *Tenax propositi vir.*

Seat and External Appearance of the Organ of Firmness.

This organ is formed by convolutions XIII. Pl. VIII. IX. XI. XII. placed immediately on the top of the head under the two superior anterior angles of the parietal bones, at the point, where these meet the superior posterior edges of the frontal. When these convolutions have a considerable development, they give to the crown of the head a spherical protuberance. The crown of the head is prominent in persons endowed with firmness; while it is level or depressed in the feeble and irresolute.

Lavater himself, as I learned after my ideas were already fixed in this respect, perceived by means of the numerous *silhouettes*, which he had collected, that the form of the head I have now pointed out, is proper to persons of a firm character.

Nothing is more easy than to multiply observations

on this subject. There is no family, no school, no society, which does not furnish the opportunity. The cranium Pl. xcvi. is that of the famous painter Unterberger; this man continued all his life immoveable in what he undertook; he undertook only things difficult of execution, and which required many years to bring them to perfection; though this disposition of mind by no means facilitated the means of providing for the wants of the numerous family, with which he was burdened. In this cranium, we see, on the summit the projecting elevation, of which I have just spoken, well marked.

This protuberance is much more remarkable in the cranium of a highway robber, extremely hardened in crime; this wretch was long kept in a narrow prison to force him to declare his accomplices; when it was seen, that this means was insufficient, recourse was had to blows with a stick; this torture appeared too painful to him, and he strangled himself with his chain. After his death, I found the parietals disunited precisely in the place, where the organ of firmness is placed. Was this separation an effect of the violent strangulation? Must we attribute it to the excessively energetic activity of the organ of firmness? Is it an effect of chance? Perhaps we shall have occasion to observe similar cases, which will aid us in resolving this question.

Dr. Spurzheim and myself saw in the house of correction, at Strasburg, a desperate robber, who, for a whole year, had pretended to be dumb; this man had the organ of firmness extremely developed.

Firmness of character must not be confounded with perseverance in certain propensities; as with the uninterrupted manifestation of certain faculties, which may exist in the most vacillating character.

How happens it, that certain persons, to procure enjoyment, are obliged to change every moment the object of their favorite propensities, while others are opposed to every kind of change? Lodging, friends,

mistresses, every thing, in fine, is dearer to them, the longer they remain in their possession. There are persons who have a rage for building. Hardly is one of their plans executed, when they are again changing; to make changes is their occupation through the whole year. There are likewise men, who love the fair sex, and feel the desire to unite themselves to woman by indissoluble ties, and to anticipate happiness from such a union. But no sooner do they possess the object of their desires, than it loses, in their eyes, all the charms it possessed; the spell is broken; in vain do they change; with each change they only wander farther from the end they propose to themselves. Does this disposition depend on the want of firmness of character, or, on a defect of the principle of attachment, or rather, on a deficient development of both these qualities?

Conclusion of the Exposition of the Organs, and of their Functions.

If I had treated of all the fundamental faculties, and of their organs, I should have made known all the instincts, propensities, and faculties of man and of animals — I might say, thus far extends the province of man, and no farther. But, probably, those, who will follow me in the career which I have opened, will still discover some fundamental powers, and some organs, which have escaped my researches. Yet it is to be presumed, that they will never discover as great a number, as some philosophers seem to believe to exist. We must be cautious of admitting a particular organ for each modification of a quality or faculty. Nor must we deduce from a particular organ the qualities or faculties, which are only the result of the simultaneous actions of many organs. Now; if we reflect on the number of possible combinations, which may result from twenty-seven to thirty fundamental

qualities or faculties, from the reciprocal action of as many organs, we shall no longer be astonished at the infinite number of varieties met with in the characters of men. How many different combinations result from ten figures, from twenty-four letters! How many different faces result from the different combinations of the small number of parts, which compose the human face! How many shades, colors, and concords result from the combination of the small number of primitive colors and fundamental tones!

I have constantly adopted the principle of advancing nothing, which I could not either rigorously prove, or, at least, render very probable by strong arguments; it is for this reason, that, for the qualities and faculties, of which I maintain the existence, I have confined myself to that degree of activity, to which I could discover them and observe their manifestation. I am not ignorant, that it would have been more philosophical to bring back always to their fundamental forces, the qualities or faculties, which I have been able to detect only in their exalted action; but, I have preferred to leave something for those to do who will come after me, rather than to put them under the necessity of undoing, what I might have prematurely established.

Besides, the difficulty of determining the primitive forces, is perhaps only apparent. Though all individuals of the same species are endowed with the same qualities and faculties, all are not endowed with them to an eminent degree. All dogs are not attached to their master; all are not courageous; all have not the faculty of directing their course; all bitches are not good mothers. Nevertheless, we say with truth, that all dogs possess the organs of attachment, of courage, of localities, of love of offspring. All have not an exquisite smell: can we therefore say, that dogs do not possess the faculty of scent? So, likewise, all men, though essentially furnished with

the same moral qualities, and the same intellectual faculties, are not geniuses in any respect. Most are limited to the simple disposition, to the capacity, to a moderate exercise of human power. It is given to only few individuals to be original. The Homers, the Ciceros, the Euclids, the Raphaels, the Michael Angelos, Titians, Mozarts, Canovas, St. Vincent de Pauls, &c., are rare; but every body is sensible to the charms of poetry, eloquence, painting, architecture, music, acts of beneficence. Thus, every body, with few exceptions, has the capacity to enjoy the productions of individuals, more happily organized. Why should not a person have the organs of poetry, of sculpture, of music, although unable to compose an Iliad, a Saint Madeleine, *une Flute enchantée!* These reflections, applied to organs, whose fundamental function seems not to be well determined, will perhaps prevent my successors from changing the denominations, which I have adopted conformably to the very energetic manifestation of a quality or a faculty.

There are presumptuous men, who think they can do every thing better than it has been done, and who say to me: "I doubt not, that there exists different organs in the brain; I only doubt whether we ought to admit those, which you pretend to have discovered." I would urge these persons to publish their discoveries, as well as the proofs on which they rest them. If their ideas are more conformable to nature, their proofs more convincing than mine, I will receive them with the more eagerness, as I attach more importance to a doctrine of the functions of the brain, which should leave nothing to desire.

Others, again, make exceptions to my physiology of the brain, inasmuch as they pretend, that I admit too great a number of fundamental qualities, and faculties and organs. It is not astonishing, that from twenty-seven to thirty fundamental qualities, and as many organs, should appear much too numerous to philosophers, capable of deceiving themselves to the extent

of believing one, two, three, or at most six fundamental forces, sufficient to explain all the qualities and all the faculties of man.

When I commenced my researches, I was very far from knowing what I should discover. I had as little prepared myself to find a single fundamental power as to find twenty. Each of those, which I admit, is clothed with distinctive characters of fundamental qualities or faculties. Each one fulfils the following conditions announced at the commencement of the volume.

1st. That the organ is neither developed in the same time with the others, nor degrades itself simultaneously with them.

2d. That, in the same individual it is more or less developed than the other organs, and its functions takes place with more activity than that of the others.

3d. That when, in complete imbecility and in complete loss of mind, the function of this organ is alone in activity, this organ has alone acquired a certain degree of development.

4th. And that this organ alone remains in arrear in its development, in cases where its activity is alone more feeble, than that of the other qualities and faculties.

5th. That in mental diseases, the primitive force in question, may alone be injured or remain untouched, that is, that its organ may be singly injured, or be found singly untouched.

6th. That the fundamental function and its organ exist in certain species of animals, and are wanting in others.

7th. That often the same fundamental forces are found to exist in different degrees in the two sexes, and that, in this case, the organ of the quality or faculty has a degree of development differing in the two sexes.

These modifications certainly cannot be explained either by the aid of a single fundamental force, or of

three, or of five, or of six; and every hypothesis, which renders no reason for the daily phenomena which the state of health and the state of disease offer us, is necessarily false.

Now, as it is precisely these modifications, which constitute the character of a fundamental power, and as they are found, either wholly or in part, in all the moral qualities and intellectual faculties of which I have treated, I must necessarily receive them as so many fundamental powers.

All, that may seem incomplete to the reader, will be completed hereafter, when I shall treat of the philosophy of man.

CONFIRMATION OF THE TRUTH OF ORGANOLOGY, AND CONSEQUENCES WHICH FLOW FROM THIS DOCTRINE.

Agreement between the prevalent Form of the Head and the moral and intellectual Character of Nations.

The philosophers, who have hitherto made a collection of the crania of different nations, sought for characteristic signs, not only in the osseous box, which encloses the cerebral mass, but likewise in other bones of the cranium. They sought rather to find the marks by which they might distinguish the head of the negro, the Carib, the Iroquois, the Tongusian, the Samoïede, the Chinese, the Arab, Laplander, Kalmuck, than to discover the material or organic causes of the characters, by which these nations are distinguished. We see, by all that I have said in the preceding sections, that, in order to find the external signs of the difference of these characters, it is only necessary to study the osseous box of the brain.

In treating of each quality and of each individual faculty, I have pointed out for almost all, the influence which climate exercises on them. I may therefore

confine myself for the present, to presenting some general ideas.

It is certain, that different qualities and faculties characterize, in a particular manner, certain countries, and that there is a marked adaptation, as well for certain races of men, as for the energy of certain moral and intellectual powers. It is under the temperate zone, that man has attained the highest degree of perfection of which his nature is capable. Under the extremes of heat and cold, his activity is impaired. Under the one, he is dull and stupid, moderate in his pacific desires; under the other, he is violent in his affections, feeble in judgment, and given up to animal pleasure; under both, he manifests a mercenary soul.

"It is to the southern nations of Europe, both ancient and modern, that we are indebted for the invention and embellishment of that mythology and of those ancient traditions, which even now present the most fertile field for the imagination, and an inexhaustible source of poetical allusions. We owe to them the romances of chivalry, and those succeeding models of a more rational style, by which the imagination is excited, and elevated, and the spirit is purified."

The north has been more fruitful in the productions of industry, and it is there, that the sciences have received their most valuable additions: the efforts of imagination and of feeling have been more successful and more common in the south. While the borders of the Baltic were made illustrious by the labors of Copernicus, Tycho Brahe, Kepler, those of the Mediterranean produced men of genius in all departments, and abounded in poets and historians, as well as in philosophers.

In the north, science is still confined to those departments, which furnish scope for the judgment and memory. Faithful details on public events, without much discernment in regard to their respective importance; the treaties and the claims of nations, the

genealogies of sovereigns, the dates of their birth; these are the great objects, which the literature of the north has endeavoured religiously to preserve; while it has allowed the faculties and feelings of the soul to remain neglected. The history of the human heart, the interesting memoirs furnished us by the free and natural incidents of private life, as well as the brilliant events of high office, the spirit of wit, the piercing shafts of satire, all the varieties of eloquence among the ancients and the moderns, are confined, almost without exception, to the latitudes of the fig and the grape.

The burning desires, the fiery passions, which are enkindled between the sexes in one climate, in another shrink into cold regard, or reciprocal pardon for mutual disgusts. One is struck by this difference, in crossing the Mediterranean, in ascending the Mississippi, in crossing the mountains of Caucasus, in passing the Alps and the Pyrenees to the Baltic Sea.

On the frontiers of Louisiana, woman governs by the double ascendency of superstition and passion. Among the natives of Canada, she is a slave, and is valued only for her labors, for the domestic duties which are her lot.

The fires of love, the tortures of jealousy, which have so long reigned in the seraglios and harems of Asia and Africa, and which, in the south of Europe, have hardly been influenced by the difference in religion and of the civil establishments; by a diminution of the heat of climate, and in higher latitudes, easily change into a momentary desire, which takes possession of the soul without enfeebling it, and leads it to acts of gallantry. Farther north, it is a spirit of gallantry, which occupies the mind and the imagination, more than the heart, which prefers intrigue to enjoyment, and substitutes affectation and vanity, for desire and feeling. In proportion as we leave the tropics, this passion degenerates more and more into a habit of domestic union, and cools to such a degree of insen-

sibility, that, if the two sexes had the liberty of choice, they would hardly prefer this kind of society."*

The history of the human race forms an inexhaustible source of similar reflections. Researches of this nature will be more multiplied, and will have more importance, in proportion as men are more convinced, that intellectual operations depend on the animal organization.

As to the examination of heads in particular, I deem it my duty to recommend the following precautions.

To observe a small number of crania is usually thought sufficient, in order to be prepared to draw deductions from them; it would in fact be so, if the moral and intellectual character of all individuals composing a nation, were the same. According to my observations and those of Spurzheim, there is, in this respect, the greatest difference between man and man, even among nations to whom a decided national character is attributed with reason. Spurzheim saw at London twelve Chinese, and found them as different from each other as the Europeans. The resemblance between them existed only in the countenance, and especially in the position of the eyes. M. Diard gave me two crania found at Coulpi, on the borders of the Ganges. If I except the organs of the love of offspring, and of the sense of property, which have acquired an equal degree of development, all the others offer striking distinctions. We see the same differences in negroes, though these resemble each other in the mouth and nose, especially when they come from the same district of country. Among three negroes, whom Dr. Spurzheim saw at London in the establishment for mutual instruction, was a young man, eighteen years of age, endowed with extraordinary talents and a very agreeable face; I have seen several negroes of both sexes, whose features were far from

* Ferguson, Essay on the history of civil society, vol. I. p. 315, &c.

being disagreeable. I see the same form in individuals of different nations, so that it would be impossible to distinguish by that circumstance alone, whether a man was French, German, Italian, Spanish, or English. It is precisely for this reason, that we find individuals of all nations, who have precisely the same moral and intellectual character. We therefore pass a hasty judgment, when we think to discover the general character of a nation, in a small number of crania.

In order to discover this general character, we must have it in our power to study a great number of individuals, whole masses, the whole nation, if possible. With such facilities, it would be easy for the organologist to discover, in the structure of the head, the material cause of the character of a people. It is true, that, generally, the negro is inferior to the European in intellectual faculties; accordingly, in general, negroes have the head smaller, and a cerebral mass less than the inhabitants of Europe. It is true, generally, that the English and the French have less disposition for music than the Italians and the Germans: accordingly, the organ of tones is less developed in the former than in the latter. We may also explain, by comparing the forms of their heads, why the English and Germans are disposed to seek the connexion between cause and effect, while the French confine themselves to individual facts, and despise abstractions and generalizations, &c.

It is in this respect, that the study of the forms of national heads may be useful to organology: and, at this moment, one might make on this subject a very interesting work. It is of little consequence to the physiologist, that the general character of a nation depends on the influence of the climate, upon the kind of life, the habitual occupations, nourishment, the form of the government, religion, or on original race; for, in most cases, the question might be actually insolvable. It will often be easy to deny, that the climate exercises a predominant influence.

The history of all ages and all nations teaches us, that the most striking contrasts, both in regard to physical beauty and to the intellectual faculties, are found placed near each other. One nation will live thousands of years in one country without gaining civilization or the character of natives. On the other hand, we should sometimes be tempted to say, that the change of the form of government and of the religion has also changed the character of a nation; while in fact it is not changed; it is only compressed or has been temporarily modified. If you see a people to-day seized with religious fanaticism, to-morrow a prey to the passion for conquests, and the next exalted by the desire of liberty, finally, at all times, varying from moment to moment in its judgments and in its desires; if the same nation, which formerly was the cradle of the arts and sciences, now grovels in idleness and sensuality; avoid saying that its organization and its character have changed. It appears to be a part of the plan of nature, that sometimes one organ, sometimes another, should exercise supreme power over the same nations.

I subjoin some observations on the heads of the Papous, extracted from a memoir read to the academy of sciences by M. Gaimard, physician and naturalist of the expedition of discovery around the world, commended by Capt. Freycinet, and one of the compilers of the zoölogy of the great work, in the press, in relation to this expedition.

"We brought," says he, "from the island of Rawak six heads of the Papous, which we found on the threshold of the tomb of a chieftain. On our arrival at Paris, having submitted these heads to the examination of Dr. Gall, we have now the satisfaction to offer, with more confidence, such of our observations as will support the doctrine of this celebrated physiologist. At the first examination of the crania, M. Gall remarked in all an inequality, which he called *rachitic deformity*, and which led him to believe, that the men, to whom

it belonged, inhabited low and damp places. It was with surprise, we must say, that we confirmed the truth of so delicate an observation. In fact, most of the inhabitants of this Archipelago, living principally upon fish and shells, scarce ever leave the seaboard, which in these countries is so marshy, that one can in a manner sail in the woods. The inhabitants, whom necessity obliges to remain in such unhealthy places, endeavour to escape their influence by raising their houses on piles. They have probably learned by experience, that places constantly submerged, are less dangerous than those occasionally so, whence the custom which they follow of building their habitations above the waters of the sea.

"The heads of the Papous present a flattening of the anterior and posterior parts, and at the same time a widening of the face.

"The summit of the head is elevated, the parietal protuberances are prominent, the temporal very convex, and the coronal, at the place of the semicircular line of the temples, presents a remarkable prominence.

"The bones of the nose, almost vertical, flattened from before backwards, have little prominence; they are narrowed at their middle part and widened above and below. The form of the nose corresponds to this arrangement, which is still increased by the breadth of the rising apophyses of the superior maxillary bones, directed forward. These bones themselves are much broader than in the European race, which depending especially on the development of the malar apophysis, gives to the face the breadth, which is remarked in all these nations.

"The anterior opening of the nasal canals is very much widened at its inferior part; this widening is even more considerable than among the negroes.

"The malar bones are more directed forward, and the zygomatic apophyses are broader and more prominent.

"We observe, in one of the heads, the greater

breadth and depth of the maxillary and frontal sinuses, discovered by the fracture of the bones. The draughtsman, M. Chazel, has faithfully copied this accident, as well as the scar, made by a cutting instrument, which has altered the left parietal.

"The alveolar arch is of very remarkable thickness in the part corresponding to the molar teeth; the roof of the palate, more developed in the transverse diameter, is less extended from before backward.

"The anterior palatic opening is larger. Would not this disposition indicate a more considerable development of the naso-palatic ganglion and a more perfect organ of taste?

"One of these heads, which was not drawn, is irregular, offers in the two halves of the cranial box a considerable difference. The flattening, instead of being in the direction of the anterior posterior diameter, is obliquely from right to left, and from behind forward. The left parietal is likewise much flattened, which greatly diminishes the capacity of the cranium on this side, whence there must have resulted a great inequality in the cerebral hemispheres. This head resembles in this respect that of Bichat, with the difference, that the posterior depression is found on the opposite side. A similar conformation may be met with among all nations.

"Another head presents two osseous prominences in the auditory passage.

"Finally, the last, which is smaller, seems to be that of a woman: the anterior part, less broad and less elevated, announces more limited intellectual faculties; the occipital, more prominent at its superior part, by indicating a decided love for children, enables us to divine the maternal character, and the squamous portion of the temporal, more flattened, denotes less propensity to cruelty; which again comes in aid of the opinion of the sex of the individual, to whom this head belonged. It was, very probably, a woman; she was young, because the osseous prom-

inences are not marked, and because no suture is ossified.

"If, after the examination of the osseous prominences, we pass to that of the faculties, which, according to the discovery of M. Gall, they announce, we shall see the development of the parietal protuberances indicate circumspection, whence results the distrust to which the Papous are subject. We might say, that this is an instinct in half savage men, as it is in most animals. We may add, that in the Papous, distrust must often be brought in play by the wars, made on them by the Pirates of the surrounding islands, who fall upon them unawares and make them slaves. Without entering here into fuller details as to the customs, which belong more particularly to the history of the voyage, I will only say, that, when in a simple canoe, one of us (M. Quoy) visited the village of Boni, all the inhabitants fled into the woods, before it was possible to speak to them. It is, without doubt, this state of alarm, almost habitual to these islanders, which had led them to place their houses almost opposite dangerous reefs, of which they alone knew the passages, in order to have time to escape their oppressors.

"In one of the heads drawn, the lateral portion of the frontal, which we see below the semicircular line of the temples, and which touches the anterior inferior angle of the parietal, offers a remarkable convexity, and indicates a manifest disposition to theft. We know, that theft is a habit, to use the expression, proper to all these tribes, and that they execute it with more or less cunning and industry.

"But the most marked trait, denoted by the elevated temporal bone and temporal fosse, is the carnivorous instinct which is sufficiently developed, to lead to murder: a frightful propensity to which these islanders abandon themselves, and of which the bones in question are probably the result. The chief, or Kimalaha of Guébé, assured us, that there existed anthro-

pophagous tribes in the interior of the land of the Papous. This assertion reminds me, that, in landing at the island of Ombai, I saw suspended in the cabin of a native, in the village of Bitoka, a row of jaw bones. Six months before, a dozen Englishmen were killed and devoured by the ferocious Ombayens, in this island, where we, being few in number, incurred the greatest dangers.

"The elevation of the superior posterior and middle part of the frontal, and of the corresponding part of the parietals, is a sign of exaltation in religious ideas, whence flows the tendency to superstition. We ought here to say a word concerning the perfect arrangement and religious care, which these natives exhibit in the construction of their tombs. These are small huts in which several persons might be contained in an inclined attitude. The body there reposes in a box, which most generally encloses small idols rudely carved, bracelets, a comb, and hair. Sometimes we find nothing; in this case they are simple sarcophagi, raised to the memory of those who, having perished in combat, may have fallen into the power of the conquerors. At other times, a statue, placed under a small hangar, (*shed*,) indicates the place of the burial; or the spoils rest on piles, and are covered with a canoe reversed.

"The top of the head very elevated, announces inflexible firmness. We have no fact in support of this opinion.

"The posterior flattening of the cranium, which we have observed in five heads, shows that the organ of philoprogenitiveness, or, of the love of children is deficient. We see it prominent only in that, which, we have reason to believe, belonged to a woman. Our opinion coincides with that of M. Gall. It is in fact persons of this sex, who take care of the children; the men have no concern with them, and even appear indifferent to them. Among the negroes, on the contrary, M. Gall has almost always remarked the de-

velopment of the prominence, which indicates the existence of this faculty, the preservative of the species.

"The observations, which we have made on the Papous, the justness of which appears to us to be confirmed to a certain extent, by the study of the character of the individuals, who form the subject of them, seem to us to contradict the paradoxes of those morose philosophers, who, angry with the vices of men as they exist in society, have represented the man in the state of nature such as he is not, and have made of him an ideal being, in order to bestow on him attributes of power and means of happiness, which civilization can alone confer.

"We ought to add, that the Papous would be susceptible of education; that their intellectual faculties would require only to be exercised and developed, to make them hold a distinguished rank among the numerous varieties of the human race." (QUOY et GAIMARD, *Zoölogy of Capt. Freycinet's voyage round the world.*)

We see by this relation, that other travellers have given a very mistaken idea of the organization of the head of the Papous, by representing it as extremely defective. The two heads here described are now preserved in my collection.

Of Physiognomy, or the Talent of Knowing the Interior of Man by his Exterior.

We understand by the expression *physiognomy*, the art of knowing the moral and intellectual character of man, by the sole external conformation, not of his face alone, but of all the other parts of the body, without these parts being put in action.

Not only the vulgar, but even philosophers, give to this art the preference, over the physiology of the brain. Others imagine, that my researches on the

functions of the individual cerebral parts, and on the inferences to be drawn from a certain form of head, are of the same nature as those of the physiognomists. There is, however, absolutely, no relation between the two. A physiognomist, Lavater for example, is not at all guided by the knowledge of anatomy and of physiology; the laws of the organization of the nervous system in general, and of the brain in particular, are unknown to them; they have no idea of the different composition of the brain in different species of animals; they take no account of the different results of the different development of the cerebral parts. They know not the influence, which the brain exerts on the form of the head; they have no notion of the changes, which the encephalon and the cranium undergo in the different ages of life, in different diseases, in mania, &c. They are still imbued with prejudices imbibed in regard to the causes of the different moral qualities, and the different intellectual faculties, and to the divisions of them, which philosophers have established. Now, if we consider, that the material cause of all the qualities and all the faculties exists in the brain, how can we expect ideas conformable to nature, from men wholly strangers to the knowledge of the structure and functions of the brain?

Accordingly, all the observations of the physiognomists are founded on extremely variable indications. Physiognomists have not yet established a single solid principle, a single immutable sign. All that they have advanced amounts merely to *sensiblerie* and declamation. Read all the writings of Lavater, and you will every where find the same wanderings of the imagination, the same exaltation so contrary to the spirit of observation. The same character has its sign sometimes in a certain form of the eyes, sometimes in a certain form of the nose, mouth, hand, and even in a peculiar position of the teeth. This is easily explained; when the physiognomist knows the character of the person, and finds in him any part

formed in a manner which strikes him, this conformation becomes for him the distinctive mark of this character. When a criminal is led to the scaffold, there is no one who does not read his character in his face; whereas so long as he kept his place in society, no one saw, what is now seen written in such distinct characters.

Submit the same head, the same drawing to the judgment of three zealous physiognomists. Each of them is persuaded of the infallibility of his knowledge; and yet each of them will pronounce a totally different judgment. I have often shown a collection of four hundred casts to physiognomists, fully persuaded of the truth of this science. My casts give very faithfully all the forms of the forehead, of the nose, eyes, cheeks, lips, chin, &c., and yet not one of these physiognomists has ever either determined the general character, or indicated even a particular quality or faculty of either of the originals of my four hundred casts. All have constantly been deceived.

That, says one of my readers, would not have happened to me; a hundred times have I judged the character of persons from their physiognomy, and I doubt if I was ever deceived. Have you judged persons whose character was previously unknown to you? Have you given yourself the trouble, and have you had time to substantiate your judgment? Have you eaten a bushel of salt, with each of the persons whom you have judged? And how do you announce your judgments? *This is a good man, an essentially honest soul; this man has something deceitful in his eyes, I would not trust him; that is an amiable woman and of angelic temper; what a venerable matron!* &c. But what is there determinate in all these judgments? Do they teach us by what quality or what faculty, such an individual is distinguished?

I have proved, that the brain is exclusively the organ of the soul. There is then only the form of the brain or that of the osseous box, as far as it is deter-

mined by the form of the brain, which can enable us to judge of the qualities or faculties. There can exist no relation whatever between any other part, and the qualities or faculties. There is not, either in the nose, or in the teeth, or in the lips, in the jaws, hand, or knee, any thing, which can determine the existence of a quality or a faculty; these parts, therefore, cannot furnish any indication relative to the moral or intellectual character.

I know well, that, according to the physiognomists, there exists a certain harmony between all the parts of the body. "It is evident," says Lavater, "that the intellectual life, the faculties of the human understanding and mind, manifest themselves especially, in the conformation and situation of the bones of the head, and principally of the forehead; although, to the eyes of an attentive observer, they are sensible in all the points of the human body, on account of its harmony and its homogeneousness." On this hypothesis, it would be matter of indifference to take for the subject of observation, the nose, the knee, the foot, the chest, hand, or brain.

I have conversed on this subject with the most learned artists. Generally, they hold the opinion, that the form of a determinate part of the body being given, one can determine the form of the other parts; that the nose suggests the forehead, and the whole head; that a determinate form of the forehead necessarily supposes such a form of the nose. These assertions have induced me to make the most exact researches. I have examined with care, devotees, poets, philologists, voluptuaries, warriors, ambitious men, who had each the cerebral organ of their dominant quality or faculty extremely developed, and in each, I have found a different nose, different lips, different hands, &c.

In general, the physiognomists have recourse to more than one gratuitous hypothesis. They go so far as to say, that it is the soul, which builds itself its

external envelope, and, consequently, that this last must necessarily bear the impress of the qualities and faculties of the former.

1st. This assertion is proved by nothing.

2nd. It supposes that the cause of the difference of the qualities and faculties of the soul depends on the soul itself, and not on the material organs.

3d. Experience proves, that, both in man and in woman, the virtues and the faculties are not proportional to the beauty of the different parts of their body, or, of the harmony which reigns among them.

And after all, when a physiognomist has pronounced a judgment, by what has he been determined? Will he be able to tell me, what kind of eyes, nose, mouth, the person has, whom he has judged? He has, therefore, not judged from the forms of the parts, and, consequently, not as a physiognomist. The gestures, the movement, the habit of body, the motion of the eyes, the speech, &c., have determined his judgment, without his being able to render an account to himself, how he has passed a pathognomic judgment; that is, he has judged of the motion, and not of the form of the parts; in this case, we shall be able to understand each other.

It is not without a kind of confusion, that I mention the opinion, according to which one may judge the character of a man, by the resemblance he has to some animal. Where are these resemblances found? Again in the nose, the jaws, the eyes, the mouth; and what can they, consequently, indicate? Let two persons undertake to guess what animal I resemble, and each of them will name a different one. Yet, say they, Socrates resembled a Satyr, and he confessed himself, that he had the inclinations of one. But what kind of animal is a Satyr? And where is the strong head, whatever its physiognomy, which has not to struggle against the desires of the flesh?

Of Pathognomics, and of Mimicry or Pantomime.

I have said, that one does not judge as a physiognomist, when he pronounces a judgment on the character of a person, without taking an exact account of the forms of the parts, on which he founds his judgment. If the parts in question are in motion, and if it be the motions which we judge, we pronounce a pathognomic judgment; for the act of judging a person by his gestures, by the whole habit of his body, is *pathognomy*.

This art is founded in nature herself; for, it is nature that prompts all the gestures, the attitudes, the movements, finally, the whole pantomime, by which men and animals express all their feelings and ideas. Pathognomy has its fixed and immutable laws, whether we apply it to man or to animals, so long as the question relates to the same feelings and the same ideas. Pantomime is the universal language of all nations and of all animals: there is no beast, there is no man, who does not learn it; there is no beast or man, who does not understand it; it accompanies language and strengthens its expressions; it supplies the defects of articulate language; words may be ambiguous, but pantomime never is so.

Who does not recognise by his pantomime, the voluptuary, the bully, the boaster, the vain man, the devotee, &c.? Have men ever been deceived in regard to the expression of anger, despair, jealousy, the desire of vengeance, grief, tenderness, irony, gaitey, confusion, envy, &c.?

There are those, however, who pretend, that the expression of the affections, passions, feelings, ideas, is not subjected to invariable laws; that it is arbitrary, and varies with the man or the animal, that makes use of it.

There is no doubt, that the sentiments and the ideas are modified differently in every animal, that experi-

ences them, and that consequently the pantomime of each of these individuals, must be differently modified. Still, in essential points, all human individuals feeling and thinking in the same manner, their pantomime must also be essentially the same. If this pantomime were arbitrary, how would children and even animals understand it?

Another reason again, why the pantomime of the affections, &c. cannot be absolutely uniform in all its details, is, that there is almost always a complication of different affections, and that it is not, far from it, the complication of the same affections, which constantly takes place. Jealousy, for instance, expresses itself very differently, according as it is complicated with anger, with a repressed desire of vengeance, with confusion, pride, grief to see one's self betrayed, contempt, irony, &c. The pantomime must necessarily be complicated with the expression of the different sentiments, ideas, and passions, which affect the individual simultaneously.

What would become of engraving, painting, sculpture, the comic art, eloquence, poetry, if the expression of the sentiments and the ideas were not subjected to immutable laws? What means would they have in their power to paint modesty, prudence, contrition, fear, despair, baseness, remorse, innocence, joy, anger, contempt, pride, meditation, contemplation, devotion, or firmness? How would the eye of the dying gladiator say to us, *I die, but I am neither surprised nor grieved.* How would Laocoon present to us the image of man, sinking under sufferings without too much weakness? Who could comprehend their language? Would not the expression of love be confounded with that of hatred; the expression of envy, with that of benevolence?

Where, in fine, is the man or the animal, who takes time to deliberate on the manners, in which he would make his feelings and his ideas understood by others? Even at the moment, when the feeling and the ideas

arise, they are written on the exterior in characters discernible by all the world. It is certain, therefore, that the feelings, ideas, affections, passions, are manifested without, by suitable expression according to determinate and invariable laws.

But how happens it that each affection, passion, feeling, and idea, produces a peculiar and proper pantomime? Why does the humble man walk meekly along, with his eyes fixed on the ground, while the proud one struts with expanded chest and head erect? Why does the devotee raise his head forward, and direct his looks and hands toward heaven?

These are bold questions, and the bolder as no one as yet has entertained the idea of seeking the cause of these phenomena. Let us see if organology is capable of throwing any light on these mysteries.

Of the Internal Sources of Imitation in general, and of the Imitation of each Feeling, of each Passion, &c., in particular.

The brain is the source of all the feelings, ideas, affections, and passions; their manifestation, therefore, must depend on the brain and be modified by it. The brain is connected with the instruments of all the senses, and by aid of the spinal marrow, is equally so with the instruments of the voluntary movements. It controls the senses and the muscles, and consequently, the extremities; it puts in action each of the parts; by its activity it determines the movement they must make, the position they must adopt; as soon as it is at rest, the senses, the muscles, the limbs are inactive.

But the different cerebral organs are placed in different regions. The action of the brain, according as such or such an organ is active, must then commence from different regions. Each of the cerebral organs, in a manner peculiar to itself and suitable to its place, brings under its influence the instruments of the senses,

the muscles, the extremities. Each organ, therefore, expresses its action by a peculiar play of pantomime; consequently this play of pantomime is the peculiar language of the organ in question, and reveals, not only the nature of the feeling, the idea, the affection, the passion, but also the seat of the organ, from which their movements have proceeded.

Organology may then draw from mimicry two advantages equally valuable: 1. Mimicry may serve to indicate the place of the brain, where the organ which acts in such a particular case is found, and thus prepare for the organologist the way to arrive at proofs, which place beyond doubt, what at first he had only suspected: 2. It serves as a confirmation to him by concurring to prove, that the organ, of which he observes the action, is in fact placed where, guided by other facts, he had located it. In treating of the organs in particular, I might have reported in regard to each of them, what has relation to expression. I have not done it, because I thought I could dispense with this redundancy of proof, and I preferred to explain without interruption all that has relation to pathognomics.

The reader is now prepared to divine and to judge the expression of each organ in particular. But, before entering into any detail, I am going to determine the general principles of the external manifestation of the action of the organs.

1st. The organs, which have their seat in the inferior regions of the brain, when they act with energy, carry the head downward, depress and shorten the body.

2d. Those of the organs, which are placed in the superior regions of the brain, during their energetic action, elevate the head and the whole body.

3d. The organs, placed in the superior posterior regions of the brain, depress the head and the whole body backward and downward.

4th. The organs, placed in the inferior anterior regions

of the brain, direct the head and the whole body forward and downward.

5th. The organs, placed in the superior anterior part of the brain, elevate the head and the body and carry them forward.

6th. The organs, placed at the superior posterior part of the brain, elevate the head, the body, and carry them backward.

7th. The organs, placed in the inferior region of the brain, in a perpendicular line with the great occipital opening, depress down perpendicularly the head and the whole body.

8th. The organs, placed in the superior region of the brain, perpendicularly above the great occipital opening, elevate perpendicularly the head and all the body.

9th. When the twin organs of each function act simultaneously, the head and the whole body move symmetrically from above downward, from before backward, &c., according as the organ which acts, is placed in the anterior, posterior, superior, or inferior region of the brain.

10th. When there is only one of the two equal organs, which acts, the head and the body move on the side on which this organ is placed, from above downward, from below upward, from before backward, from behind forward, according as the organ acting is placed in the superior, inferior, anterior, or posterior region of the brain.

11th. When the two double organs act alternately, the head and the body perform alternately the motions belonging to their action, sometimes on one side, sometimes on the other.

12th. When the double organs, having their seat in the perpendicular axis of the brain, act alternately, the head moves on its pivot from right to left, and from left to right, from above downward, and from below upward, according as the acting organ is situated in the superior or the inferior part of the brain.

It is in consequence of these laws, that, when, in man or in an animal, a fundamental force is strongly in action, the senses, the limbs, and the head execute certain determinate movements, without the animal or the man having any deliberate consciousness of them. These movements are, therefore, a purely automatic language, and for that reason generally intelligible.

I shall examine the pantomime of most of the organs of the fundamental qualities and faculties, of which I have hitherto treated. In describing this pantomime, not such as I have invented it, but such as nature made it, I shall have occasion, not only to explain the twelve laws above announced, but also to add to the proofs already adduced new proofs, that the organs are situated in the region which I have assigned to them.

Natural Language of the Activity of the Instinct of Propagation.

The organ of this instinct being placed in the inferior part of the brain, in the occipital fossas immediately behind the great occipital opening, the head and the body must, conformably to the third law, be drawn backward, and from above downwards, whenever this organ acts with energy.

Que l'on observe, pendant l'accouplement, le taureau, l'étalon, le cerf, le bélier, le bouc, la souris, les oiseaux, etc., et l'on verra qu'ils retirent la nuque et portent le nez en avant, Pl. LXI. fig. 1.

Aussi de tous les temps les artistes ont indiqué, par cette attitude, le plus haut période de la jouissance amoureuse. Que l'on se souvienne de l'excellent tableau de Carlo Cigniani, représentant Joseph qui échappe aux brûlans désirs de la femme de Potiphar; l'impudique amante, le sein découvert, la nuque retirée en arrière, la bouche entre-ouverte, le regard en-

flammé, retient l'objet de sa passion avec ses deaux bras étendus. Qui ne connaît cette représentation si vraie du Titien, des amours de Jupiter et d Io, Pl. LXI. fig. 2, et les vers de Lucrèce :

> " Atque ita suspiciens teretî cervice repostâ,
> Pascit amore avidos inhians in te Dea visus,
> Eque tuo pendet resupini spiritus ore."

Lorsque ces caractères ne se rencontrent pas dans la jouissance, elle n'a point été complète.

J'ai déjà montré, à l'occasion de l'organe de l'instinct de la propagation, que dans la jouissance amoureuse, c'est au cervelet que se rapportent tous les gestes; j'y ai cité les jeux par lesquels les oiseaux, les chiens, les chats, préludent au mystère amoureux, C'est en conformité de cette loi encore que l'Amour tient son bras passé autour de la nuque de Psyché.

Natural Language of the Organ of Attachment.

This organ is placed by the side of the organ of the love of progeny; the head and the body ought, therefore, during its energetic action, to be slightly inclined sideways and backward. This posture again has been very faithfully given by the ancients. There is a beautiful group of Castor and Pollux, in which we see their arms resting on each other's shoulders, and these friends pressing together their organs of attachment. In the Madona *au lapin* of Raphael, Mary presses this region of her head against the corresponding region of the head of the child, Pl. XCVII. fig. 1. Observe the pantomime of women very susceptible of a tender friendship, when they express to their friend the deep feeling, which animates them; they place themselves side by side, embrace the shoulders of each other, and press together the posterior lateral parts of the head. We see the same attitude whenever we request two female friends to give each other proofs of their sincere friendship. Even when

two monks, meeting in their monastery, salute each other, each of them passes his arm over the shoulder of the other, and brings his own head near that of the other in the region, where the organ of attachment is found. The usual friendly salute between two men who meet, consists in touching each other's hand, moving it and pressing it gently, while one usually turns the side of the occiput toward that of the other.

Cats to testify their attachment lift their backs, turn the head laterally backward and from above downward, rubbing gently the organ of attachment against him, whom they caress.

If this pantomime is not always in reality as characteristic as I have described it; it must be remembered, that friendship is not always as lively, as the usual protestations would seem to indicate.

Natural Language of the Organ of Self-Defence.

This organ, as we have seen, has its seat at the inferior posterior angle of the parietals. It is placed on one side and a little below the organ of attachment. When it acts with energy, therefore, the head must be drawn a little backward and between the shoulders. When only one of the two double organs is active, the head should be drawn aside, backward, and against the shoulder of that side whose organ acts. Pl. XCVII. fig. 1. When the two organs are active to the same degree, this movement must take place alternately on one side and on the other.

It was the expression of the organ of self-defence, which first suggested to me the idea, that it is the seat of the organs, that determines the nature of gestures. I saw two coachmen fight; one threw himself like a madman on his adversary, who was much smaller than himself; the latter, leaning a little on one side, clenched his fist, drew his head between his shoulders, depressing it slightly, and repulsed victoriously the

attacks of his enemy by vigorous blows. Pl. xcvii. fig. 3. In fine, the greater one endeavoured by turning to take him in the flank. The smaller leaned still more, took the attitude of the fighting gladiator, bent his body forward, with head drawn back between the shoulders, and continued to repulse his enemy with success. The larger one, in the hope of flooring him, seized him in his arms; his antagonist, with his chin against the chest, grappled him with such force, that he overthrew him; the concourse of spectators put an end to the combat. While admiring the courage and address of my little victorious athlete, I made the following reflections.

1st. The organ of self-defence was here in full activity, and produced all the movements of the combatant. I was struck especially with his placing himself with the legs separated, the body drawn up, the occiput bent backward between the shoulders, a position which gives great steadiness to the whole body, but particularly with his advancing his chin a little. I naturally attributed this act of stiffening the neck, and drawing the head backward, to the state of excitement of the organ of self-defence, since these movements took place so near the seat of the organ; I was still confirmed in this idea, when I saw, that my athlete drew back the head towards one of the shoulders, taking an oblique attitude.

Above all, I saw manifestly, that, when there is only one of the double organs in action, the head is turned toward the side of this organ. At this period, I had already remarked, that animals, when they wish to regard an object attentively, turn the head sometimes on one side, sometimes on the other, according as they look or hear attentively with one or the other of the eyes or ears. I saw then, that the same thing takes place in the organs of the qualities or faculties.

Struck by this idea, I considered the expression of each of the organs which I had then discovered, and, to my great astonishment, I found that this expression

always corresponds to the seat of the organ which acts, and that the movements of all the other parts, the hands, feet, &c., correspond to this seat. Never should I have imagined, that it was given to man to penetrate into secrets of this nature, and I confess, that the joy of having made this discovery, which furnished, at the same time, such beautiful confirmation of all that I have previously discovered on the subject of the organs, nearly deprived me of my reason. To understand my ideas on expression, requires such an exact knowledge of the organization of the brain, of the seat of each of the organs, qualities, and faculties, and of the manner in which each of these organs manifests itself, that neither my hearers nor my readers will be able to agree with me, when this part of my doctrine shall be presented to them. The connexion, I establish between the expression and the seat of the organs, is too new and too profound a thought to be perceived at the first glance. Most persons even refuse to admit, that expression exists as I describe it. I have invented it arbitrarily, say they, in consequence of my reveries. It is only those, whose attention has been fixed on these objects, and who, having observed themselves and others, have thus become convinced, that the pantomime of the same quality, or faculty, for example, of boldness, of devotion, &c., is essentially the same in all individuals, that gradually become disposed to admit, that all the movements which compose it are involuntary, and that, consequently, they must proceed from the same determinate and immoveable cause.

When we direct our attention further into nature, we soon become familiarized with these ideas. In the state of health and in the state of disease, we execute all our movements according to the same laws. Who understands not the natural language, which accompanies the use of the external senses? Hardly can we perceive savory dishes, before our mouth waters; we observe the motions of the nose and mouth, when

we are attentive to an odor or a flavor. Before the animal or the man, who is tormented with thirst, reaches the cup, the mouth is already open, and the tongue applied to the lips to refresh itself in the liquid. Observe the effort of the eyes and the ears, when we look at an object, or when we listen to any noise. When we are menaced with a danger, before having any deliberate consciousness of it, we first give to the most exposed part the movement, which is most proper to diminish the danger. Not only the feet, the arms, the hands, but the whole body is involuntarily put in motion in a determinate manner. Those parts, which are more nearly threatened, contract even convulsively.

In the state of disease, in man as well as in animals, it is by the motions of the patient, that the physician frequently knows the seat of disease. When an animal is tormented by worms or by pains in the intestines, he always carries his mouth towards the place where he feels the pain. In the staggers, it is by the manner in which the sheep holds his head, that we judge of the part of the brain, where the hydatid is situated. A person without consciousness, stunned by a fall or a blow, always carries the hand to the suffering place, &c.

Those of my hearers who follow the course of my ideas in these reflections, will be convinced, that in fact the exterior man is only an impress of the interior. I hope it will be so, likewise, for some of my readers at least. But it is time to return to my subject. In the natural language of the instinct of self-defence, all the body in a manner concentrates itself; the muscles contract, the neck stiffens, the arms are drawn a little back, and the hand closed, the teeth are clenched, the eyes as well as the mouth threaten the adversary. The coward scratches his ears as if to excite the organ. Every day I see the same language even in animals, so far as the structure of their frame allows it; for example, in dogs, who are going to throw

themselves on each other. Cocks, at the moment of fighting, draw their heads briskly backward several times. Bucks, before throwing themselves on each other, raise themselves on their hind legs and bend back the neck. And thus these movements coincide with the seat of the acting organ.

Natural Language of the Instinct of Destruction, and the Instinct of Murder.

The organ of murder, or of destruction, has its seat immediately above the ears, in the perpendicular line of the vertebral column. The head, therefore, during the energetic action of this organ, is drawn back between the shoulders, and is carried neither forward nor backward, but makes a rapid movement, or rather it turns rapidly from left to right, and from right to left.

Sometimes my hearers have guessed admirably well the action of this organ; for, I am in the habit of giving the language of the organ of which I am discoursing. When one is so enraged against another as to exclaim; "If I had him I would tear him in pieces; if I meet him,"—he raises his two fists, and shakes them, one on each side of his head, with great force, he sets his teeth, and makes a violent movement from right to left, and from left to right, with the head drawn back between the shoulders. Notice in Pl. LXIX. fig. 1, the position of the woman, Albert, at the moment when she prepares to murder all her family. The head is strongly drawn back to the neck; she poises in her hand the hatchet, the instrument of her crime; and yet this is the only position she recollected, as she recalled it to her memory, when the artist asked her in what attitude she was, when she committed the deed.

In the chase, we hold the dogs at the moment, when, thirsting for blood, they are going to rush on

their prey, they set the teeth with violence, foam at the mouth, bark furiously, and shake the head with violence. Often in the combat of animals, at Vienna, I have seen oxen and bulls in their rage, in presence of the enemy, whom they threatened to annihilate, groan, bellow, and throw into the air with their feet, sand and stones, shaking with fury their heads, which they had drawn back upon the neck. So the lion, breathing nothing but carnage and death, shakes his mane with fury. If animals shake with violence, their prey, which they are strangling, the movement may be attributed to the same cause.

Natural Language of Cunning.

The organ of cunning is placed in the lower part of the forehead in front, but not altogether in the anterior part. Hence it follows, that, during the energetic action of this organ, the head and the body must be carried forward and downward. When the double organs act alternately, the head and the body are gently turned from right to left, and from left to right. While turning thus, the cunning man looks aside, and accompanies the movement of his head and body by an analogous movement of his fore-finger, which he holds extended. Hence the expression, *a low, vile flatterer, a cringing man.*

When an Italian wishes to warn you against a perfidious and false man, he looks aside at this man with an expression of distrust; he points to him stealthily and downwards with the fore-finger of one hand, and with that of the other he depresses one of his own cheeks. Pl. XCVII. fig. 4. The expression would be still more just, if he carried the fore-finger to the temple, which probably too is the original gesture. When by cunning one has accomplished his object, one of the eyes is partly shut, or throws an expressive look on one side; he walks with a wolf-like tread;

the fore-finger points out the dupe; and he gently elbows his companion, to announce the victory, as mysteriously as he performed the trick; or, he designates the dupe by making a slight motion of the head one side, Pl. XCVII. fig. 5, all, movements, which represent the mode of address of the cunning man, and which are always in relation with the seat of the organ.

The tiger and the cat, when they watch their prey, or approach it with the wolf step, place the head flat on their fore paws, or lie with the body flat, and the fore and hind paws extended before and behind, the eyes and the tail moving gently, sometimes to one side, and sometimes to the other. The fox has the same gait, when he creeps out of the wood.

Even dogs, when in playing together they wish to surprise their comrade, either place themselves straight on their feet, which have an oblique direction forward and backward, the head horizontally extended, or they lie flat on the ground, the head extended, and drawing themselves gently forward in zigzag direction, until finally they leap with petulance on their adversary. The sparrow, when any thing is offered him to eat, provided he has not yet been tamed, approaches it only by giving to his body, a direction more or less oblique.

Natural Language of the Instinct of Property, or Avarice.

As the organ of the instinct of property is also placed laterally in the temples, but more forward than backward, during its energetic action the head will be carried forward and a little on one side, the arms stretched forward, the hands sometimes opened wide, to receive, sometimes the fingers curved, as in the act of catching a fly that is escaping. A beggar, who asks alms of you, will never walk straight up toward you;

he always advances obliquely, with his head forward and his hand half open.

Natural Language of Circumspection.

The organ of circumspection is placed in the superior external lateral part of the parietals, a little backward from the perpendicular, which passes by the centre of the occipital opening. Consequently, during its energetic action, it raises the head and the body, and gives the head a rotary movement, at the same time that it carries it backward. Observe a man, who, after having reflected a long time, arrives at some particular plan, and dwells on the means of putting it in execution. While he reflects on the course he ought to follow, his body is bent forward; once decided, he raises himself suddenly, turns his head, sometimes to the right, sometimes to the left, holding it slightly inclined backwards, while the eyes wide open, follow the movements of the head, and their direction corresponds to the place of the organ. Pl. xcvii. fig. 6.

The roe-buck is too circumspect to take flight immediately when chased, like the boar or the fox, who save themselves by stealing off at the first noise. The roe-buck delays deciding, he hesitates and wanders here and there, until he is seen nearly on all sides. Thus, with the head raised, he looks on all sides, seeking to discover hills and bushes: finally, obeying the impulse of his terror, he endeavours to make his way through the hunters and the waylayers. I have seen a marten, which was pursued into a granary, follow the same method; she had not perceived me; sometimes she raised the head, and turned the eyes from one side to the other with anxiety: when she perceived, that she was approached more nearly, she retreated by lying flat on the belly. We may observe the same language in the rabbit, the squirrel,

and even in the circumspect birds, the woodpecker for example.

Natural Language of the Sense of Hauteur, and of Pride.

The organ of pride has its seat in the median line, in the superior posterior part of the head. Consequently, during its energetic action, it elevates the head and carries it a little backward.

See the proud man bridle up, straighten himself, and carry his head high. See how he carries his arms forward, in the attitude of command; sometimes admiring himself he raises them: then throwing from his high elevation a look of contempt on all that surrounds him, he crosses them on his breast, or gesticulating with his right, he supports the palm of his left on his side, with the elbow advanced. Pl. xcvii. fig. 7. Ask this man to interest himself in your behalf with the king: he will protect you with a look, he will carry one of his hands on his breast, in testimony of his powerful influence, he will straighten himself on the points of his toes, and a gracious movement of the head directed upward and backward, will say to you: *Leave it to me.* The more profound the feeling of pride is, the more audaciously does the man swell and erect himself; the more does the look, which he throws about him, express self sufficiency and contempt; the more space does he pass over in his solemn walk. The man, who has a consciousness of his own merit, of his own talents, likewise raises his head with dignity, straightening the whole body. Pl. xcvii. fig. 8. A very lively lady expressed to me her regret, at having made an inconsiderate step through pride. Cursed pride! said she, carrying her half open hand to the seat of the organ. In general the case is not rare, that, at the moment of the extreme activity of an organ, the hand is hastily carried toward its seat.

Thus, then, in the expression of pride, all the gestures indicate a tendency to raise one's self, to enlarge, to lengthen the stature. "I know no people" says Engel, "no race of men, in whom pride does not carry its head high, does not raise all the body, and cause the man to elevate himself on his feet, in order to appear taller."

In speaking of pride as a fundamental quality, I have spoken of the expression of those, who are maniacs through pride. This expression is essentially the same in the maniac, as in the sane man; only, by reason of the subirritated state of the former, all the gestures are outraged into caricature.

The attitude of the proud courser magnificently caparisoned, of the cock that has just vanquished his enemy, coincide with the attitude of the proud man, so far as the relation of the form of these animals to the human form permits it. In each case the head is high; the movement, grave and measured.

When we wish to express humility, submission, respect, our natural language is precisely the reverse. The head and the body are bent forward; every thing tends to contract our person: from the profound reverence of kneeling, to the oriental salute on the face, all demonstrations of respect are only the true or simulated expression of the absence of all pride, of all feeling of one's own merit; an expression dictated by the intention of making evident a devotion without bounds, an entire submission, unequalled humility, profound respect. Every where a shortening of the stature, a contraction of the body, and carrying it forward. Pl. XCVII. fig. 9. This expression is a language generally received, consequently natural and founded in the nature of man: it can be explained only by the absolute inaction, and the complete apathy of the organ of pride. Never, and in no country, will man express respect, obedience, submission, by raising his head and carrying it backward.

Confusion results from wounded pride. Accordingly

the mortified man retires, not only with the language of humility, but he also covers his face; he endeavours to escape all observation; he would wish to hide himself in the centre of the earth.

Natural Language of Vanity.

The organ of vanity is placed a little farther backward than that of pride, and more on one side. Consequently, with an energetic action of this organ the head and the body must be raised and carried backward: and, as the double organs are further apart than those of pride, the body and the head must be turned alternately, sometimes on one side, sometimes on the other; hence results a balancing of the whole body. So long as vanity manifests itself tranquilly, the vain man, like the vain woman, holds the head raised; they walk balancing themselves, and turning the head on one side and the other, to see if they are admired.

The fop, vain of the most frivolous advantages, struts, separates his legs, makes gestures to the right and left, squares himself, draws his head backward, and advances with an important air, carrying himself as much sideways, as forward. Pl. xcvii. fig. 10.

In treating of the organ of vanity, I spoke of the sensibility in animals, both to praise and to disapprobation. Observe in his cage, either a canary bird or a goldfinch; while you address him in a kind tone, you will see him turn from side to side, and answer you in affectionate accents, expressive of his pleasure. I here recall to the reader the interesting pantomime of my little dog, when she was receiving praise, while she carried my slipper in her mouth, and I beg him to re-examine the article on the organ of vanity. He will here see movements, which proceed from the region, where the organ of vanity has its seat, or which are referable to that region.

Natural Language of the Organ of the Memory of Names and Words.

This organ has its seat above and behind the eyes. When a person is embarrassed in recalling a name, he holds the eyes fixed and raised, passes the palm of his hand over the eyebrows, presses and rubs the lower part of his forehead, as if to excite the activity of the subjacent cerebral part. Men ordinarily make the same movements, when they try to recite a piece learned some time previous. There are persons, who accompany with several other movements the tension of the eyes, and the action of rubbing the forehead; they bite their fingers, strike their thighs with their hands, &c. But these gestures belong only to individuals; whereas the movement of the eyes, and the action of carrying the hand above the eyebrows, and rubbing the forehead, are always seen.

Natural Language of the Organ of the Arts.

This organ has its seat in the temples, nearly at the height of the superciliary ridges. During the energetic, alternative action of the double organs, the head and the body must sometimes be carried to one side, sometimes to the other, and make a movement similar to that of a bird, which looks at an object sometimes with one eye, sometimes with the other, or that of the dog, which, in watching, hearkens sometimes with one ear, and sometimes with the other. Observe a milliner making a hat; in order to judge of it well, she never places it directly before her, but holds it obliquely, bends her head forward, and views it alternately on one side, and then on the other: she brings to it, therefore, sometimes the right organ, sometimes the left. This is manifest; for, otherwise, why should she not hold the hat directly

before her, and look at it with both of her eyes at once?

Pl. xcvii. fig. 2, a sculptor examines his works with an attentive eye; he is placed a little obliquely; with the left hand, he sustains the elbow of the right arm, and with the expression of thought, places the two fingers of the hand precisely on the organ of the arts. His head is obliquely bent on one side. When he is fatigued with this position, he assumes the corresponding one on the opposite side.

We see on the tomb of Piranesi, a fine statue, which represents this artist, reflecting on his art; it has the position which I have just described.

Natural Language of Music.

The organ of music being placed on the anterior inferior edge of the forehead, its energetic action imparts to the head and body an oscillating movement, from behind forward, and from side to side. Every body knows the natural language of a passionate amateur, who hears fine music. He keeps time with his head and with his body; and manifests his delight by inclining his head, and turning it from side to side.

When I see a person play on any instrument, the body motionless, I am sure that his playing is without soul. When, on the contrary, he sometimes gently inclines on his instrument, and raises himself, with his eyes directed obliquely upward, balancing himself, it is an evidence, that he is filled with his subject.

A musician of my acquaintance, passionately fond of his art, almost to madness, traverses his chamber, trilling, and even walks the streets almost without consciousness; commonly he holds his head bent forward, sometimes he raises it suddenly with his eyes fixed, and his looks obliquely directed towards heaven; this is always the moment of inspiration.

We have some portraits of musicians, which repre-

sent them in this attitude. The engraving of Dussek, among others, presents the moment of inspiration. Pl. LXXXVI. fig 1.

I know a composer, who, while composing, constantly strikes himself on the seat of the organ of music. When he gives himself to a different kind of mental exertion, he exhibits wholly different movements.

M. Garat, in my presence, was requested to sing. At the moment of commencing, he passed his hand first on the organ of tones on the right side, and then on the left. Did he make this movement to animate the organ? Or did the organ already in action, give this movement to his hand? At a party, Madame Catalini could find no language to express the gratification which singing caused her; in this state of embarrassment, she carried on each side the palm of her hand on the organ of tune; rubbing this part with the expression of the most lively joy. These, without question, are movements which proceed from the organ of tune, and which re-act upon it.

Natural Language of the Sense of Localities.

The organ of the sense of localities is placed in the anterior inferior part of the forehead, by the side of the organ of educability. We very rarely have an opportunity to observe its action. But in the following instance, however, I had it in my power to do so. One day, while I was talking with a philospher on the subject of the city of Vienna, the latter, not being able to recall to his memory one of the streets of the city, placed before his eyes the index and ring finger, which he held separate, and which he moved gently, and then with his eye fixed he ran over the different quarters of Vienna. We perform nearly the same action, when we are doubtful at the entrance of a court.

Natural Language of Poetry.

The organ of poetry is placed in the superior lateral part of the head, above the temples, and extends obliquely from below upward and backward. The individual before mentioned, who, while he composes music, vibrates his finger on the organ of tones; when he writes a poem, raises himself obliquely towards heaven. We shall never see a poet in any other attitude, at the moment when his genius inspires him. So much was this the favorite attitude of Pope and Schiller, that the artists have represented them in this position. Pl. xcvii. fig. 12. Usually the poet places his finger on the poetical organ. Let me not be told, that this position of the hand is for the support of the head; we have seen, that, during the activity of the other faculties, it is placed in a different region.

Natural Language of Satire.

Those, who have a decided inclination to make epigrams, and to utter sarcasms, during the paroxysms of their caustic humor, carry the hand or the finger to the superior lateral region of the head, where the organ of satire has its seat. This was the favorite attitude of the satirical Born, author of the Monachology. Pl. xcvii. fig. 13. It is in this attitude, that Sterne was engraved. Pl. lxxxiii. fig. 6. Here the position of the hand is very different from that of the poet and the sculptor, &c.

Natural Language of Meditation.

The organ of comparative sagacity, which acts in meditation, is placed in the anterior superior part of

the forehead. Every body knows the expression of profound meditation; but, as this act is most generally complex, its expression ought also to vary greatly; still, the movements, both of the head and the hand, indicate that the exertion takes place in the anterior superior frontal region. Sometimes the arms are crossed, and strongly pressed against the chest, the eyes motionless, the head sometimes raised, sometimes depressed forward. Pl. xcvii. fig. 14. The whole superior part of the forehead, is supported in the palm of the hand; the eyes are shut; the fore-finger is placed on the middle superior region of the forehead; sometimes the head is dropped; sometimes the eyes are raised, as if seeking for an object, and when the idea is caught, the individual raises himself hastily, and carries his hand, extending the fore-finger, as if he were pointing to what he had discovered, saying to himself, "that is it." Pl. xcvii. fig. 11. When we wish to induce any one to reflect, we apply the finger to the summit of his forehead, saying to him, "come, collect your ideas." When, through haste, we have committed any folly, in the moment of anger, we strike the forehead, saying, "stupid fellow that I am."

Natural Language of Benevolence.

The organ, the energetic development of which determines benevolence, has its seat in the median line of the anterior superior part of the forehead. It must necessarily be directed toward the object of its action. As the organs of friendship of two individuals tend to touch each other; so the organs of benevolence seek to place themselves in reciprocal contact. In a group of small children, we sometimes see two, who, penetrated with friendship and benevolence, bring together their heads precisely at the place of the organ of this feeling. This expression has given rise to the saying in German, *die Kinder bockeln*, that is, the chil-

dren strike their heads together like bucks. See also the beautiful compound expression of surprise and benevolence, Pl. XCVII. fig. 16., the arms extended towards the person welcomed, and the direction of the head: how could benevolence be better expressed?

Natural Language of Devotion.

The organ of devotion is placed in the median line, in the upper part of the upper half of the frontal bone near the top of the head. Consequently, during its energetic action, the body and the head are carried forward and upward. The arms and the eyes are directed towards heaven. Pl. XCVII. fig. 16. Sometimes the hands are united, sometimes each on its own side is gently elevated or inclined, according as it is joy, hope, or resignation, which prevails. When, in fine, it is the idea of the grandeur and of the omnipotence of the Supreme Being, which exclusively takes the lead, the man humbles himself, and penetrated with profound veneration, adores in the dust; an expression of which I have already made use while speaking of the organ of pride. I have seen a man making a fervent prayer, who had absolutely inclined his head against the ground, and who made every effort to touch the pavement, not with the forehead, but with the organ of belief in God and religion.

The act of raising one's self to heaven, it is said, is founded on the belief, that God dwells there on high, and has nothing in common with the seat of an organ.

But, who has told us that God dwells on high? From our infancy we are taught, that he is present every where. If then our action proceeded from our belief, when we were under the influence of religious feelings, we should turn ourselves in all directions. But, whenever we are influenced by a feeling, whenever an organ acts in us with energy, we do not think of what has been taught us; it is an internal force that

directs our movements. There is no one who, under the influence of surprise, in an emotion of joy, or sudden terror, does not carry his head and his eyes toward heaven, exclaiming, my God! my God!

Finally, why, in spite of instruction, which tells us the contrary, cannot we get rid of the idea, that God is on high? It is simply because the organ, which renders man capable of raising himself to the idea or perception of God, has fixed its throne in the most elevated part of the brain, whence it always has exerted, and always will exert its influence on all the other forces of man.

Natural Language of Firmness.

The expression of firmness has its seat immediately at the top of the head; during its energetic action, therefore, it holds the head and the body elevated perpendicularly. At the instant we adopt the firm resolution, not to allow ourselves to be turned from our purpose by any thing, we raise the whole body vertically, we raise ourselves a little from the ground, place our legs firmly on the earth, and, with the neck extended, prepare to brave all obstacles. It is to this attitude, that is referred the expression of an immutable will, of an inflexible character. Pl. XCVII. fig. 18.

To these partial expressions of each particular organ let us also add some general expressions, which designate a certain general state of the brain: Pl. XCVII. fig. 19, the melancholy man abandons himself, without resistance, to his chagrin; fig. 20, the entire inaction of the brain of the idiot; compare these states of apathy with the expression of the man, all whose attention is fixed on the recital of an interesting event, fig. 21, and especially compare them with the expression of excessive joy, fig. 22.

The reader will pardon me, if I submit to him also two drawings, which may well be regarded as simple

objects of curiosity. My friend Kummer, who was attached to the unfortunate expedition of the Medusa, sent them to me, making the remark, that the head-dresses appeared to him to be a confirmation of the discovery of the seat of the organs; fig. 23 represents the head-dress of a lady of Kacundy; the distribution of the hair, in particular tufts, is conformable to the organs of propagation, of the love of progeny; the organ of pride is even surmounted with a kind of plume. Fig. 24, the head-dress of a Moorish lady of Krarsas, which shows the organs of propagation, of the love of offspring, of attachment, of self-defence, of cunning, of circumspection, of the religious sentiment, of firmness. An unaccountable occurrence, if it is not allowable to presume, that it is the action of the organs of the brain, which has determined this singular manner of arranging the hair.

M. Demangeon, in his analysis of my large work, has very well caught the spirit of my principles and my opinions, in relation to pathognomics. After having advanced that the art of the physiognomist does not exist, that is, that it is impossible for any physiognomist to determine any form of nose, of chin, of eyes, &c., which is always found in connexion, in different individuals, with any moral quality or intellectual faculty, he continues: "But he (M. Gall) attaches great importance to expressions, of which he treats fully in this same section, and from which he draws very many new proofs to the support of the organs, which he has determined, as if to corroborate the demonstration. According to him, it is pathognomy, and not physiognomy, which guides us in our judgments, when, in place of founding them on determinate external forms, we found them on the gestures and the whole carriage of the person. Pathognomy, or pantomime, is a language founded on nature herself, who inspires the gestures, the attitudes, the movements. It is a universal language, from which all nations and all animals derive the expression of

their affections, passions, sentiments, and ideas. There is no man, no beast that does not understand it. It supplies, enforces, renders precise, and illustrates spoken language, by developing irony, anger, confusion, desire, grief, sadness, tenderness, jealousy, despair, revenge, friendship, aversion, pride, vanity, fatuity, stupidity, deceit, cunning, the spirit of chicanery, devotion, sensuality, &c. Without pantomime, eloquence, poetry, the dramatic art, painting, sculpture, engraving, would fall to the level of purely mechanical arts, and no longer would have either expression or attraction. This language, therefore, is not one of pure convention, as some persons have thought; it is based on immutable laws, the violation of which would throw us into nonsense and folly, though it be not uniform in all its details, on account of the almost infinite complications of affections, and the extremely variable predominance of one over the other. After these general observations, M. Gall makes known the kind of expression proper to each organ, and thence draws new proofs in support of those, which he has already furnished."

Conclusion.

When hereafter my readers, by their own observations, shall have convinced themselves of the justness of the expression, which I have just exhibited for each organ, they will acknowledge, that it furnishes a new proof in favor of the region, where I place the seat of the organs. Each simple expression is the action of an insulated organ; it is therefore one of the elements of a complex expression; just as each of the fundamental forces is one of the elements of a complex idea or sentiment, one of the elements of every moral and intellectual character.

Every man, therefore, who wishes to express certain sentiments or certain ideas with truth, or render

them intelligible to others by means of the language of action, must fulfil one of the two following conditions:

Either; the actor must know exactly the simple expression, in order to know of what gestures, of what movements of the muscles, of what positions he shall compose the play, by which he will attempt to render with truth the complex sentiments and ideas, which he is most frequently called on to represent. This condition can then be easily fulfilled by him, who has familiarized himself with the expression, which each organ produces, conformably to its seat. For such a connoisseur, there is no pantomime which he cannot reduce to principles; that will not happen to him, which happened to Engel, in his excellent work on expression, for want of knowing the true origin of gestures. This author often designates such a pantomime as perfectly in harmony with nature, but without being prepared to reduce to certain rules the precepts which he gives. When men are convinced of my doctrine, pantomime and a great part of the art of declamation, will no longer be abandoned to an obscure and uncertain feeling, but will be found reduced to sure and invariable principles.

Or; again, he who undertakes to render faithfully, and in all their degrees, complex sentiments and ideas, ought to be endowed with the faculty of impressing himself with these sentiments and ideas to such a degree, that, in order to render them, he may need nothing, but the inspiration of his own genius. Such are those natural actors, who, in all parts suited to their talents, are true and inimitable, without effort and instinctively. Such are the men of whom I have spoken, in treating of the organ of expression. If, every where, the parts were assigned only to those chosen persons, the stage would always present to us nature herself; but I mean nature idealized, nature fulfilled. National prejudices would soon disappear in all coun-

tries; all would soon have the same taste; every where applause would be offered only to the image of nature; all extravagance and bombast would be pronounced prejudicial to that illusion, which constitutes the first object of the dramatic art.

So far as the action of the internal organs marks durable traces on the exterior man, it is right for us to draw from these marks, which are the results of this continually repeated action, inductions relative to the habitual occupations and the fundamental character of a person. By such impresses we can doubtless distinguish the superficial man from the profound thinker; the good liver from the devout man; the man of repartee from the dull idiot. We easily distinguish the rich man from him who is oppressed by misfortune; but it is not certainly by the original proportions of his face, nose, mouth, ears, &c., but simply by the influence, which the internal forces exert on the external parts. It is, therefore, a pathognomic judgment, and not by any means a physiognomic one, which we pass in such cases.

Of Universal Language.

We know what Leibnitz, and Descartes before him, have written on the possibility of a universal language. Since then, many philosophers have proposed means for realizing this idea; each, according to the measure and nature of his acquirements.

Those, who speak of a universal language, mean to speak of a language, which should be understood by every body. But when, at the same time, they propose a language formed of arbitrary signs, which it would be necessary to teach and learn, it is evident that such a universal language is impossible. How shall we work the miracle of uniting all nations in such a manner, that they shall all consent to adopt the same signs, whether words, gestures, alphabetic

signs, or manual alphabet, or finally, hieroglyphics? Accordingly all efforts, directed towards this end, have been thus far fruitless, and will ever be so.

There is not and cannot be any universal language, except what Nature herself has created. Men may learn to speak it better, to understand it better, but they will never perfect its elementary principles.

We have seen that each organ, however feeble its action, manifests itself externally and instinctively by certain movements of the muscles, by certain gestures, by certain exclamations or involuntary cries, by certain attitudes. Those movements of the muscles, gestures, cries, and attitudes, betray the organ which is in action. They consequently also betray the nature of the propensity, of the feeling, of the thought, which, at the moment, occupy the individual. This language, therefore, is the natural language; it is expression, it is the language of gestures or of action, the pathognomic language.

We shall know the alphabet or the elementary principles of this language, when we know all the fundamental qualities and faculties, as well as the particular expression, that accompanies each of their manifestations. Study the gradations of the qualities and faculties, as well as those of their expression, and if you wish to represent the expression of the union of several propensities, feelings, thoughts, make of these gestures, muscular movements, cries, attitudes, what you make of your words, of your alphabetic and numerical characters; combine these elementary principles as much as your feelings and thoughts are combined, and you speak, you hear, the universal language. You see the same language in brutes, and for the most part they understand you; you interpret justly the groans of the new-born infant, and the latter understands the caresses of its mother. It is the profound study of this language, that reveals to the actor the mysteries of pantomime, that adds to the recital of events a peculiar charm, which makes of the arts,

such as the arts of painting, drawing, sculpture, the most eloquent arts.

If this language is not as generally perfect, as it might be, it is because we have greatly neglected it; it is too easily replaced by the language of words. But observe the deaf and dumb, before they have received any instruction; the exactitude and the readiness, with which they communicate to each other the emotions of their souls, feelings, sentiments, thoughts, and their intentions, will prove to you, that the language of action has many advantages over spoken languages. Do we not daily see, that numerous collections of people interpret without mistake the pantomimes of our plays? Roscius engaged to translate, by gestures, the periods of Cicero with the greatest fidelity, even when it pleased the orator to change their character by varying the turn of expression, or transposing the words. According to this, it is wrong to say, that the language of action is not sufficiently developed, that it is not rich enough, and wants delicacy. It must at least be confessed, that it remains always the most energetic, and the only one of which we know the use in the excess of passion, when the violence of our feelings deprives us of the reflection, necessary to express them by purely conventional means. Even in idiots and in madmen, the language of action still serves us as interpreter of the feebleness and the disorder, with which their mind is struck.

The language of action will be the more perfect and intelligible, as the sentiments and the ideas, which it is wished to express, are more vividly felt. It is for this reason, that men and nations, endowed with great vivacity of character, employ commonly and simultaneously the language of action and the language of words. It is difficult for every body to dispense wholly with the former, although the latter alone would suffice to render us intelligible. We better support a violent declamation, than the sleepy

monotony of a discourse or a lecture, and there is no farce more revolting and ridiculous at the same time, than to hear words declaimed with contradictory gestures and intonations.

The intimate and immediate connexion, which exists between the language of action and the operations of the organs of the brain, is also the source of that sympathy, which, by means of the pathognomic language, gives rise in us to the same sentiments and the same thoughts, with which pantomime is itself animated. Hence this precept: *Si vis me flere flendum est primum tibi ipsi.* On this has been founded a theory of the influence, which signs exert on our feelings and on our ideas. But signs are nothing, and have no meaning for beings incapable of the feelings and the ideas which these signs express. These signs will not even be understood, they will awaken no feeling, no determinate idea, until the individual has previously experienced corresponding ideas and feelings. It follows, that the influence of the internal functions on the external signs, must necessarily precede the influence of the external signs on the internal functions; that the functions are the condition *sine quâ non* of the signs, and not those of the functions. These remarks limit exceedingly the proposition adopted by the ideologist, that without signs we should not think. Without feelings and without ideas, there would be no sign, and any language, whatever, can never have more signs than those, who form it, have ideas and feelings. From long reflection it would not be difficult to arrive at the proof, that even spoken language is a product of the language of action. The latter is not limited to gestures. It is not less natural to man to produce sounds, cries, exclamations, when he is vividly affected, than to produce certain movements of his limbs. It is from this source that spoken language has drawn all its first elements.

We see by all that I have said, how much interest

as well as advantage, is offered by the study of the expression of the language of action, and if ever there is a prospect of a universal language, it can be realized only by the fullest knowledge of the influence of the interior on the exterior man.

Remarks on some passages of the work of M. Georget, entitled *Physiology of the Nervous System, and especially of the Brain.*

The great number of passages, which I have copied from M. Georget's *Physiology of the Nervous System*, must have convinced this young author how much I am pleased with it. But this very consideration leads me to correct some ideas which he has advanced respecting me and some other writers.

Vol. I. p. 78, he addresses me with compliments, and with the following language: "I say it openly, it is in the lectures and in the works of Dr. Gall, that I have reconciled myself with the study of the noblest attributes of man, that I have learned to familiarize myself with the knowledge of them; it is from this time only, that I have had a fondness for such studies, that I have known how to profit by the lucubrations of authors; it is doubtless also to these lectures, that I owe my having made researches on the other attributes of the nerves. Those, who see, or rather who admit of, nothing in the works of this philosopher, but hypothetic structures, but a doctrine of bumps, but divisions of the cranium into compartments, will perhaps be astonished at this eulogy; let them read and meditate on the works of M. Gall, this is my sole answer.

"Besides, they will see, that I am far from thinking, that this celebrated philosopher has not erred; that he alone has travelled the road of truth; that no one, before him has spoken of what he regards as the foundation of his doctrine; in this last respect, I shall even reproach him with having been too sparing of textual

citations, where they might have lost him the character of originality. After the works of M. Gall, I shall place those of Bonnet; they ought to be placed before, if we consider, that they were published at a much earlier period. This learned naturalist, this philosopher who wrote nearly sixty years ago, has given the soundest notions on the seat and the mechanism of intelligence. So long as he confines himself to the domain of physiology, his opinions conform to observation; it is only when he throws himself into metaphysical questions, that he forgets himself, and talks nonsense like a metaphysician. We shall quote from him some very remarkable passages, which perhaps will give no pleasure to Dr. Gall."

Page 3, he says: "I shall here reproach Dr. Gall. What motive could have induced him to pass over in silence the works of Kant and Bonnet? Could it be because their ideas had some analogy, as we have seen, with his own? How happens it, that he only attacks Descartes and Locke by bringing forward opinions attributed to them, and not their own expressions, which is not always the same thing; while he has great care to quote literally, and to refute at length (which he hardly does for the preceding writers) those authors who have advanced exaggerated opinions, purely gratuitous, and hence very easy to destroy?"

Page 143. "Doctor Gall thinks, that the brain is exclusively the organ of moral qualities and intellectual faculties; and he accumulates the most direct proofs which confirm this proposition.

"I shall also reproach this physiologist with having been unjust toward his predecessors; all whom he charges, *in globo*, with ignorance of the functions of the brain. Yet has he read Bonnet, who preceded him more than sixty years, in a career which he has run so gloriously, since he often places his name among those of his adversaries; Bonnet, who so posi-

tively says, and plainly proves by a great number of arguments, of which M. Gall too avails himself, that the brain in man and animals is the organ of thought and of feeling, that is, of the ideas and the passions. How many other examples might I not quote, which would show that it is not solely from the appearance of M. Gall, that we must date the origin of physiological knowledge on the mechanism and the seat of the intellectual functions!"

In the preface, which is at the head of the first volume of my large work, I have expressed myself in this manner: p. 31. "We hope in the course of all this work, never to humble ourselves so far as to say any thing whatever, for any other purpose than that of truth. To betray nature, in order to pay personal court, is a thing unworthy of the naturalist. The greatest men will therefore pardon us, if we seek to rectify the errors, which, we may think we have found in their works. Their errors and their prejudices deserve the more attention, as they are more likely to be propagated from age to age. Notwithstanding this we are not less filled with a sentiment of esteem and gratitude for the services, which they have rendered to humanity; and who in fact could forget the signal services which Reil, Prochaska, Sœmmerring, Scarpa, Walter, Cuvier, &c., have rendered to the study of the nervous system? But who also, even with the most penetrating and most scrupulous spirit of observation, does not sometimes err or find himself mistaken, when the point is to seize the most complicated whole? Who can foresee the discoveries reserved by another path to the person, whom happy circumstances, chance, or application shall aid? Who among us would not wish to recommence his works from the place where he has terminated them, or finds himself detached from them? The true investigators of nature, having no other object than truth, ought to desire that those, who succeed them, may not be dazzled and deceived by the false glare, with which either indi-

viduals or academies shine or glitter. The suffrages, solely based on the consideration of private individuals, are the less flattering, in proportion as they attest the weakness of those who bestow them.

We have also frequently proved in detail the falseness of the opinions of men, who, in the judgment of many of our readers, did not perhaps deserve any attention on our part. It is certain, that we should not have exposed ourselves to the reproach, which might be made to us in this respect, if we had not taken into consideration the history of the science, and if it had been possible for us to conceal the names of the authors and the partisans of certain objections. Whoever is once convinced of a truth by the evidence of facts, finds all objections equally insignificant; but it is not so with those, who doubt, nor with those, who read in order to be instructed. How will these do to distinguish a well founded objection, from one that is only futile?

It has happened but too often, that men of the greatest merit have proposed to us the most trifling scruples. Each has a chain of ideas of his own, with the points of contact and habits which are peculiar to him. Such an one, who in certain respects greatly distances his cotemporaries, finds himself, in other respects, ages behind them; hence the reason, that the greatest men fall sometimes into incredible misapprehensions. If we only answered the doubts and difficulties of men, who constitute authority, how many times should we run the risk of being accused of error in our choice? Here all depends on the degree of acquired knowledge. If we are asked, for example, whether it is the muscles that produce the protuberances of the brain? MM. Ackermann, Walter, Hufeland, Portal, adopt the affirmative without hesitation; while we are convinced with Sœmmerring, that it is in contradiction with the laws of organization and all facts. Is it the brain, which is soft, or, the cranium, which is hard, that impresses its form on the

other? If we decide for the first opinion, we shall have against us, perhaps, the greater part of our readers, almost all the physiologists and pathologists, though Galen already had caught a glimpse of this truth. In the North of Germany they consider as superfluous the arguments by which we establish, that the dispositions are innate in man, without his moral liberty being the less real: and besides, one has, on the contrary, much trouble to bring himself to the idea, of the coexistence of innate dispositions, with the faculty of not being wholly mastered by them. While in agreement with the fathers of the church, with moralists, and with instructers, we demonstrate the influence of organization on the exercise of the intellectual faculties, without, however, rendering the soul material, Walker, Ackermann, Steffens, and a host of others, raise the cry of materialism. Where then shall we begin or where shall we stop, in order not to speak of objections, important or insignificant in the eyes of every one? Each author and professor has his part and his sphere of activity. Such an one may appear at a distance, of colossal merit, but, on near approach, he inspires pity. Where again is the miserable writer, who, in taking part for or against an opinion, does not find his supporters in the friends or the enemies of this opinion? According to this, as we present without distinction the two sides of the question, in seeking to remove all doubts and all objections, we may hope that our readers will have for our explanations the same indulgence, that we have had for objections and doubts of every kind.

And p. 40. "In order to present the opinions of each author in all their force, we have almost always quoted his own expressions. In this manner no one will be able to complain, that we have abridged or disfigured his ideas, and all readers will be able to compare our opinions with those of others, and to pass on them an impartial judgment."

All my work is compiled according to these princi-

ples. Hence that great number of passages literally quoted from other authors; hence at the head of each treatise there will always be found the history of the subject. See, in vol. I. of my large work in 4to, the treatise on the great sympathetic nerve, p. 29; on the nervous system of the vertebral column, p. 47; on the difference of automatic life and animal life, p. 79; on the nerves of the head, p. 127; on the functions of the five senses, p. 149; on the method of examining the brain, p. 233; on the anatomy of the cerebellum and brain.

I have done exactly the same in the other volumes. After having established the innateness of our propensities and our faculties, and after having proved, that their manifestation depends on the organization, I directed myself to refuting the objections, and I have never failed to exhibit literally the opinions of Plato, Quintilian, Malebranche, Helvetius, Locke, Condillac, Bonnet, Haller, Buffon, Sprengel, Herder, Bichat, &c.

In the treatises on materialism, fatalism, and moral liberty, you see not only several passages of the most philosophic fathers of the church, but also those of Malebranche, Bonnet, Condillac, Leibnitz, Pascal, Cardinal Polignac, Helvetius, Lavater, Tracy, Ancillon, Kant, Fluenbach, Sonnenfels, Pinel, Prochaska, Fodéré, &c.

In the section on the organ of the mind, which constitutes the subject of the second volume, I have commenced by the exposition of the most striking opinions on the seat of the soul, and on the reciprocal action of the soul on the body, and of the body on the soul. The reader will be able to determine, whether, in my adversaries, I have addressed myself to feeble authors, and whether I have neglected to report literally the passages of my partisans, whether ancient or modern.

As the matter in the following volumes belongs almost exclusively to me, there is less room for quota-

tions. Yet you will still meet the names and the passages of Laurens, Diemerbrock, Fichté, Blumenbach, Sœmmerring, Hufeland, Walter, Rudolphi, Richerand, Portal, Dumeril, Cuvier, Plattner, Ackermann, Fodéré, Dumas, Home, Sprengel, Esquirol.

Even in the particular treatises on the fundamental powers and on the seat of their organs, I have scrupulously quoted all that could have relation to my subject. For example, in connexion with the propensity to propagation, and that of the love of offspring, I have copied literally the passages of Apollonius of Rhodes, of Van-der-Haar, Tissot, Formey, Pinel, Richerand, Larry, Cabanis, &c.

One would not certainly expect to find in a physiology of the brain, the names of Ferguson, Sobry, Grimm, Dupont de Nemours, Rousseau, Laromiguiere, &c.

Could I quote more fully and report more literally than I have done, the opinions of George le Roi and professor Pinel, whose expressions are so infinitely more just and more in harmony, than those of Kant and Bonnet?

It must be allowed, that in all my quotations I have been impartial in my selection. The same author sometimes served me as a support, sometimes I treated him as an adversary, without any regard to authority, or to reputation, or to the influence of the person, the age, &c. It is in my nature to take the good wherever I find it, and always to attack the front of prejudice and error.

My proceeding is, therefore, the opposite of that of most French authors, who are willing, in a preface or in any other place, to designate lightly men whom they have read thoroughly, but of whom they make no mention in the body of their work. An excellent means of giving themselves all the latitude of usurping furtively the honor of others!

Since the question relates to quotations, who has more right to complain than I have? I should make vol-

umes, if I wished to enumerate all the robberies committed on my property. In order the better to conceal the fraud, they usually take the precaution to slide in some words of criticism or contempt against the author, whom they are preparing to plunder. We shall find proofs of this in almost all the works written in late times on the physiology of the brain, and it is only necessary to read the works of Richerand, and the article, *Touch*, of MM. Chaussier and Adelon, who have made an extract from my treatise on the functions of the five senses, as if they had not the slighest knowledge of my work.

Let us now look at the passages, which cannot be expected to please me, and appreciate at the same time the true value of the favored authors of M. Georget.

Vol. i. p. 124; M. Georget says: "It is especially in Charles Bonnet, that we shall find the plurality of the organs of the brain admitted in the most formal manner; we can never be wearied of quoting this great man. 'Without being initiated in the secrets of anatomy, one may know, at least in general, that a brain is an extremely compounded organ, *or rather an assemblage of many different organs*, formed themselves by the combination or interlacing of a prodigious number of fibres, nerves, vessels, &c. The prodigious multiplicity and diversity of the ideas, which arise from the different operations of our mind, may enable us to judge of the astonishing art, with which the intellectual organ of our thoughts has been constructed, and of the almost infinite number of parts, and of parts infinitely varied, which enter into the composition of this surprising machine, which, to speak in the spirit of the philosopher, incorporates an abridgment of nature. . . . . Hence, it follows, that an intelligence, which should understand thoroughly the mechanism of the brain, which should see in the greatest detail all that passes there, might read in it as in a book. This prodigious number of organs infinitely small, appropriated to feeling and to thought, would be to

this intelligence, what the characters of printing are to us. We turn over books, we study them; this intelligence would limit itself to contemplating brains. . . . Our feelings of different kinds belong to fibres of different kinds. . . . The degree of agitation determinesthe vivacity of the feelings, the species of fibre decides the kind of feeling. . . . In fine, how do we remedy that fatigue, that pain, which results from too long continued attention to the same series of ideas? By rest or a change of objects. Why by rest? Because it is a cessation of action. When the mind no longer acts upon the fibres on which it has acted, the tension, that it has impressed upon them, diminishes, because enfeebled and lost. Why by a change of object? Because the soul acts no longer on the same fibres. Each perception has fibres which are appropriate to it."

Page 141. M. Georget goes on to say: "The reader has not forgotten the quotations, we made from the Palingenesia of Bonnet, so very positive in relation to the seat of intelligence; I will add to them the following from the same author. 'Assuredly, if it were permitted us to see to the bottom of the mechanism of the brain, and especially of that part, which is the immediate instrument of feeling and thought, we should see the most attractive object presented by the terrestrial creation. We are never satisfied with admiring the apparatus, and the play of organs, destined to incorporate a piece of bread with our own substance. What, however, is this spectacle, compared with that of the organs destined to produce ideas, and to incorporate with the soul, the whole world? All there is of grandeur and beauty in the globe of the sun, yields without doubt, I do not say to the brain of man, but to the brain of a fly. . . . We are therefore led to believe, that the organization of the brain of animals, differs essentially from that of the human brain. We shall hardly run any risk of self-deception in judging of the relative perfection of the two machines,

by their operations; and how superior are the operations of the human brain to those of the brain of animals! How much has reason the advantage over instinct! It appears, therefore, that the brain of the brute is a machine incomparably more simple than that of man; the construction of the animal machines has been calculated on the number and the diversity of the effects, which they had to produce, in relation to the place, which was assigned to each species in the scale of animal life. The brain of the monkey, much less complex than that of man, is incomparably more so than that of the oyster.'"

M. Georget seems to wish to insinuate to his readers, that I have designedly concealed the names of the authors, who, before me, had already formed some idea on the functions of the brain, and on the plurality of the organs of intelligence. If M. Georget had read my work with less haste, he would have seen, vol. II. p. 214, in the statement of the most remarkable opinions on the seat of the soul, and on the reciprocal action of the soul on the body, and of the body on the soul, the names of the sects and the authors, who professed on this subject opinions more or less absurd. He would have seen the names of Stahl, Pythagoras, Plato, Galen, of the Stoics, of Aristotle, of Erasistratus, Herophilus, Servetto, Auranti, Van Helmont, Descartes, Varthon, and Schelhammer, of Drelincourt, Bontekoe, Lancisi, Lapeyronie, Willis, Vieussens, Ackermann, who all have had some suspicion, that the brain is the seat or organ of the soul. But, after these quotations, we must not forget to read also, p. 217, the solution of the question, whether, in the actual state of our knowledge in physiology, it is proper to be still making researches on the organ of the soul? and we shall see what confusion, what uncertainty and vacillation reigns in the opinions of Hippocrates, Reil, Dumas, Richerand, Sprengel, Pinel, Esquirol, Fodéré, Bichat, Sabatier, Roger, Darwin, Buffon, George le Roi, Vicq d'Azyr, Cuvier, Stahl, of

whom several even deny absolutely, the influence of the brain on the faculties of the soul.

Does M. Georget wish to accuse me, as the journalists formerly did, of having wished to make my readers believe, that I am the first, and the only one, who has conceived the idea of the plurality of the organs? Then I refer him again to vol. II. p. 356. Let him read again the statement of opinions on the difference which exists, as well between the different moral qualities, as between the different intellectual faculties, on the plurality of the organs, and on the seat of those organs; in which article I have made no change in this edition.

He will find in this statement the opinions, on these matters, of the Greeks, of Pythagoras, of St. Paul, of Galen, Gilbert, Gassendi, of Bacon, Van Helmont, Wepfer, Willis, Leibnitz, Frederick Hoffman, Haller, Blumenbach, Barthez, Casimir Medicus, Reil, St. Augustin, Plato, Anaxagoras, Aristotle, Stahl, Malebranche, Condillac, Vieussens, of the ancient Jesuits, Peripatetics, Arabians, of Vockerodt, Carpus, Gregory of Nissa, of Albert the Great, of Mundini of Luzzi, of Servetto, of Petrus Montaguana, Ludovico Dolci, Willis, of Charles Bonnet, p. 359, l. 25; of Lancisi, of Lapeyronie, of Haller, and Van Swieten, of Cabanis, Mayer, Prochaska, of Plattner, Malacarne, Chanet, Wrisberg, Tiedemann, Richerand, Cuvier, Degerando, Sœmmerring, Ackermann, Bérard, and Montègre, &c.

The passage of Bonnet, which so much interests M. Georget, I had quoted in my answer to the report of the Institute, p. 248, where he says, that an intelligence which should know fully the mechanism of the brain, which should see in all its details what passes there, would read as in a book, &c. I have quoted him, vol. II. p. 34 and 38, where he affirms with reason, that it is only by the physical, that we can penetrate into the moral constitution of man. I have quoted him, p. 77, acknowledging, as he does, that there is

no truth useless or dangerous. I have quoted him, p. 100, adopting his, the only just, definition of moral liberty. Finally, I have quoted him, p. 412, where he says, that, if fatigue ceases when the mind changes its object, it is because it then acts by other fibres.

All these literal quotations are very far from exposing me to the suspicion, of having intended to distract my readers from the ideas of Bonnet. As I have never ranked this philosopher among my opponents, whatever M. Georget may say, I will add also, some passages of the Palingenesia, which will give him pleasure. Let us first copy the passage, which M. Georget has himself reported, p. 103. "I have then supposed, that each species of sensible fibre has been originally constructed on relations, which are applicable to the mode of action of its object. Our brain has, therefore, been organized in a direct relation to those marvellous operations of our mind, by which it gradually brings itself to the most general and most abstract ideas. Rather a bold genius, (Helvetius,) and one who knows how to manage his subjects with as much art as grace, has thought, that he made a very philosophic step in discovering, that the horse differs from man only by the hoof. It appeared to him, that, if the feet of the horse, in place of terminating by an inflexible hoof, had ended in supple fingers, he would soon have attained to a level with man. I doubt whether a philosopher, who shall have deeply studied the nature of animals, will applaud the discovery of this ingenious author, whose merit ought not to be confounded with his opinions; he had not considered, that any animal whatever is a particular system, all of whose parts have a mutual harmony among themselves. The brain of the horse corresponds to his hoof, as the horse himself answers to the place, which he holds in the organic system; if the hoof of the animal were converted into flexible fingers, he would not be the more capable of generalizing his sensations; the hoof would still exist in

the brain; that is, the brain would want that admirable organization, which enables the soul of man to generalize its ideas; and were it ordained that the brain of the horse should undergo a change corresponding to that of his feet, he would no longer be a horse, but another animal, which would require a different name."

Page 31. Bonnet says: "I maintain that, supposing all souls perfectly alike, organization would suffice to introduce varieties among them. And what is there more evident? A mixed being feels and perceives only by the aid of his senses. All his sensations and perceptions are always in a determinate relation to the number and the quality of his senses.

"Would the human soul, placed in the brain of the oyster, ever acquire notions of morals and metaphysics? Its nature, indeed would remain the same; but it could not display its activity, as it displays it in its own brain. It would, therefore, be extremely degraded by the sole diversity of organization; and if it were possible, that a soul so degraded should preserve a remembrance of what it had been in the human body, it would be a most terrible misfortune to it to be condemned to inhabit the body of an oyster.

"I suppose there is no essential difference between human brains; and this supposition seems to me legitimate, the number and nature of the senses being the same in all men; but all men do not derive the same advantage from their senses. What a difference in this respect, between Montesquieu and a Huron!

"The senses communicate with the brain, and produce there durable impressions, sources of imagination, of memory, of reasoning. A disease may derange all the economy of the brain, and annihilate imagination, memory, reasoning; it does not annihilate the soul, yet the latter is reduced to the state of the soul of the brute.

"If the brain is modelled in any way by external

objects; if there are fibres appropriated to each kind of perception; if these fibres retain the impressions which the objects have impressed on them; if such is the law of the union of soul and body, that to certain fibres, and to certain states of these fibres, certain sentiments, certain perceptions in the soul constantly correspond, we must admit that the soul of a Huron, lodged in the brain of a Montesquieu, would there experience the same sentiments, the same perceptions, as the soul of Montesquieu.

"It would there experience the same successions, the same combinations of sentiments and of perceptions; for, I persuade myself, that I have well established that the connexion of our ideas depends originally on that of the sensible fibres. If it were not so, how should it happen, that physical accidents, which can only affect these fibres, should destroy the connexion of our ideas?"

Thus far, all is perfect, all is excellent. But was Bonnet free from the prejudices of his time? Has M. Georget always understood him correctly?

Notice here, p. 110, Bonnet applies himself to the research on the location of the soul: "Whatever be the part of the brain, which is the seat of the soul, or the immediate instrument of its operations, we cannot help admitting, that there is, somewhere in the brain, an organ, which unites the impressions from all the senses, and by which the soul acts or seems to act on different parts of its body.

"We see clearly, that the action of objects is not limited to the external senses. The action of sound is not confined to the tympanum, nor that of light to the retina; there are nerves, which propagate these different impressions to the brain. Those, who, after having lost the wrist, still feel the fingers, show us satisfactorily, that the seat of the feeling was not where it seemed to be. The soul does not, therefore, feel by the fingers. Neither is sensation in the external senses.

"We are very little informed in regard to the intimate structure of the brain. Anatomy is lost in this dark labyrinth. It sees the nerves of all the senses converge there; but, when it endeavours to follow them in their course, they escape it, and it is compelled to conjecture or to grope.

"We must, therefore, give up determining precisely what is that part of the brain, which constitutes the seat of the soul. A celebrated anatomist (de la Peyronie), proceeding by way of exclusion, has maintained, that the seat of the soul is in the corpus callosum, because all the experiments, he has tried, have appeared to him to prove, that this is the only part which cannot be wounded or altered, without the functions of the soul suffering more or less.

"Another anatomist, Lorry, has contradicted this result, and attempted to establish on other experiments, that the seat of the soul should rather be in the medulla oblongata. He produces in its favor facts, which seem decisive. I will quote only a single one: we know animals which have no corpus callosum: the pigeon for example, has none according to what this anatomist says; and yet we cannot deny the pigeon a soul.

"However it may be with this question on the seat of the soul, it is very evident that all the brain is no more the seat of perception, than all the eye is the seat of vision.

"But, if we are not permitted to penetrate into the secret of the mechanism of the brain, we can at least study the effects, which result from this mechanism, and thus judge of the cause by its effects.

"We know that we have ideas only by the aid of the senses; this is a truth, which experience attests. Experience also teaches us, that our ideas of every kind are chained to one another, and that this connexion belongs to the combination, which the fibres of the senses have together.

"It therefore follows, that the different senses with

which we are endowed, have, somewhere in the brain, secret communications, by means of which they may act on one another.

"The part, where the communications take place, is that which must be regarded as the seat of the soul. It is the internal sense.

"This part, therefore, is, in some way, the epitome of all the senses; since it unites them.

"But it is also by this part, that the soul acts on its body, and by its body on so many different beings. Now the soul acts only by the agency of the nerves; it follows, therefore, that the nerves of all the parts, which the soul governs, must terminate in this organ, which we regard as the immediate seat of feeling and of action. It is in this sense, that I have said that this organ, so exceedingly complicated, was a *nervology* in miniature.

"We see sufficiently, by all that I have just stated, that it is of little importance to my principles, to determine precisely what is the part of the brain, which properly constitutes the seat of the soul. It is sufficient to admit with me, that there is in the brain a place, where the soul receives the impressions of all the senses, and where it displays its activity. I have shown, that this supposition is not gratuitous, since it flows immediately from facts which cannot be called in question."

Let us suppose that Bonnet is really of opinion, that each nervous fibre is endowed with a certain perception or faculty: of what avail would that be to enable us to arrive at the knowledge of any organ whatever? Let any one discover in the optic nerve the fibre which sees red, the fibre which sees yellow, &c., and here we should not have to do with organs of a different nature, but only with the modifications, with the different capacities of the same organ. Thus, the so much admired passages of Bonnet are not more significant than the suppositions of Albert the Great, of Servetto, Dolci, &c.; and had Bonnet a juster

knowledge of the fundamental qualities and faculties, for which alone it is possible to discover organs? It is for the same reason, that those who had some more reasonable presentiment of the plurality of the organs, have, notwithstanding, always despaired of its being possible to discover them: such was the definitive opinion of Haller, Van Swieten, Prochaska, Cabanis, &c.

If it be true, as Bonnet maintains, according to the philosophy of his time, that we have ideas only by the aid of the senses, how do you allow the innateness of a propensity or a faculty, and consequently how can you admit, that its organ previously exists in the brain? Thus every thing limits itself, in Bonnet's system, to a simple aptitude, a capacity of receiving such or such an impression, by the aid of the senses: to wit, that by their means such or such an operation might take place.

Finally, when Bonnet tells you, that all the brain is no more the seat of sensation, than all the eye is of vision; when he tells you, that the soul acts only by the agency of the nerves, that it therefore follows, that the nerves of all the parts which the soul governs must terminate in this organ, which he regards as the immediate seat of sensation and action; by the expression *sentiment*, he constantly means nothing more than sensation, the first impression made by the senses on the brain, and by no means the psychologic sentiments, such as the sentiment of pride, benevolence, &c. Consequently, M. Georget does Bonnet infinitely too much honor, when he lends him the idea, that the brain is the organ of sentiments, that is, of the affections, passions, propensities; and it is not sufficient to quote his authors literally, it is necessary to hear their language.

The general expressions of Bonnet frequently reveal sublime and very just ideas; but, as we have just seen, it is precisely this generality which imposes on us. As soon as he enters into detail, he betrays the

crudeness of his conceptions. He, who so well perceived, that the brain of the horse answered to his hoof, how could he all of a sudden abandon this luminous idea, and admit that "a single organ, a single sense, may have been constructed with so much art, that it may alone suffice to give to the animal a great number of ideas, to diversify them, and to associate them strongly together. It will combine them even with so much the more force and advantage, as the fibres, which shall form its seat, shall be more intimately united in the single organ."

"The trunk of the elephant is a beautiful example, and one that will well illustrate my idea. It is to this single instrument, that this noble animal owes his superiority over all other animals; it is by this, that he seems to hold the middle place between man and brutes. What pencil can, better than that of the painter of nature, express all the wonders worked by this sort of universal organ!

"This trunk," says M. Buffon, "composed of membranes, nerves, and muscles, is, at the same time, a member capable of motion, and an organ of sensation. The elephant can shorten, lengthen, curve, and turn it in all directions. The extremity is terminated by an addition in form of a finger; and it is by means of this, that the elephant does whatever we do with our fingers. He picks up from the ground the smallest pieces of money; he gathers herbs and flowers, choosing them one by one; he unites knots, opens and shuts doors by turning the keys and pushing the bolts; he learns to trace regular characters with an instrument as small as a pen.

"In the midst of this finger-shaped extremity is a concavity, in the bottom of which are found the common passages of smell and respiration. The elephant has, therefore, his nose in his hand, and is able to join the power of his lungs to the action of his fingers, and by a strong suction, to draw up liquids, or lift very heavy bodies, by applying to their surface the

extremity of his trunk and making a vacuum by inspiration.

"Delicacy of the touch, exquisite scent, facility of motion, and the power of suction, are found, therefore, at the extremity of the elephant's trunk. Of all the instruments, with which nature has so liberally furnished her favorite creatures, the trunk is perhaps the most complete and the most admirable; it is not only an organic instrument, but a triple sense, whose united and combined functions are at the same time the cause, and produce the effect, of that intelligence, and of those faculties, which distinguish the elephant and raise him above all animals. He is less subject than any other animal to the errors of the sense of sight, because he rectifies them promptly by that of touch, and making use of his trunk, as of a long arm to touch bodies at a distance, he forms, as we do, correct ideas of distance by this means," &c.

The eloquent historian of the elephant then unites, in a single view, the various services, which this great animal derives from his trunk. "Touch," he continues, "is that one of all the senses, which contributes most to knowledge; the delicacy of the touch gives the idea of the substance of bodies; the flexibility in the parts of this organ gives the idea of their external form; the power of suction, that of their weight; the smell, that of their qualities; and the length of the arm or trunk, that of their distance; thus, by a single limb, and, so to speak, by a single act, the elephant feels, perceives, and judges several things at once; now, a multiple sensation, is in some respects equivalent to a reflection; therefore, although this animal is like others deprived of the power of reflecting, as his sensations are found combined in the organ itself, as they are cotemporaneous and, as it were, indivisible; it is not surprising, that he has of himself, species of ideas, and that he acquires in a short time those, which it is desirable to give him."

I have already proved in several places, that it is

precisely the inverse of the relation of Buffon and Bonnet, which exists between the senses and the understanding. It is not the perfection of the senses, which gives intelligence to the brain; but it is the perfection of the brain, which determines the employment of the senses, or of external instruments. Why are the monkey and the idiot incapable of employing their hands in objects of art? Why does the rabbit construct a burrow, and the witwall suspend its nest so artfully between two boughs, while, with the same instruments, the hare and the cuckoo never do any such thing?

As respects Kant, I have always heard him spoken of, in Germany, with enthusiasm. But, by a singular fatality, I have never had a sufficiently transcendent mind to comprehend any thing of his philosophy. The books, whether of jurisprudence, medicine, or metaphysics, written in the style of Kant, Fichté, Schelling, &c., have always disgusted me by their bombastic, unintelligible, corrupted style. I shall endeavour to prove, in the following volume, how mistaken M. Georget is, when he thinks he finds some resemblance between my ideas and those of this too profound philosopher. The most sublime intelligence will never be able to find in a closet, what exists only in the vast field of nature.

The same reproaches, which M. Georget has addressed to me, having been made to me also by others, with a certain air of importance, these gentlemen will please hear with indulgence my profession of faith.

Few are more modest or humble than I am, when I take a view of that immensity of things, of which I am condemned to be ignorant, though they are immediately connected with my profession.

But when the question concerns the discovery of the structure and the functions of the brain, it is with unshaken confidence, that I consider myself in advance of all my predecessors, as well as my cotemporaries.

In fact, I may claim to be the first, that has established physiological principles, according to which the structure and functions of the brain ought to be studied; the first, that has passed the barrier, which superstition and philosophy, for thousands of years, had opposed to the progress of the physiology of the nervous system; the first that has conceived the idea of distinguishing general attributes, from the real fundamental qualities and faculties; the first, that has determined the instincts, propensities, sensations and talents, which belong to certain cerebral parts; the first that has had the courage, patience, perseverance, to examine and fix the relations, which exist between the energy of the moral qualities, of the intellectual faculties, and the different developments of the parts of the brain; the first that has extended these researches through all the animal kingdom; that has studied thousands of animals, in regard to their most striking instincts, propensities, faculties, and the configuration of their brain, both in individuals and species. No one, before me, has found and pointed out the only means capable of discovering the seat of each instinct and propensity, of each sensation and intellectual talent. I claim to be the discoverer of these seats and to be the first that has demonstrated them by numerous irrefragable, pathological, and physiological facts, and by an infinity of researches into the comparative anatomy and physiology of all the tribes of animals.

All these conceptions, and all these fundamental truths, even previous to our journey undertaken in 1805, were already diffused by my numerous hearers in all parts of the learned world; and if the anatomy and physiology of the brain have been perfected at a later period, it is still either to the works of M. Spurzheim and myself, or to that only true direction, that we have given to the labors of other anatomists, that this degree of perfection is due. Where is the author who, in regard to any essential part of my

doctrine, has ever manifested any thing but vague conjectures, lightly conceived and quickly dissipated. All have stopped at generalities, more or less plausible in appearance, and all have retracted as soon as the point was to fix a principle, an immutable proposition. You quote to me, and I myself quote the Mayers, Hallers, Van Swietens, Herders, Vicq d'Azyrs, Cabanises, Prochaskas, Sœmmerrings, &c.; well, all have despaired of the possibility of discovering any organ whatever; all have followed the paths of the sterile philosophy of Plato, Leibnitz, Wolf, Descartes, Locke, Condillac, &c. Not one has had the slightest presentiment of the nullity of all these doctrines; not one has dreamed of analyzing the moral and intellectual economy of man and animals; of determining the instincts, propensities, sensations, faculties! You quote to me the most celebrated of your naturalists, M. Cuvier, and I quote him also. But read his works from one end to the other; read his report on our memoir, presented to the Institute, in 1808; read the Dictionary of the Natural Sciences; read what, in his *règne animal*, he says on the impossibility of recognising the instincts by the form of their brain; what vacillation, what tergiversation, what uncertainty, what contradiction of his own opinions, appear on every page. And has this distinguished naturalist succeeded in making a single true application of his knowledge of comparative anatomy, to the physiology of the nervous system in general, and especially of the brain, in particular?

Let any one read with candor the history of philosophy; of the progress of comparative anatomy and of the physiology of the nervous system; read what is still objected to the plurality of the organs; how men still hesitate to admit the fundamental qualities and faculties, and the seats of their organs, without which the physiology of the brain is reduced to a mere chimera; and then maintain, that before me physicians, philosophers, conceived and taught a clear and exact idea

of the functions of the brain and its constituent parts!

Indeed, it may be said, that to me only the physiology of the brain owes its existence. That I have discovered it without the aid of any one whatever, the history of each of my discoveries sufficiently proves. It is with the physiology of the brain as with its structure. To unravel whatever might by chance have been found in the writings of authors, would have required infinitely more sagacity, than to divine, by means of observation, the mysteries of nature. I commenced, continued, and almost completed my discoveries without any previous instruction; and, if afterward I compiled quotations from others, it was rather to manifest my point of departure from them, than to strengthen my ideas.

Let us close these remarks by an objection, which M. Georget makes to the doctrine of the functions of the different cerebral parts: "But," says he, "there are very great difficulties touching the mechanism of the exercise of these faculties, which M. Gall has not resolved, or even assailed, at least so far as occurs to me. How do all these faculties communicate together, so that several are simultaneously in action, as happens in the smallest intellectual operations? How do they mutually derive the knowledge proper to each, as must happen to the metaphysical sense, to the poetical sense? &c. How do they receive impressions by means of the sensorium? Is it reasonable, credible, that twenty-seven or thirty-five faculties can communicate equally with the sensorial power, and be particularly stimulated by the impressions in relation with their destination? The difficulty, which appears to me the greatest and hardest to resolve, is this: how happens it, that there is only one *self*, one sentiment of existence, one single consciousness of the thinking being? Or, in other terms, how happens it that each of these members of the intellectual power has not its distinct consciousness, its intimate sense of existence? Why do all

the intellectual operations, sensations, perceptions, operations of the mind, passions, &c., produce the effects of being felt, perceived, executed, excited by a single power, and refer themselves to one single *self?*"

How happens it, that M. Georget, who has already so often rejected the insinuations of the metaphysicians, assumes all at once the air of wishing to place himself under their banners? How do all the organs of voluntary motion, how do the five senses communicate together, in such manner, that several may be simultaneously in action? For my answer I refer M. Georget to the axiom: *no difficulty whatever can destroy a fact.* You do not explain either fecundation, or life, or sensation, or thought, or digestion, and yet fecundation is effected, and life, sensation, thought, digestion, take place. In conclusion, I refer you to what I have said on these idle questions in several places of this work. And, if you are still eager for explanations, I refer you to the tribunal of metaphysicians, who explain every thing, *without knowing any thing.*

END OF THE FIFTH VOLUME.

CRITICAL REVIEW

OF SOME

ANATOMICO-PHYSIOLOGICAL WORKS;

WITH

AN EXPLANATION OF A NEW PHILOSOPHY

OF THE

MORAL QUALITIES AND INTELLECTUAL FACULTIES.

By FRANÇOIS JOSEPH GALL, M. D.

TRANSLATED FROM THE FRENCH

By WINSLOW LEWIS, Jr., M. D., M. M. S. S.

IN SIX VOLUMES.

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CONTENTS.

PREFACE.

HAVING omitted in this edition, the anatomy of the nervous system and of the brain, I did not intend to enter into any discussion regarding anatomical facts. But as, since my first publications, the nervous system has become the object of numerous researches, both of anatomists and physiologists, it is no longer possible to discuss its anatomy or its physiology, separately. Some maintain, that anatomical propositions are so intimately connected with physiological, that the truth or the falsehood of the former, necessarily includes the truth or the falsehood of the latter. Others, by confounding the vital with the special animal functions, pretend to have discovered the organs of the specific functions by the lesion and mutilation of the different parts of the nervous system and of the brain.

I have therefore thought it necessary to reply to the principal works, which treat promiscuously of the anatomy and physiology of the nervous system, at least so far as they are directed against my discoveries.

The works of Tiédemann, Carus, Rudolphi, Rolando, Flourens, Burdach, Serres, &c., &c., have seemed to me to be the most deserving of notice; because in them there is the most manifest intention of overthrowing my anatomical and physiological principles.

As to the comparative anatomy of the brain in the four classes of vertebrated animals, by M. Serres, I have noticed the report of it inserted in the *Archives générales de Medicine*, T. VII. 1825. At first, I supposed that the author of this report entertained the

same opinions as M. Serres; but afterwards, I saw that M. Olivier had repeated, among many other excellent remarks, several of the same observations that I myself had made against the assertions of M. Serres.

In one of the volumes, I have reproached MM. Chaussier and Adelon with having copied my ideas on the functions of the five senses, without making mention of me. It is due from me to repair the wrong which I have done to these illustrious professors; they had indicated the source of their ideas in some preceding passages.

The objections, which have been made against the physiology of the brain, since the publication of my large work, are but repetitions of those which I have so often refuted. The same may be said of those of M. Bérard, the most of which are purely metaphysical. As to the rest, his doctrine of the relations of physics and morals is a forced work of circumstances, and is consequently unworthy of the serious attention of an observer of the constant laws of nature.

I have always had a consciousness of the dignity of my researches, and of the extended influence, which my doctrine will hereafter exercise on all the branches of human knowledge; and, for this reason, I remain indifferent to all that may be said, either for or against my works. They differed too much from the received ideas of the times to be appreciated and approved at first. It required a profound and connected study to understand them: all the world, however, wishes to judge, and each one gives his opinions according to the degree of his intelligence.

My whole doctrine is now before the public. The decision cannot remain doubtful much longer. Personal considerations will disappear; the passions will be calmed, and the critic will judge of it only by its intrinsic value. Posterity will not fail to establish a parallel between the point whence I started, and the place to which I have arrived. Opponents have too well shown the state in which the different objects,

which make a part of my works were found, to make it difficult to determine the advances they have made or will make by my discoveries.

What advances in comparative anatomy, physiology, and comparative pathology of the nervous system! What fruitful source of undeniable principles for philosophical studies, for the art of selecting, deducing the good from the dispositions of individuals, for directing the education of the young! What precious materials for a criminal legislation, founded upon a complete knowledge of the motives of human actions! How different will history appear to him, who knows how to appreciate it, according to the dominant propensities and faculties of those personages, who have been its great actors, &c. &c.

The foundation of this useful doctrine is established, and it should be as firm as the facts, the materials of which it is constructed. But I am far from believing that the edifice is finished! Neither the life, nor fortune of one man, can be sufficient for this vast project. Hitherto I have depended on my own resources. But an immense number of fortunate circumstances must concur, in order to elevate this study to the degree of perfection of which it is susceptible. It is necessary to have a complete collection of the skulls of animals, not only of various species, but also of individuals in whom had been recognised faculties or qualities particularly distinct: there should be a complete collection of the brains of animals, modelled after nature in wax, in order to increase the means of comparison. A large number of skulls, or at least of busts moulded in plaster, of men and women distinguished for some quality or faculty, are also requisite: and lastly we should possess a more extensive acquaintance with natural history than we do at present, as regards the instincts, mechanical aptitudes, the qualities and faculties; in a word, as to the interior economy of animals.

It is to be hoped, that the utility and importance of

these researches may soon be generally acknowledged; that soon a necessity will be felt of making it an object of public instruction; that governments themselves will favor it; that others among the learned will assist me with their knowledge, and that then moral and intellectual physiology will appear in a splendor, that my unaided efforts could not alone effect.

I had contemplated making extracts from the English works of Mr. Combe, and from the various societies which have been formed in London, Edinburgh, Philadelphia, &c. But those works are too important to be given in the small space, which I could devote to them; nor would such abstracts have been satisfactory to my readers. Those, who read English and are interested in the physiology of the brain, will be readily convinced how much those men have contributed to its perfection.

At the time when this volume was nearly finished, a young and very skilful anatomist, M. Fauville, thought he could refute my ideas on the origin of the white fibrous substance, on the double converging and diverging system in the brain, and on the formation of the great commissure of the hemispheres. His mode of observation differs from that of M. Tiédemann, and his anatomical preparations really present a great degree of plausibility, so that those who are not familiar with the anatomy of this organ, so delicate and complicated, or those who cannot receive physiological proofs, may easily be persuaded, that the great commissure is the immediate continuation of the fibres of the corpora striata. It is for this reason, that I shall present in a single point of view, the principal arguments which prove, that the great commissure is formed by the nervous fibrils reëntering from the surface of the diverging and converging convolutions, to form this great union of the hemispheres. But the importance of these proofs will not be perceived, until the reader shall have read what I have said on this subject in the course of this volume.

I. It is evident to the eye, that the transverse bundles of the annular protuberance, or of the commissure of the hemispheres of the cerebellum, are continuations of the nervous fibrils, which arise from the surface of the lamellæ of the cerebellum, and which, by converging and uniting to those of the opposite side, form this commissure.

II. It is also in the same manner evident, that the anterior commissure is formed by the fibrils and bundles, which converge from the anterior interior part of the middle lobes. The great nervous cord traverses the corpora striata, without adhering to them in any way. Indeed, if any commissure is to be formed by the bundles of the corpora striata, it must be this one.

III. The septum lucidum, equally formed by the nervous fibrils which come from the base of the brain, and which meet in the median line of the great commissure, is but a commissure, and has nothing in common with the corpora striata.

IV. The posterior pillars of the fornix and the lyra are the result of filaments, entering and coming out of the fimbriated edge of the tœnia, and the cornu Ammonis. All these parts have no connexion with the corpora striata, but yet make a part of the great commissure.

V. No one will contend, that the anterior and posterior folds are not integrant parts of the great commissure. Now, these folds are evidently formed by the nervous fibres, which reënter converging from the anterior and posterior lobes of the hemispheres. The direction of the fibres which form these folds, is evidently opposed to the direction of the nervous bundles of the corpora striata. It is impossible to conceive this disposition, if it is admitted that the fibres of the folds are continuations of the corpora striata; every thing, on the contrary, is explained by allowing that the folds are formed by the reëntering

fibres of the hemispheres. Their direction, which is oblique and crossing that of the bundles of the corpora striata, is necessarily controlled by the width of the interrupted horizontal direction of the anterior and posterior lobes of the hemispheres. If, then, the septum lucidum, the posterior pillars, the lyra, the posterior and anterior folds, all the integrant parts of the great commissure, are formed by the reëntering fibres of the hemispheres; if all the other commissures, that of the hemispheres, of the cerebellum, the anterior commissure, are formed by the reëntering or converging fibres of the hemispheres, how can any one rationally admit, that the only middle horizontal part of the great commissure should make an exception to this general law?

VI. The great commissure, in its posterior part, is extended beyond the corpora striata, because the posterior lobes are more voluminous than the anterior, and it is the posterior lobes, which furnish the posterior third of the great commissure. If this posterior third were a continuation of the corpora striata, it could not be extended backward farther than the corpora striata themselves.

VII. The fibres of the corpora striata diverge more and more, as they proceed from their origin. This divergency ought to be perceptible in the fibres of the great commissure, even as far as its median line; but, commencing from the two folds, the direction of all the fibres of this commissure is perfectly parallel, as far as to their reunion in the median line; no tendency to divergency can be discovered. This tendency should be more perceptible towards the anterior and posterior thirds of the commissure.

VIII. The fibres of the bundles of the corpora striata are stronger and of a firmer consistence; those of the great commissure are more delicate and softer.

IX. In the fœtus, the great commissure is formed from before backwards, for the anterior lobes are the

first to appear. If it were the continuation of the corpora striata, it should, like those bodies, be formed from behind forward. They exist even when there is no appearance of the great commissure; while, on the contrary, this commissure commences at the same time with the hemispheres.

X. The two folds being thicker than the rest of the great commissure, evidently prove, that they have gained an increase of medullary fibres, which cannot be conceived on the supposition, that they are the continuation of the corpora striata.

XI. The posterior fold is much thicker and more furnished with nervous fibrils, than the anterior. This fact is explained by the greater volume of the posterior lobes, which consequently furnish a greater number of fibrils to form this fold. If the two folds were a continuation of the corpora striata, this difference of thickness could not be accounted for.

XII. For a long time, anatomists could not explain the great quantity of the white substance of the hemispheres, by the bundles of the corpora striata only. But this increase of the white substance is conceivable, when it is admitted, that the grey substance of the surface of the hem spheres, furnishes the other half of it. And as throughout, the grey substance produces the nervous fibrils, it is conformable to the universality and constancy of the laws of organization, that the same should be true of the grey substance, which is not fibrous, which covers the external surface of the cerebral membrane.

XIII. Lastly, if the great commissure were a continuation of the corpora striata, it would be impossible to explain phenomena seen in hydrocephalous subjects, as the unfolding of the hemispheres, their extension into a large bladder, without any rupture, and often without any remarkable injury of the functions of the brain.

These arguments henceforth ought to be sufficient

to demonstrate the weakness of the attempts of certain anatomists, to deny the reëntering converging system, and the formation of the great commissure agreeably to it.

FUNCTIONS OF THE BRAIN.

THE ANATOMY OF THE BRAIN, *containing the History of its Development in the Fœtus, with a comparative Exposition of its Structure in Animals:* by FREDERIC TIEDEMANN, &c.: Translated from the German by A. J. L. JOURDAN. Paris, 1823.

M. JOURDAN has prefixed to his translation a preliminary discourse, and M. Boisseau, in the *Journal Universel des Sciences Medicales*, Vol. xxx. p. 309, has complimented both. It is asserted by these learned writers, that the observations of Tiédemann have refuted the principles, established in my anatomy and physiology of the nervous system in general, and of the brain in particular. Before examining the works of Tiédemann, I shall review the preliminary discourse of Jourdan, and the report of Boisseau.

Jourdan commences by proving, that he is initiated in the mysteries of the transcendental philosophy. He tells us, that it is impossible to conceive the idea of absolutely inert matter; that activity alone exists for the idealist as well as for the realist: in a simple state for the first, who allows but one power, the *me* (le *moi*); double for the second, which supposes two, the *me* and the *not me* (le *moi* et le *non moi*); that to feel is to be sensible to a power, which fills a certain space; that the universe, as cognizable to our senses, has its origin in the conflict of an infinity of different

powers; that Kant has satifactorily demonstrated, that both space and time, are the primitive forms of all intuition; that the words *body* and *force* express only one and the same idea, as we particularly regard its existence, either in space or time; that consequently, *to be* and *to act* are synonymous terms; that very many absurd theories, &c., would have been avoided, if physiologists, true to the wise precept of Hippocrates, had borrowed from philosophy the art of reasoning only; that the words *organization* and *life*, *organ* and *organic action*, express the same phenomenon, according as the one or the other is considered as acting, or as existing, or as to space or time, &c., &c.

Jourdan afterwards makes an application of these profound speculations, to the physiology of the brain, in his opinion a judicious one, in mine erroneous. After having examined many errors of the philosophers, he considers with Seneca and our own experience, that man has a greater tendency to believe on the faith of another, than to examine and judge for himself. He moreover discovers, that many cerebral parts are but little developed in some animals, whose cerebral action differs but little from that, which is seen in other animals, who have them very large; that the preëminence of man, as to cerebral action, depends not on the presence of a new part, but on the development, and more especially on the concentration (*centralization*) of those, which exist already in the lower classes of animals; that the soul is the highest degree of perfection as to sensibility, that is to say, of the nervous action itself; the active manifestation of a nervous system perfectly centralized, (*centralizé*,) having for its result the development of individual consciousness, as this perfectly centralized system is but the soul itself, considered only as regards its existence in space; that this doctrine accords with the immortality of the soul; that the brain acts in time, without simultaneously manifesting itself in space; that we cannot perfectly understand it, because it is

not restricted to the two primitive and necessary forms of all intuition by our intelligence. "As it does not manifest itself to us," continues Jourdan, "in space, or under either of those two forms, which alone can affect our external senses, we can only acquire a confused notion of it by our internal senses. But, although this notion may be confused, it does not necessarily follow, that it should be erroneous. Therefore," adds Jourdan, "in my opinion, we may, by the light of reason alone, arrive at an intuition of existence purely intellectual in all nature, of a principle superior to matter, the bonds of which there is so great a tendency in us to separate. It seems to me, then, that we arrive at a certain point in conceiving intelligence as the product of centralization of a nervous system, whose sphere of action augments as the more intimate harmony is established between its different parts. In this way, a superior man disseminates the influence of his genius, and extends its power over vulgar minds, which it subjects to its control. Thence arises the force of opinion, that immovable rock which withstands all the effects of physical might, of that opinion which made Tiberius tremble in the midst of his satellites, and in those recesses where he had shrouded his crimes and his fears."

It is in this manner, that Jourdan wishes psychology to be regarded, and his whole preliminary discourse abounds with such incoherences, such exquisite taste, such sublime thoughts, such connected ideas, such severe judgments, &c. But the intelligent principle of Jourdan is not exhausted by these efforts. He resorts to Kantism, and whether he talks sense or nonsense, I am ready to respond for his entire innocence; and I shall now show how, by the most singular evasions, he comes to his principal point, the refutation of my physiology of the brain.

"The doctrine of the plurality of the faculties, and consequently of the cerebral organs, is in my mind inadmissible. It is denied, from a false application of

the principle, that one organ cannot, at the same time, perform many offices."

The doctrine of the plurality of the faculties is not deduced from any principle; it is the result of observation only; it is the observation of the diversity of instincts, propensities, and talents of men and of animals; the observation, so confirmed and constant, of the exterior indications corresponding to the varied forms of brains, which has confirmed the belief, that the various parts of the brain are appropriated to the different faculties! If Jourdan reads my works, he will there find, in a thousand instances, these same proofs, and no longer be disposed to judge a cause before knowing its merits.

Jourdan reproduces all the objections, which he might have found answered in my writings.

Thus he says: "We cannot perceive any real difference between the objects, designated by Gall as fundamental faculties. They are the developments of the same activity, dependent on the perfection of the brain, or, in other words, on the addition, not of new parts, but on an increased quantity of cerebral substance."

According to the transcendental philosophy, the functions of the various senses are only modifications of one and the same sensibility. Nevertheless, nature has given a different nervous apparatus for each of these functions. If Jourdan finds no real distinction between the talent of poetry and the propensity to propagation, between the memory of places and the genius of induction, between the talent of music and that of construction, how can he explain why the monkey and the goat do not compose poems? why the swallow and the stork are not philosophers? or why the hog cannot sing like the nightingale? All these ideas being fully refuted in my works, it is useless to enlarge at this time upon the subject.

The *centralization* of the brain has become the favorite theory of Jourdan, Bérard, and their associates. It is

unfortunate for French glory, that this is not of French French origin. How! so sublime a discovery, so fruitful in results, and sprung from a foreign soil! Jourdan, Bérard, and their associates, have borrowed it from Carus, Carus from Okem, and all the transcendental metaphysicians of Germany have conceived it *à priori* in their sublime constructions of the universe. Let us unite our efforts, to transplant these brilliant discoveries to the schools of Paris and Montpellier. Why should they any longer trouble themselves to find the measure of intelligence in each species of animals, and in each individual? By a happy idea, the mass of all the faculties is thrown into the same bony boxes (*boites*). Weigh the contents of these boxes, weigh the brains, and you will have the intelligence of a grain, of an ounce, from one to three pounds, six pounds, always in the proportion of the cerebral parts centralized to one simple mass, equally uniform as to its existence, as to its dynamic activity, its existence in space, and its activity in time. It is, therefore, no longer a question but of the *plus* or *minus*, and the *minus* or *plus*.

The carp will build somewhat like the beaver, and the beaver will build at least a thousand times better than the bee; the sheep will kill as much as the wolf, and the elephant will be twenty times more murderous than the tiger; the frog will sing like the nightingale, which will be two thousand times surpassed by the wild boar; the dolphins and porpoises will make as much better philosophy than Jourdan and Bérard, as the centralized mass of the brain of these learned men, is exceeded by the cerebral mass of these metaphysicians of the ocean.

As to the passage which Jourdan quotes from the work of Georget, I have also done the same, and replied to it in the fifth volume of the octavo edition, p. 523.

"Add to these difficulties," continues Jourdan, "those which are presented by the limitation of dis-

tinct faculties in the midst of a mass, whose substance is every where continuous." An objection, which Jourdan will find answered in vol. II. pages 380, 383, and 391.

According to Jourdan, the objections are increased, in proportion as the hypothesis of the plurality of the cerebral organs, is taken into consideration, without mentioning the discordance between Gall and Spurzheim, the first of whom counts but twenty-seven organs, while the latter admits thirty-five.

Neither Spurzheim nor myself have ever definitely limited the number of organs; we both agree as to those we have both admitted; and if, at some future time, Jourdan should discover a new organ, by observations founded on a great number of positive facts, and on comparative anatomy and physiology, he will have the merit of having added to the perfection of the physiology of the brain. Here again, I refer him to some late details in my works, and more especially to vol. III. page 15, 4to. edition.

"It is necessary only to examine without prejudice each of these pretended faculties, to discover that they are all very complicated, whereas a faculty should be simple." Indeed, if you decide the faculty of the instinct of propagation, the love of offspring, of attachment, of self-defence, to be all one faculty, then you have faculties very complicated. All that Jourdan says of the instinct of self-preservation, of the propensity to govern, of the love of glory, is but the repetition of the same ideas which have been refuted in each treatise on a fundamental faculty, and, in particular, in the replies made to the objections of Demangéon. The views of Lamark regarding habit, have been more amply discussed than they merit, in vol. I. p. 155.

As to the results of education, which Jourdan but so imperfectly understands, in case our faculties were real, how can he understand that the eyes of the painter, the ears of the musician, the tongue

of the wine-taster, receive an education? The sight, the hearing, the taste, are not these real faculties?

"In surveying the long series of animals provided with a brain," M. Jourdan says, "we observe the circle of the intellectual faculties increase, in proportion as the hemispheres of the brain advance towards the cerebellum, which in man finally terminate by covering it entirely. Is it then credible, that the anterior part of these same hemispheres, has the privilege of concentrating in itself the most noble prerogatives of intelligence; since this part is that which is the first developed? And without attaching more importance to the posterior than to the anterior lobes, is it not exceedingly probable, even certain, that their appearance is connected with the most complete development of the encephalon, and consequently of the mind; since otherwise it would have been sufficient to produce a more extended intelligence, to have given to the anterior lobes alone a greater amplitude or thickness?"

This objection proves, as M. Jourdan says, that man has a greater tendency to believe on the faith of another, than to examine and judge for himself. When on the subject of the love of offspring, I demonstrated, that it was not true, that the posterior lobes were wanting in animals, which, as regards intelligence, are placed below man. Many animals, as the elephant, the dolphin, and apes, have the cerebellum as much covered by the posterior lobes, as man. I have shown, that this error of Cuvier, Tiédemann, and Carus, has its source in the position more or less horizontal or vertical in animals. In all females, the posterior lobes are more developed, more completely covering the cerebellum, than in males. From this, it should follow, that women excel men as to the noblest faculties of the intellect. If I desired to reason on this point, I should say, that the posterior lobes, as well as the cerebellum, were developed at a later period, because they are the organs of propensities, which are manifested much later in life, than the faculties of

intelligence. If M. Jourdan could be persuaded to read, what I have said upon the signification of a large or small development of the forehead, he would be convinced, that he never would have made this objection, if he had known my works. It is rather a great part of the middle lobes, which are wanting in herbivorous animals, as I have demonstrated by comparing the brain of a calf with that of a carnivorous animal. Vol. IV. p. 76.

"If we pass," continues M. Jourdan, "to other difficulties, our doubts will still increase. Let us admit for a moment, the opinion of Gall as to the structure of the convolutions, *although it may be apparent at this day*, that it is false and founded in a great measure on an erroneous theory of the hydrocephalus internus: we must then attribute different faculties, either to various parts of the length of the same fibre, or to the bundles made up of these fibres. The absurdity of the first supposition is very evident. [Why does M. Jourdan concern himself so much with mere absurd propositions?] As to the second, how is it credible that fibres of the same nature, which arise from the same point, which are in contact and are even intimately united with each other, can possess different faculties?"

If the first supposition were absurd, the second is false, as I have fully shown in many parts of my works. To recall to the reader one of these replies, is it not true, that, in the medulla oblongata, the different fibres and ganglia appear of the same nature, that they arise from the same point; (if M. Jourdan wishes to designate as a point a considerable extended space,) that these fibres touch each other, and that they are there as intimately united as in any other part of the brain, and that still they possess different faculties? Nothing is more unaccountable, than what MM. Jourdan and Bérard say of the structure of the brain. At every moment they betray the fact, that they have never dissected, nor witnessed a dissection of this

organ. Where is then this same point, from which the nervous fibrils of the hemispheres arise? Have they ever seen the hemispheres unfolded, that they dare to assert, that my opinion of their structure is false? Have they ever examined a hydrocephalic subject, where the brain has been found dissolved, instead of being unfolded? It must result from a total ignorance of all these physiological and pathological phenomena, that any one can still uphold the ancient errors with such conceited vanity.

"It is the development of this or that convolution," continues our learned M. Jourdan, "which builds up each faculty, as Gall says. But the beaver possesses to an high degree the talent for architecture, notwithstanding his brain is perfectly smooth; whilst the seal, whose hemispheres are furnished with convolutions nearly as numerous as those of man, manifests no capacity as to ingenuity or construction. Moreover, the beaver loses his constructive talent, as soon as he quits the society of his species. There is then something besides the greater or less development of this or that portion of the encephalon, which is the foundation of the propensities and talents of man, and animals provided with a centralized nervous system. I have added this last phrase intentionally, for it appears to me incontrovertible, that the propensities and talents are both connected with a special organization, when the nervous apparatus is composed of masses either insulated or feebly united, while, at the period when this same apparatus has acquired a marked influence over all the others, its action also assumes a character of unity, which permits the predominance of a propensity or talent, only inasmuch as it has in itself more or less preponderance. Intelligence is not the noblest attribute of cerebral action, as has been said, but it is that free will, by which the highest degree of volition is manifested, and which exacts the most perfect development and centralization of the nervous system. I defy M. Jourdan to give any

rational interpretation of all the arbitrary expressions the half anatomical, half metaphysical nonsense of the last passage. Let him first explain to me how the beaver, who, according to his statement, is still deficient in the convolutions, possesses to such a great degree the talent of architecture, whilst the seal, whose hemispheres have so many convolutions, even more numerous than man, does not manifest any capacity for mechanical ingenuity and construction; while man so often shows a passion for the mechanic arts. According to the hypothesis of the centralization, the seal should enjoy all the faculties. Some one has told M. Jourdan, that the brains of the rodentia have no convolutions, and he has believed it without further examination. If he had ever observed the brain of the beaver, of the kangaroo, and of many others of the rodentia, he would have found these convolutions; and if he had ever seen beavers when alone in a small pond, he would have learned that they do not lose that talent, which, by his statement, revives immediately when they are in company with their species. All animals in a state of captivity or wounded suspend at least for a short time, the exercise of their faculties; but they do not lose them. If M. Jourdan had read my works, he would have found the reply to this objection, vol. IV. p. 145.

The following is a similar fact that M. Geoffroy Saint Hilaire has had the kindness to communicate to me.

"There has been at the Menagerie du Jardin du Roi, for several years, a beaver. He is not of the social species like the beaver from North America, he is of the species of beaver of the Rhone, who live alone like water rats. Nevertheless, after what I have witnessed, it is evident that animals, when constrained by a new position, can find in their native qualities resources, which they can oppose to unexpected contingences.

"Our beaver at the Menagerie occupied an apartment which was never warmed. In the winter

season he was furnished with an abundance of straw, and a shutter was prepared to enclose the bars of his apartment. It happened that, one night, it was excessively cold: the shutters were not made tight, and the beaver endeavoured to obviate the effects of the severe weather by all the means in his power.

"It was customary to give him at night a certain quantity of fresh branches for food. In the morning the wood was found divested of its bark. Before closing him up by letting down the shutter, they gave him in the evening fruit, carrots, apples, &c.

"It had snowed, and the snow had accumulated in a corner of his apartment.

"These were all the materials, which the beaver had to make use of, to build up a wall to defend him from the cold and the external air.

"He twisted the branches of the tree among the bars of his cell. This was done precisely like basket work and with great symmetry. The branches thus interlaced, of course left little spaces which the beaver filled up with the carrots, apples, and straw. Each of these was cut, so as to correspond to the opening which it was required to close: and lastly, as if the animal had comprehended the necessity of covering it all with a more compact cement, he used the snow to fill the very minute spaces. The wall protected two thirds of the aperture, and he used all that had been given him in constructing it.

"It happened in the morning, that the snow, being frozen between the branches and the side of the shutter, the last adhered to the newly built wall. The shutter, however, being raised, disclosed in this manner, the wall which had been built by the beaver.

"The attendant was so astonished at this unexpected construction, that he came to me immediately without having deranged it.

"In stating the above to Dr. Gall, I have only given that which I witnessed myself."

If M. Jourdan had had even the most superficial

knowledge of the physiology of the brain, he would not have said that this or that convolution established this or that faculty. He would have said, that such a cerebral part is the organ of such a faculty, and that this faculty is the more energetic, as this cerebral part, whether it be smooth or folded into convolutions, is the more developed.

Let M. Jourdan point out to me the animals, who are provided with a *centralized* nervous system. I designedly use this term. At what period can one admit, that the cerebral parts are still enough isolated, in order that each should be connected to a special function? What is the extent of this isolation? At what distance should the nervous bundles be separated from each other? Are they sufficiently so in the medulla oblongata, in the annular protuberance, where no distinct separation is perceptible, and whose functions are so different? or are they centralized, as the advocates of centralization suppose? In what species of animals does this centralization commence? How happens it, that in man, in whom, according to your notion, this centralization is the most perfect, there is, in almost every individual, some propensity or talent, which predominates? Great architects, musicians, mathematicians, poets, voluptuaries, philosophers, &c., have then the misfortune of not possessing a centralized brain!

And as to the brains of porpoises and of elephants? let M. Jourdan show me there, the difference between them and that of man! Why do not these animals enjoy in the highest degree the self will of M. Jourdan? Centralization then is a word without sense, not founded on fact, a chimera, a monstrous offspring of the transcendental philosophy, begotten and adopted by Messrs. Jourdan, Bérard, and company, to serve them as a defence against the irresistible proofs of the plurality of the cerebral organs.

We come, at last, to the definitive judgment of M. Jourdan, as to the physiology of the brain. "If I

reject," he says, "the doctrine of the plurality of the intellectual faculties and the cerebral organs, which appears to me untenable, I do not think that there exists, even in man himself, various degrees of intelligence, corresponding to as many conditions of the brain, which produce marks of their existence on the skull, and of which the *general* form of the cranium becomes a sufficiently accurate index."

Is it to be credited, that this avowal has been drawn from M. Jourdan, from a slight attention to the different forms of the crania of men endowed with various degrees of intelligence? This redoubtable adversary understands German, and has read the concluding pages of M. Carus, from 310 to 311, which he has faithfully copied, without making the least mention of M. Carus. In the poverty of his resources, and in the security that few of his countrymen would detect his plagiarisms, he is modest enough to make a display, even of the very blunders of another. He continues, by making use of the passage from M. C. J. Carus. "But I am persuaded also, that it is with craniology as with physiognomy; and as it would be absurd to attribute idiocy to large lips or to a prominent chin, because these are often observed in the physiognomy of persons of dull minds, it is not less so to connect different degrees of intelligence with any prominence of the encephalon and its osseous covering, which, perhaps, may be noticed in a certain number of individuals, who might possess it in a degree more or less remarkable. The doctrines of Lavater and Gall rest on the same foundation, on a *petitio principii:* they must share a similar fate. We are authorized in the belief, that, as there exist in the human race as many modifications as individuals, and as the different degrees of organization remind us of those cases in which nature established, and permanently adopted in some of the inferior vertebrated animals, the general formation of the human head, should express a character resembling that, which is found in

these same animals, according as the cerebral organization, or, which is the same thing, the intellectual dispositions of the individuals, approach those which characterize them. It was in this light, that Porta* wished physiognomy to be considered, and certainly it would be more profitable in the results than the arbitrary methods of Lavater and Gall."

Here is an eminent example, where it may be well said, that the dead destroy the living. Whenever I shall wish to be admired, extolled, and even have my follies applauded, I will drown, hang, burn myself, to ensure death; and if, notwithstanding these means of destruction, my *moi* remains still condemned to employ itself in the affairs of my *non moi*, with the inanities of the world in *space*, I wish, at least, to have places and titles to bestow in *time*.

I have read both Porta and Huart.† I earnestly wish that M. Jourdan should enrich French literature with those interesting productions. They are embellished with engravings, which are very convincing of the truth of the physiologico-physiognomical principles, such as human heads of both sexes, with the jaws and ears of an ass, and foreheads like the Spanish rams, &c., &c. We read, (the page I cannot now recollect): "Those, whose foreheads are retreating, compressed, narrow, and similar to the vilest ape, are wicked, perfidious, mimics, liars, boisterous: those, with the beak of a magpie, are thieves, plagiarists, boasters: those, with large eyes and round ears, resemble rats, and are compilers: those, with sharp noses and scarcely any eyes, like the mole, they are taciturn and act by stealth." And an infinity of such things are found in those authors, equally worthy the consideration of our most renowned physiologists. I cannot conceive how I

* *De humanâ physiognomoniâ*, B. Portæ Neapolitani; lib. IV. qui ab externis, quæ in hominum corporibus conspiciuntur signis, ita eorum naturas, mores, et consilia demonstrant, ut intimos animi recessus penetrare videantur. Haver, 1593. *(Note by M. Carus.)*

† Uber die Prufung der Kœpfe.

could so far have forgotten the previous lessons of Porta and Huart, as to have written in vol. iv. p. 284, of my large work, and vol. v. p. 429, of the octavo edition, a treatise on physiognomy and pathognomy, in which I have urged the absurd idea, that there is some difference between the signification of an aquiline or flat nose, large or contracted lips, and a defect or development of a part of the brain: lips impart to us the delights of a kiss; all the world is aware of the great advantage of a nose; but of what use is the cerebrum and cerebellum? at most, (the discoveries of the new physiology lead to that belief,) but to serve to make the miserable race of man walk forward or backward.*

Journal Universel des Sciences Medicales, vol. xxx. p. 309.

Let us now attend to the opinion of M. Boisseau, on the work of M. Tiédemann, and the preliminary discourse of M. Jourdan.

M. Boisseau says, p. 311: "In reading the work of M. Tiédemann, published in 1816, we shall be astonished, undoubtedly, to find in it a remarkable resemblance to the work of M. Serres, announced since 1822, at least judging of it from the report of the illustrious perpetual Secretary of the Royal Academy of Sciences. We make this remark the more willingly, because no one will deduce from it any conclusion unfavorable to M. Tiédemann, who could not foresee, who could not anticipate, (as it is now seven years since,) that that, which he had discovered already, would be, some years after, discovered by one of our associates."

When nations make war, pillage is justifiable. Now

* The discoveries of the functions of the cerebrum and cerebellum, are well known, viz. that the first is destined to make the animal walk forwards, and the last backwards.

the learned, who are bent on discoveries, are constantly at warfare with each other; therefore, they should have the right of plunder, and, in this respect, the low malice of M. Boisseau is truly national.

It matters not, whether it is M. Tiédemann who has plundered M. Serres, or M. Serres, M. Tiédemann, or M. Tiédemann, M. Carus, or Messrs. Carus and Tiédemann, Messrs. Gall and Spurzheim; the facts remain; the world, the common country of the learned, loses nothing. It is thus, that a few years before the publication of my large work, I taught in my lectures, that, according to a great number of experiments, the medullary fibres, remounting from the genital parts along the spinal marrow, as far as the cerebellum, decussate like the anterior pyramids. I have recorded those same observations and the same deduction, in the third volume, p. 115, in 4to., printed in 1818. Since the end of September, 1823, Messrs. Serres and Flourens have disputed the priority of this discovery. It then follows, that I have seized the property of these two experimenters. My criminality has been known to them for several years; for, M. Flourens has himself inserted some articles on this same work, in the Revue Encyclopédique, September, 1819, and March, 1820. But, instead of finding fault with me, they have substituted another purloiner instead, who has been, at least, two hundred years guilty of non-appearance. The most of those authors, who have written since the publication of my works, and who have treated of the same subjects, have exercised the same kindness towards me.

M. Boisseau cites a few anatomical facts, some of which accord with my views, and others are in opposition. I shall reply to them all, after having first explained the ideas of M. Boisseau, who continues:

"The reader will not do justice to the merit of the work of M. Tiédemann, from so slight a sketch; he has only seen, that, to judge of the anatomical system of M. Gall, it is necessary to be acquainted with the

labors of his celebrated associate. M. Tiédemann endeavours to refute it in many particulars by facts, which overthrow his principal anatomical propositions; it is known that, unhappily for his physiological opinions, M. Gall pretends, that both are so connected, that the first cannot be refuted without destroying the last. It is for him to defend himself against an attack directed to the very foundation of his doctrine; it is surprising, that, since 1816, he has not attempted it, and more astonishing, that, in 1817, the work of M. Tiédemann was known in France, by an analysis of M. Jourdan, in this journal. The author announces that he has the brains of fœtuses of every period, to convince, if necessary, those who might be incredulous of what he has advanced. 'I think,' says he, 'this method indispensable at a period, when, unhappily, things are described and figured, of which nature never has furnished a model.' We agree with the translator, that the work of M. Tiédemann is one of the most remarkable which has appeared for a long time; uniting it with that of M. Chaussier, on the encephalon of the adult, it forms an anatomical monograph of the human brain."

This passage gives me an opportunity to make several elucidations, which I will render at the same time instructive. To judge correctly of my anatomical system, it is proper to know the excellent work of M. Tiédemann; it is well to know also the works of all those, who have written and are writing on the same subject; it is, above all, indispensable to understand my method of examining the brain, and my discoveries. But it is not sufficient to know, that one author says no, or that his predecessor has said yes. If individual authority is to determine it, I think myself as much entitled to this right, as any one else. No one has examined so many brains as M. Spurzheim and myself. All our predecessors sliced this noble organ into a thousand pieces, and were satisfied with making mechanical and minute descriptions of its different

parts. I put myself above all authority. I have broken the ice, and have established a method of philosophical and physiological dissection, founded on the gradual perfection of animals, and on the laws of the organization of the nervous system. Every day experience proves that, whenever this method is abandoned, uncertainty and error are the sure results. At one time, for example, a part derives its origin from a superior part, and is directed towards an inferior part; at another time, the reverse. Sometimes, the ganglia are simple enlargements, at another, they are the apparatus of reinforcement; now these same ganglia are placed at the commencement of the nervous apparatus; at another, they form their completion; sometimes, the gelatinous, or non-fibrous substance, gives origin to the white fibrous substance; and sometimes, this has an independent origin, &c. &c.

We have repeated the same experiment hundreds of times, to dispel the doubts which still remained in our minds; while M. Tiédemann, according to his confession, has only made his dissections on the same object two or three times. And when, after multiplied examinations, we could not sustain a particular opinion, we have frankly avowed it. Lastly, those only, who have never made examinations of brains, cannot believe, that a certain preparation, such as the maceration in alcohol, the boiling in oil, can render the parts so distinct, that the anatomist can trace, without interruption and without rupture, the origin, continuation, reinforcement, the peripheric termination, or final distribution of the nervous fibrils. I shall prove, that M. Tiédemann is often mistaken, even in things the most distinct, and that very often he has determined with precipitation, points, which apparently will for ever remain undecided. Is it, then, astonishing, that he reproaches us with having described and figured things of which nature never furnished the model? He says, to prove the accuracy of what he advances, he preserves the brains of fœtuses of every

month. We have done more; we have dissected the brain before thousands of witnesses, before anatomists the most skilful in the investigation of the organ, such as Reil, Loder, &c. We have made this dissection, as well in our public as our private lectures; and I invite all those, who wish to know the truth, to witness this same demonstration; I will do it as many times as they deem it necessary. After that, they may determine if our engravings of the brain are not conformable to nature. Undoubtedly those, who have never seen the unfolding of the hemisphere, and the two orders of nervous fibrils, diverging and converging, cannot comprehend, and do not succeed in making those preparations. M. Spurzheim and I are no longer alone; there are already a large number of young anatomists, who are perfectly competent to defend our discoveries against all attacks, and this number is daily increasing, by the lectures which we are constantly delivering. If Messrs. Tiédemann and Carus had attended one of these lectures, they would have united their assent with that of M. Loder and Reil; and they and Messrs. Jourdan and Boisseau would be convinced, that, to form an anatomical monograph of the brain, they must rectify many of their opinions, as already we have shown many errors in the work of Chaussier.

Let us rectify another error of M. Boisseau. This savant represents me as asserting, that my anatomical and physiological opinions are so united, that the first cannot be destroyed, without, at the same time, demolishing the last.

I used the following expressions on this subject, in our reply to the report made by the committee of the French Institute, on our memoir, presented to this learned body the 14th of March, 1808,* p. 244, &c.

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* *Researches on the nervous system, in general, and the brain, in particular:* — Memoir presented to the French Institute, followed by observations on the report, made to that body by its committee.

After having shown, that there are but few cases, where the structure of parts designate to the anatomist, the functions which depend on them, I say:

"We must have recourse to other means. Usually the knowledge of functions precedes that of structure. It certainly is not necessary to understand the structure of the eye, or the organization of the optic nerve, in order to know that it is the organ of vision, &c. It is without anatomical dissection, that we ourselves have made most of our physiological discoveries; and these very discoveries might have existed for ages, without their correspondence with the structure of the brain being perceived. On the other hand, supposing that the knowledge of the organization had preceded that of the functions, it would have given rise sooner or later to conjectures, which infallibly would have been stamped with the prejudices of the age. Formerly, the seat of courage, love, sympathy, and cruelty, was placed in the heart; and after the same manner, the liver was assigned as the organ of anger and sensuality. If anatomy had been an unerring guide to the knowledge of the functions of the different parts, would Willis have caused the *vital spirits for motion to be secreted in the cerebellum?* Would Galen have attached the organ of smell to the anterior ventricles? Would the soul, alternately dislodged from the pineal gland, the corpus callosum, the annular protuberance, &c., have been placed by Sœmmerring in the vapor of the ventricles, and by Ackermann in the medullary substance, which lines the interior of these cavities, &c.? Would the memory have been placed in the grey substance, and the judgment in the medullary substance, of the hemispheres?

It might be expected, that anatomists, seeing the great diversity of the constituent parts of the brain, would have been the first to have deduced from it the diversity, and consequently the plurality, of the organs of the intellectual and moral faculties. But

when we observe that, even at this time,* Vicq-d' Azyr, after having made up the parts of the human brain, by ascending from insect to man, and afterwards analyzed it by passing from man down to the insect, has still admitted only a single organ of the soul, we are taught by experience, how very little the mere knowledge of a mechanical structure avails the physiologist. It is only by observing the phenomena of nature, regardless of the prejudices or vagaries of any metaphysical system whatsoever, that we can attain a correct knowledge of the structure of the brain, and of the nature of its functions. Herder, struck with the phenomena of the understanding in the various animals and in different individuals, conceived the idea of a plurality of intellectual organs, and even the hope of some day discovering them, by an attentive comparison of their brains with their peculiar qualities.

"A vast number of physiological and pathological facts should be collected, embracing many years, before any rational deduction can be made, as to the laws of the organization of the brain and the nervous system generally. But what could be the use of all these facts, if we had not previously supposed, that there was an intimate and necessary connexion with their material conditions? It is in this manner, prepared by physiological and pathological observations, that we have made, in a short time, discoveries, to which the scalpel would never have led us. And it is precisely the perfect accordance of intellectual phenomena with material conditions, which ensures a lasting duration of our anatomical and physiological doctrine of the brain.

"To say that the discovery of the functions of the brain is made independent of the knowledge of its structure, or that these functions have no immediate and necessary connexion with its structure, is a very

* And again that even now the metaphysical physiologists see in all these parts but one centralization of a single organ.

different thing. Can any one advance that motion and secretion have no relation to the organization of the muscles and viscera; and that digestion and the circulation of the blood have not an inseparable affinity with the stomach and the heart? &c.

"A doctrine of the functions of the brain, if it is in contradiction with its structure, must be necessarily false. If it be proved, that the brain is composed of glands, a secretory or excretory organ, it then is incapable of any superior function, and is to be classed with the other viscera. If it be a central point, where all the medullary fibrils which are found in all animals, can be demonstrated, notwithstanding their various and more or less numerous faculties; a cerebral mass always similar, then the plurality and diversity of the organs is overthrown. Whoever can show that the brain is only the origin or the central termination of all the nervous systems, will also have proved, that its functions are similar to those of other nerves. If a constant and invariable identity, in the constituent parts of their brains, can be proved to exist in different individuals of the same species, notwithstanding the gradual difference of their common faculties, then it would be impossible for us to assign their localities to organs, by comparing the predominance of their physical development with the predominance of their pyschological energy. It is in this way, by placing the principal points of our pyschological doctrine in direct opposition with the organization of the brain, they would destroy its foundations and annihilate it with all its conclusions. But, if it be true, that the constituent parts of the brain, from insect to man, are multiplied and vary in the same relation and proportion as the faculties; that all facts go to prove that the extraordinary energy of one faculty corresponds to an excitement or to an extreme development of some parts of the brain; that the derangement of a faculty is caused by the lesion or the disease of a cerebral part, in the same way that the pain or the

loss of a sense is connected with the lesion or the disease of its physical apparatus; if, lastly, it is true that the brain is composed of a nervous system, different from all others, and divided into many other systems so distinctive, that the diversity of their origins, their bundles, their directions, their terminations, their points of union, may be demonstrated to the eye; then it is a fact, that the anatomy of the brain has an intimate connexion, and is in perfect accordance with the doctrine of its functions."

These passages, the substance of which has been repeated in several places of this edition, should have taught M. Boisseau, that the physiology of the brain has never been predicated on its anatomy, and that I have never maintained as facts, that the gelatinous substance is the nutrient matter of the nerves, nor as to the diverging and converging fibrils of the hemispheres; the principal points which Tiédmann and his followers pretend to have refuted, and the reality of which I shall soon show.

It is true, that we explain, by the duplicatures of the convolutions and their unfoldings, that the intellectual and moral faculties continue in hydrocephalous cases, which is denied by these gentlemen. As they have never witnessed this unfolding, and as apparently they can render no solution of this phenomenon, they have passed it by in affected silence.

M. Boisseau finishes his review of the preliminary discourse of M. Jourdan by a very lofty eulogium. "This discourse," says he, "presents a very happy application of the German philosophy, divested of its obscurities, to the physiology which is the boast of the French school."

If ever M. Jourdan succeeds in divesting Kantism and its excrescences of their obscurities, *magnus mihi erit Apollo.* When M. Boisseau quotes the pride of the French school, does he allude to the concentration of all the parts of the brain in one single organ; to the large base of M. Lamark; to the masks

of monkeys, tigers, sheep, and owls, of Porta, Huart, and Jourdan? In short, I am of opinion with M. Boisseau that M. Jourdan, although very often inexact, is, however, a tolerable translator. He would do better to confine himself to his vocation, to furnish us translations, but not to write a preliminary discourse.

ANATOMY OF THE BRAIN, *containing a History of its Development in the Fœtus, with a comparative Exposition of its Structure in Animals:* by F. TIEDEMANN: Translated from the German by A. J. L. Jourdan; with 14 plates. Paris, 1823.

I have in another place commended the works of Messrs. Carus and Tiédemann. If M. Carus had not encumbered his positive knowledge with the bombastic transcendental philosophy; if his inflated style, his accumulated participles, and gigantic phrases had not at every moment put the attention of his reader to torture, he might have been regarded as the origin of the work of M. Tiédemann, which is much better written. I have a high opinion of the merit of these two authors: I much prefer the nature of their researches to the barbarous and fruitless mutilations of our young physiologists. But, certain authors, who are not more capable of determining the errors than the truths of the anatomy of the brain, pretend to discover, in the researches of M. Tiédemann on the brain of the fœtus, not only a refutation of our anatomical discoveries, but also of all the doctrine of the functions of the brain and its different parts. It is apparently under this pretence, that they oppose to me my two estimable countrymen, and compel me to my defence. I accept the challenge, when the interests of truth are at stake.

Advantage of Comparative Anatomy.

M. Tiédemann justly insists on the great advantages to be derived from comparative anatomy, in order to understand the structure of the brain. "Comparative anatomy," he remarks, "explains to us the origin and successive formation of the nervous system and the brain, from the most simple to the most complex of animals, and to man. There is no apparatus of organs, in the formation of which so perfect a gradation, from the simple to the complex, is found, as in the cerebral and nervous system, which is established on a uniform plan in the whole series of animals. It is by studying the gradual composition of the structure of the brain in animals, that we attain a distinct idea of an organization, so complicated as this viscus in man, and thus we finally can comprehend the arrangement and connexion of its parts.

This is precisely one of the principles I adopted, in the study and exposition of the anatomy of the human brain, and which, since the publication of this work, has served as the basis of so many other anatomical treatises, and among others of those of Messrs. Carus and Tiédemann, &c. But M. Tiédemann accuses me of having only described and figured, in relation to the nervous system of animals, the nerves of the caterpillar, and the brain and the spinal marrow of the hen and some of the mammalia; and he thinks, that no axiom relative to any point of anatomy or physiology has any foundation, when it is not ingeniously deduced from *all* the facts and observations, having any relation to the object in question. M. Jourdan makes M. Tiédemann say, *of all the facts*, which would for ever preclude a knowledge of the anatomy of the brain. M. Tiédemann speaks only of a very great number of facts as necessary (*ans der Fulle der Thatsachen*), which is much more reasonable. At the time when M. Tiédemann published his work, he could have

known the contents of my first volume only, which contains the anatomy of the brain. But if he had read it attentively, he would have found that, in many places of the text, the comparative anatomy of many animals is alluded to, without designating all these particularities. My design was not to publish a complete comparative anatomy: I only wished to make use of as much as was necessary to establish certain and immutable principles, as to the laws of the organization of the nervous system, in general, and the brain, in particular. This I accomplished; for, all that I have seen since in the brains of different animals, and all the recent works of other authors, on the same subject, have not overthrown one of these principles. As M. Tiédemann is no less persuaded than myself of the uniformity of the plan of nature in the formation of brains, why are such an infinity of facts necessary for him to make deductions of general laws? What would be the exact number required, for an anatomist to establish an axiom or a principle?

After these reflections, I hold it of much greater importance for me to apply the comparative anatomy of the brain to its physiology, than to the simple descriptive anatomy. There are found, therefore, at the exposition of each organ, numerous observations on the difference of the human brain, when compared with the brains of various species of animals, and with each other. For a long time I have been convinced of the same thing, that M. Tiédemann has just remarked, that "we need a comparative psychology, in order to understand the uses of the constituent parts of the brain; that it is required also, that the phenomena of the cerebral action should be carefully observed, from the lowest rank of animals to man, and that afterwards they should be compared with the structure of the organ itself. This comparison of the actions with the organization of the brain, in the various animals, will unfold to us the functions of each of its parts." As M. Tiédemann adds that, even now we are defi-

cient in such knowledge, it may be the case, that he may have wholly forgotten the lectures that I gave at Heidelberg, and in nearly all the universities of Germany, and that he has not read any of the multiplied extracts, which have been made by MM. Froriep, Walter, Blœde, Ackermann, Muller, &c. &c., nor even the whole of the first volume of my large work.

Undoubtedly this method would be efficacious, if it were practicable; but we must first have an exact idea of the mechanical aptitudes, instincts, propensities, and talents in general, and of the moral qualities and intellectual faculties of animals and man. The connexion between the actions and the structure of the brain, which is not founded on the physiology of that organ, will be of no advantage to any philosophy. This method would be absurd in any system, which admitted only a single faculty, infinitely modified; which gave to all the cerebral parts the same function; where it is even overlooked, that in the different species of animals, the masses of the brain equal in weight and volume, should necessarily have a peculiar structure, and, consequently, functions totally different. All comparative anatomy and physiology is at fault in the supposition, that the weight and volume of brains are the standard of the number and energy of their functions; or, in other words, that the functions are as much more in perfection, as the mere voluminous cerebral masses constitute a more concentrated centralization.

Is the whole Nervous System formed at the same Time?

M. Tiédemann says; "The history of the formation and devolopment of the encephalon in the fœtus is another part of anatomy and physiology, which has been equally neglected until very lately. The sagacity

of Harvey had led him to the discovery of a law, the correctness of which the Germans have recently proved, and, according to which, the fœtus, as well of man as of animals, is not at first provided with all its parts, which would be only less developed; but that it commences by having a simpler form, and passes through several successive degrees of formation, before it attains its greatest perfection. Would not a similar progress take place, I thought, in the structure of the brain of the fœtus? and cannot we infer from thence the successive formation and structure of this organ, which, in its perfect state, presents so complicated an organization?"

In the report on our memoir by the Committee of the Institute of France, they say, *In the nervous system, all is formed simultaneously.* At that time I refuted this proposition at some considerable length.* The following is another similar to it.

"Is it then certain, that in the living organism all the parts are formed at the same time, so that we can speak of a development and increase, but not of an origin, formation, and successive perfection and completion?

"We cannot engage ourselves with the hypotheses of the theory of *preëxisting germs*, of their development or evolution, nor of generation or production so often renewed. In admitting laws, according to which an organizing tendency (*nisus formativus*) is inherent in all beings, and after which all the parts tend to form a whole, we have no occasion to have recourse to germs, generally diffusive. The crystals of salts, stones, metals, are they entirely formed simultaneously, or do they form gradually? The bud, the flower, the pollen, the fructification, the fruit, the seeds of trees, are these all formed at the same period? or, do each of these parts successively arise? If the

* *Researches on the nervous system*, with observations, &c. pp. 149, 150. 1808.

lime tree and the oak extend their branches from every part; if the aquatic lizard reproduces his tail, his feet, and eyes; if the snail, his head, and the crab, his claws; who shall persuade us that, in these cases, the germs were confined and awaited their deliverance? How does it happen that, as the more or less nourishment is given to these germs, we can modify them and make them produce spontaneously leaves, branches, flowers, and fruits? How do the stamens transform themselves into petals, the pistils and capsules into stalks, and the calix, into leaves? How does the larva of the working bee become, solely by the influence of surrounding circumstances, a queen bee? The same substance, which serves as nutriment to the plant, fish ,bird, dog, and man, is changed into the constituent parts of all these beings, and is transformed into seed, by which each propogates its kind; are the complete germs of all these beings and their constituent parts, contained in this alimentary substance? The incubated egg has its different periods of formation. It is natural to suppose, that the formation of the vessels precedes that of the other parts. The head and trunk are visible a long time in the fœtus, before the extremities begin to develope themselves; the intestinal canal acquires by degrees its length and development; if the osseous substance is engendered and secreted at so late a period, if the teeth, at an age so advanced, what is there to prevent the successive generation and origin of other parts? In a human fœtus of about six months, the nerves of the vertebral column, the muscles of the eye and the tri-facial nerves are sooner formed than the olfactory nerve, and the latter before the auditory, the optic, the pyramids, and the annular protuberance, in which scarcely any traces of nervous filaments are perceptible. The peduncles of the brain, on the surface of which the bundles of fibres are so distinct afterwards, at this time appear to consist only of a mass of gray substance; the optic thalami, corpora striata,

and the hemispheres do not contain any distinct filament, (without preparation and to the naked eye); they are discovered sooner in the posterior and middle, than in the anterior lobes, &c."*

Thus, as regards the successive formation of the various cerebral parts, I perfectly coincided with Carus and Tiédemann, in 1808 and 1810, and their excellent writings gave me much more gratification, as I was already familiarized with this ingenious and fruitful idea. But, without intending to undervalue the advantages to be derived from the examination of the fœtal brain in its different ages, I have always inclined to the opinion, that the study of the brain of the various classes of animals below man, is a surer method of attaining a knowledge of the general laws of the organization of the nervous system and brain. No other means would be necessary, if the opinion of Carus, Tiédemann, and several German anatomists be true, that the successive formation and development of the human brain, passes through all the degrees of formation and development of the brains of animals, always becoming less and less complicated. But some inferior animals have several cerebral parts, which are not found at any period in the brain of man. M. Carus himself has advised anatomists not to give too much weight to this supposition, so specious in theory, and so frequently false in reality.† A practical discernment is required, to obviate premature conclusions, and it is indispensable to rectify in the superior classes that, which may appear to be apparent in the inferior. I would wish, then, that the successive development of the brain should be studied mostly in the fœtus; but, to know the true structure of this organ, the continuity and connexion of its parts, the direction and the varied interlacings of its fibrils, their origins, rein-

* *Anatomy and Physiology of the brain*, &c., Vol. 1. p. 240. 1810.

† Versuch einer Darstellung des Nerven Systems und insbesondere des Gehirns, p. 262.

forcements, and expansions, &c., I should always prefer either the adult human brain, or brains less complex, but more or less analogous to it.

This preference is fully justified by the success which I have obtained, in comparison with that of Carus and Tiédemann. To judge of it from the great number of inaccuracies and erroneous results, disseminated in their works, it appears to me doubtful, if they could have discovered with any accuracy from the inspection of fœtal brains, had they not previously known my anatomy of the brain, and the principles on which it is founded. Would they not, like all their predecessors and the brothers Wenzel, have described minutely and without any order, the forms and their modifications, each little hollow, each furrow, &c. &c., instead of tracing out the continuity of the fibres, the mutual connexion of parts, their use in the vegetative life, &c. &c. ?

In order to prove, that the examination of the fœtal brain is far from being sufficient to an understanding of the structure of the parts, I will give a few examples. M. Tiédemann, when speaking of the medulla oblongata, only describes three nervous bundles on its anterior surface; the pyramids, the corpora olivaria, and the bundles or peduncles of the cerebellum. If he had compared the medulla oblongata of the fœtus, with that of the sheep or the ox, &c., he would have perceived, that, on each half of the same surface there are six very distinct and visible bundles; therefore, the brain of the fœtus does not in all respects exemplify the gradual composition of the human brain. The same bundles also exist in man, but they are concealed by others, which are larger in man than in most animals.

The inspection also of the human fœtal brain has not revealed to him the large transverse band below the annular protuberance, surmounted by the pyramids, which is very distinct in nearly all the mammalia, and is covered in man by the inferior third of the large annular protuberance.

M. Tiédemann assumes that the corpora olivaria constitute a bundle, which goes to form the tubercula quadrigemina, at the same time that the tubercula are in connexion with a particular bundle, situated between the corpora olivaria and the peduncles of the cerebellum. M. Tiédemann, with his critical acumen, should have been aware of his error. He has seen that the tubercula quadrigemina form already a large mass, before even the corpora olivaria exist. He might have seen that the corpora olivaria, either do not exist at all in most animls, or are scarcely visible; yet still their tubercula quadrigemina are larger than in man; as for instance, in the horse, ox, &c. With more attention, he might have seen, that the corpora olivaria are not a bundle, but a ganglion, which is seen at a later period than the bundle of the tubercles, and which produces a particular bundle which goes into the two great cerebral ganglions, the optic thalami and corpora striata. An inspector of the brain of the mole, and a perusal of our anatomy of the brain, where we have treated of the corpora olivaria, would have convinced him of it.

According to M. Tiédemann, the two anterior pillars of the fornix, produce two very thin lamellæ, which go to the inferior surface of the corpus callosum, and give origin to the septum lucidum. This is an incorrect view of it. At the anterior termination of the innermost convolution of both middle lobes, there arises a fibrous bundle, mingled with a grey substance of only a line in breadth, and which often forms a kind of band, at the anterior internal part of the great fissure between the anterior and middle lobes. This bundle goes towards the median line, proceeds onwards above the reunion of the optic nerves, immediately before the anterior commissure, is ramified and expanded on the interior border of the hemispheres into a thin membrane, and, united with that of the opposite side, forms the septum. The filaments of this nervous membrane pursue a diverg-

ing direction from below upwards, and terminate by intermediate fibres in the median line of the great commissure,* which, divided perpendicularly in its median line, exhibits in its whole thickness the same radiated expansion, as described, p. xi.

The transverse bands or interlacings, and the interlacing in the median line of the annular protuberance of the great commissure, are wholly unknown to him. See my large work, Vol. I. p. 314, in 4to.

M. Tiédemann, always vague in his principles, takes, in pages 107 and 165, the vermiform eminences for the commissures. With what foundation? At another time, the annular protuberance is, in his opinion, the commissure of the cerebellum. When the vermiform process is single, as in birds, &c., how can it then be at the same time both cerebellum and commissure?

I cannot tell how MM. Carus and Tiédemann have conceived, that I regard the posterior parts of these tubercles, as being the roots of the olfactory nerve. "As the nervous bundles, I remark on the same page, take the same direction as those of the optic nerve, it might be supposed, that it is prolonged in the nervous layer, to which the olfactory nerve is united at the point of its separation. But this opinion seems to be contradictory to comparative anatomy, at least, in the present state of our knowledge. These tubercula quadrigemina are found in the dolphin and porpoise, in whom no olfactory nerve can be detected." Since that time, I have been convinced, that the posterior pair is a ganglion of reinforcement or of increase for the visual nerve, like the anterior. The manner, in which these two pairs contribute to vision, must be different, as, in the various species of animals, they are in different proportions; and as, even in other species, the posterior pair is either scarcely visible, or wholly

* M. Tiédemann has quoted only the four last lines of this passage, taken from my large work, Vol. I. p. 313, in 4to.

wanting, although vision may be perfect, as for example in birds.

Page 176. M. Tiédemann commends the opinion of Reil, that the number of the branches of the cerebellum and their divisions, or subdivisions, increase in the ratio of the progress of the animal organization towards perfection. He adds, that, from these facts the observations of Malacarne may be plausible, by which he attempted to establish an intimate relation between the number of the laminæ of the cerebellum, and the extent of the intellectual faculties of the human race. That physician found them much less numerous in idiots, than in persons distinguished by force and brilliancy of mind. Ideas of perfection are relative. The cerebrum and cerebellum of the elephant and dolphin are more complicated, and are composed of more convolutions than the same parts in man. In the eye of nature, perhaps, they are more perfect than in man, and it should be so, if Reil and Malacarne are correct. I wish to know, how often Malacarne has repeated his observations, in what manner he has counted the laminæ of the cerebellum, and whether, at the same time, he has observed the cerebrum. The cerebrum is defective in most idiots, and often the cerebellum equally so; but I have seen many idiots, as regards their intellectual faculties, whose cerebellum had acquired an enormous development, and who were addicted to the most brutal salacity. Why, then, this ready credulity to the assertions of some, on the authority of a single erroneous observation, while experiments, a thousand times repeated and confirmed throughout the whole animal kingdom, are disregarded? Moreover, imbecility is not the result of a defective organization solely; the functions of the cerebrum may be impeded by other indispositions; for, frequently, we see idiocy with an apparently perfect organization from birth.

M. Tiédemann remarks, page 223, "that when a fresh brain is examined, of a subject of seven months,

that a difference is not so perceptible between the white and grey substance of the corpora striata, as in the encephalon of an adult, and that these bodies are formed of an uniform and reddish mass, in which many vessels are ramified. The name, therefore, of corpora striata, is not applicable to them in the fœtus."

In this instance, again, the corpora striata are not exceptions to all the other parts of the cerebrum. M. Tiédemann is well aware, that, during the period of formation, the pulpy, non-fibrous substance is more abundant than at a later period; and that, in general, the white fibrous substance cannot be visible before it is formed by the grey substance, and the great number of blood-vessels which primarily form this last. The name of corpora striata was never appropriate to these great ganglions. There were never white striated lines alternating with grey. The nervous bundles are composed of a very large mass of pulpy, non-fibrous substance, of the size of a small pullet's egg, by the union of an infinity of minute filaments which there arise, and these bundles cross this large mass, which is in fact the great superior ganglion of the cerebellum, in a diverging manner, like a fan. M. Tiédemann is only aware of the existence of a smaller portion of this ganglion, which is seen in the ventricles and called the corpora striata. He is ignorant of its larger external portion, which is directly connected with the internal, and which is enveloped in an isolated place, covered with minute convolutions, concealed by the middle lobes. Consequently, we can only discover, after having scraped the pulpy substance either in the ventricles or in the opposite side, the striated, white nervous bundles, more or less large, as the convolutions, which they form by their expansion, are more or less considerable. Usually the bundles, which take a direction towards the posterior lobes, are stronger in animals, than those which go to the smaller anterior lobes.

Page 247. M. Tiédemann says, that the brain of monkeys is larger and more arched than the brain of the marten, fox, cat, dog, hog, sheep, goat, ox, horse, hind, and the stag; that the convolutions and anfractuosities, are more numerous, than in the animals just enumerated. The brains of the largest monkeys are very similar to those of dogs. None equal in size the brain of the horse, not even that of the ox or stag. The orang-outang's is like a new-born infant's,* that of the chimpanse is smaller, fig. 1; their convolutions and anfractuosities are not near as numerous as in the hog or ox. When, with Baron Cuvier, it is said, that, excepting the chimpanse and the gibbon, we do not find convolutions on the posterior lobe, we have only to refer to the brain of the orang-outang and the guenon, Pl. LXXVII. fig. 1, to disprove the assertion. And when M. Tiédemann repeats, in page 248, that the brain of the adult man is distinguished from that of all animals, by the volume and height of the hemispheres, and by the greater number of the anfractuosities and convolutions, I refer him to the brains of the porpoise and elephant, Pl. XXXV.

Page 294. M. Tiédemann adopts the opinion of several anatomists, viz: that all animals, including even the mammalia, with the exception of the quadrumana, are destitute of the posterior lobes of the cerebrum. I have rectified this error in another place. As, by this supposition man and the quadrumana alone possess the posterior lobes, what would be the faculty or propensity that the latter have in common with man only? This is another happy effect of the mechanical inspection of the brain, instead of attending to physiological principles.

I have already repeatedly rectified the translation of M. Jourdan. The following extract shows his intention. M. Tiédemann, page 212, compares one of my opinions with that of Reil. "M. Gall," he

* Atlas of the large work, Pl. XXXIV. fig. 2.

remarks, "rightly deriving the optic nerves from the tubercula quadrigemina, considers the optic thalami as the organs of reinforcement of the peduncles of the cerebrum, and gives to them the name of great cerebral ganglions, to distinguish them from the corpora striata, which he calls the little ganglions. According to him, their use is to increase the volume of the pyramidal bundles, which traverse them, by furnishing them with cortical substance and new medullary fibres. Reil affirmed, that they formed a sort of protuberance, placed on the internal side of the cerebral peduncle, and that they serve to concentrate its fibres into a single focus or centre, whence they diverge afterwards into a great circle formed by their expansion in the whole cerebrum. According to his view, they were organs, which went to form but the fibres of these cords, which, taking a direction from behind forwards, become radiated in the posterior lobes, that is to say, he assigns for their use, the forming of the retrograde radiation, that they are the centre of the organization of the cerebral peduncles, the focus of radiation in every direction.

"None can refuse their assent," continues M. Tiédemann, "to these ideas (M. Jourdan translates, *to the ideas of Reil*), when it is recollected, that the cerebral peduncles really acquire an increase of size, in crossing the optic thalami, on leaving which, they disseminate in the hemispheres of the cerebrum many more fibres than they were composed of, when they entered them. The increase of these two cords is effected by the numerous sanguineous vessels, which cover the optic thalami, and is the result of a great separation of the cerebral substance, (*non-fibrous*,) whence new medullary fibres arise. The multiplicity of the sanguineous vessels, in the optic thalami is proved by the abundance of the cortical substance, which is formed there, and which has a texture much more vascular than the medullary substance, as all anatomists allow: this great influx of blood is evidently to permit a

greater increase of the eminences, and to communicate to them more activity, by a more abundant supply of nutritive matter."

It must be evident to those, who have read the beginning of this passage, and who are acquainted with my principles respecting the laws of the organization of the brain, that M. Tiédemann has fully adopted my views, as he must do, as a rigid observer and acute anatomist. Why does M. Jourdan insinuate, and even distinctly affirm, that M. Tiédemann has adopted the opinion of M. Reil? In fact, the ideas of Reil, so sagacious in other respects, are no way admissible. The concentration of the fibres of the peduncles into a single point, does not increase the volume; it does not aid in their expansion, which is better effected by the transverse bands, the consideration of which remains still neglected.

M. Jourdan further mutilates the text of M. Tiédemann, when he represents him as saying, that I give the name of *great* cerebral *ganglions* to the optic thalami, to distinguish them from the corpora striata which I call the *little ganglions*. M. Tiédemann says, in conformity to my work: "According to M. Gall, the optic thalami are ganglions to the cerebral mass, and he calls them the great *inferior* cerebral ganglions, to distinguish them from the corpora striata (the great superior cerebral ganglions)." * The same intention is shown, p. 229, where M. Jourdan translates Reil and Gall, instead of which M. Tiédemann says, Gall and Reil. The first, (who is myself, acccording to Tiédemann, and who, quoting from Jourdan, is Reil,) gives to the corpora striata the name of great superior cerebral ganglions, and the other calls them, great external cerebral ganglions, as Reil has shown us in his demonstrations at Halle. Such gross mistakes of a translator induce the belief, either that he

* Tiédemann, l. c., p. 130. Antomie and Bildungs-geschicte des Gehirns im fœtus des Menschen.

is a stranger to his subject, or that he designedly errs.

It is not my intention to rectify all the errors of the work of M. Tiédemann, in other respects a very important one, nor all the faults of the translation of M. Jourdan. It will be sufficient to maintain the three principal points, in regard to which M. Tiédemann and myself are at issue. The first, that the white fibrous substance does not arise from the pulpy non-fibrous substance: the second, that there are not two different nervous systems, one converging, the other, diverging: the third, that the unfolding of the convolutions of the hemispheres does not take place.

Is the Doctrine tenable, that the white Fibrous Substance of the Nervous System arises from the Pulpy Gelatinous and Non-Fibrous Substance?

Let us begin with the medulla spinalis. M. Tiédemann says, p. 128: "It is easily ascertained at an early period, in the second, third, and even in the fourth months, that the canal of the medulla spinalis has, in proportion to the thickness of the coats of the medulla, much greater size than afterwards. The contraction which takes place, by the increased development of the embryo, is caused by the deposition of a new substance, formed by the pia mater, the materials of which are derived from the blood sent from the heart, and which, increasing the size of the coats of the cylinder, must necessarily diminish the calibre of the central canal. This substance is soft, reddish, and filled with numerous minute vessels, in the course of the two last months. It cannot be doubted, from the above, that the cortical substance of the medulla spinalis has an origin posterior to that of the fibrous medullary substance, and that it is placed from within outwards, on the surface of the latter. Therefore, Gall's opinion is erroneous as respects the medulla

spinalis, who pretends, that this same cortical substance is formed anterior to, and is the matrix of, the the medullary; for, the roots of the spinal nerves are already perceptible in the second and third months, although, at this period, the cortical substance has not been deposited in the canal of the medulla spinalis."

This is the conclusion adopted by M. Tiédemann, in accordance with several German anatomists. Before I offer proofs in support of my proposition, let us quote again from M. Tiédemann, and it will be found that his own observations are in opposition to his notions.

"During the first month, and at the commencement of the second, he observes, p. 125, the medullary spinalis has the form of a membranous canal, which *contains a liquid and transparent fluid.* Towards the end of the second month, this fluid is converted into a *soft and pultaceous mass*, like the white of the egg. As the tissue of the medulla acquires consistence, its transparency diminishes. If the fœtus is put in alcohol, the soft and fluid substance of the medulla spinalis coagulates and becomes firmer. At the end of the second month, and at the commencement of the third, *fibres cannot as yet be seen, even by the aid of alcohol; and, on examination of the medulla with the microscope, it appears to be composed of minute globules.* The small globules, which are disposed parallel to each other, and take a longitudinal direction, cannot be seen before the beginning of the fourth month on the anterior surface. These fibres gradually increase in number, not only anteriorly, but also on the sides of the two principal cords of the medulla spinalis. During the whole of the first month, and at the commencement of the second, the medulla spinalis has the form of a membranous canal containing a limpid and transparent fluid. The coats of this canal, which enclose this fluid, are not composed of medullary substance, but are formed by the dura mater, which, at this period, is thin and with-

out any appearance of fibres, and by the pia-mater abounding with blood vessels."

I ask M. Tiédemann how he can infer from these data, that the pulpy, non-fibrous substance, is posterior to the white fibrous substance? If he would examine without prejudice, he would find, as he states most distinctly, that the pia-mater with its numerous vessels, and a liquid substance, successively glairy, pulpy, gelatinous, and reddish, exists a long time, before any trace of fibrous matter is perceptible. Truly, a light breaks upon us, when, after reading the premises, we arrive at the unexpected conclusion, that the cortical substance of the medulla spinalis has an origin, posterior to that of the medullary fibrous substance! Or does M. Tiédemann wish to take advantage of the expression *cortical*, as if I had maintained, that it is a substance, placed on the external surface of the medulla spinalis, which gives origin to the other? But, is he not aware, that we have always very distinctly stated, that it is the pulpy, gelatinous substance, the non-fibrous, abounding in blood vessels, the first secreted by the pia-mater, which is the source of the nervous filaments, which nourishes and multiplies them, and which consequently may justly be called the *matrix*, the nourishing substance of the nervous filaments? Whether placed externally or internally, it is always the apparatus of origin and reinforcement; its function is at all times the same.

Let us follow M. Tiédemann, and it will be seen, that his prejudices always lead him to some false conclusion.

"The anatomy of the fœtus is no way favorable to the hypothesis of M. Gall, according to which the medulla spinalis of man and the superior animals would be composed of ganglions or enlargements of the grey substance, distinct, but adherent to each other, and as many in number as the pairs of nerves which it furnishes. If the ganglions were a part of this medulla, which is first formed, and if the medulla

itself resulted from their union, it would be the case, that, in the embryo they would be distinctly visible, as in it the medulla spinalis is found in the lowest state of organization. But, on examining it from its first period, nothing can be discovered like enlargements or ganglions." p. 134.

It is because, from the commencement, the medulla spinalis is found but little developed, and because the period for the appearance of the nerves has not yet arrived, that these enlargements cannot be distinctly perceived. How can they be seen in a medulla, which as yet has no consistence, which cannot as yet be separated from its sheath? Have not anatomists, and even the committee of the Institute themselves, denied the existence of these enlargements, so distinct and so evident, the medulla spinalis of man, of the ox? But let us proceed:

"But Gall is right in saying," remarks M. Tiédemann, "that in the adult, the parts of the medulla, the most amply supplied with cortical substance, are those whence the largest nerves take their origin."

Well! if the largest nerves must have a more abundant supply of a cortical substance, does it therefore follow that the lesser need have none? Does not that prove, that the non-fibrous substance will be so much the less perceptible, as the nerves to which it gives origin are the more delicate; but that without it there can be no fibrous substance?

"It may be seen at an early period," continues M. Tiédemann, "that the medulla spinalis of the fœtus is larger in those points, whence the great rachidian trunks arise, which form the nerves of the upper and lower extremities: its canal also is more dilated in the same place, during the last months, when the coats of the medulla are strengthened by the formation of new medullary fibres, and when the canal is diminished, and then filled up gradually by the cortical substance there deposited, it is in these places that most of this grey substance is found abounding in numerous blood

vessels, which give it a reddish appearance. But it is also true, that this considerable mass of cortical substance belongs to a secondary formation, and is no part of the original state."

Certainly these considerable masses of non-fibrous matter belong to a secondary formation, since the nervous filaments, which they produce at a later period, do not exist at first. It is thus, also, that many other ganglions, with their nervous system, are secreted afterwards, as the olivary ganglions, the corpora geniculata, the pineal ganglion, &c. &c., and their nervous bundles; it is thus, also, that all the ganglions increase in gelatinous matter, in proportion as they have their nervous productions to reinforce, as the corpus ciliare, or the central point of the grey matter in the interior of the hemispheres of the cerebellum. But the addition of the fibrous substance is always preceded by an increase of the non-fibrous. This is strictly conformable to the laws of the vegetation of plants. Pull up a tree in November, December, or January, and you will find that, while the vegetation of the branches was wholly suspended, the growth of the roots was vigorous. You will find a large number of white thick filaments, which are distended by the mucilaginous matter: subsequently, these large filaments are changed into others much more delicate. It is the same with the buds; before they are extended into branches, they are enlarged by the accumulation of the mucilaginous matter of the *cambium*.

"The presence of a great quantity of grey substance in these places of the medulla spinalis, where the large nervous trunks come out, which is so filled with vessels that Ruysch believed it wholly vascular, contributes entirely, during life, to increase and exalt the nervous action according to the general law, that the force and energy of an organ is in proportion to the degree of arterial blood, distributed to it. M. Gall is in error, in affirming that the grey substance, to which

he gives the name of matrix of the nerves, is the first formed, and is that, which produces and nourishes the nerves. But I agree with him, that it strengthens and fortifies the action of the parts of the brain and nerves, which arise from it, but only as this effect is produced by the arterial blood which circulates in it, and by the greater rapidity with which it repairs the loss, induced by the exercise of the vital action. I admit then an intimate relation between the size of the spinal nerves, and the enlargments which are seen in those places, where these nerves originate. This is easily proved in fishes, where the origins of the nerves always produce particular ganglions, [it would be better to say, where particular ganglions give origin to the nerves,] whenever these nerves, and the organ to which they are distributed, are greatly developed, or when there are particular organs, which are wanting in other fishes."

After the foregoing, M. Tiédemann enumerates several species of fishes, where the nerves always originate from the ganglionary substance, and infers from it, that no one can doubt, that the local increase of the mass of the medulla spinalis, by the addition of more or less of this substance, is for the purpose of exalting the action or activity of the nerves, which arise from these ganglions, and which would be superfluous, if the sanguineous vessels could effect the same result by their great number only.

I have delineated in my large work the nervous system of voluntary motion of the caterpillar, where all the ganglions form a kind of chaplet, which shows these enlargements so distinct and connected by a double nervous cord, that their existence is evident at every point, where the nerves originate. In serpents and in all animals, whose medulla is prolonged, these distances are very clearly marked. It is the same in birds, as is seen in the medulla spinalis of the hen, which is also engraved in my work. Examine it in the marten and the hare, even after these animals have

been cooked, and you will readily perceive throughout its whole length, the enlargement very distinct at each origin of a nerve, without taking into view those longer ones, whence proceed the nerves of the extremities. The same occurs in all animals and in man, but not in so evident a manner, since the distance from one enlargement to another, is less. To be convinced of this, draw out the medulla from its membranes, keep it in water, and not stretch it upon a board, as we have seen it done. The enlargements are always found at the union of two vertebræ, as the parts where they are in contact, are wider than the canal of the bodies of the vertebræ. As to the increase of the vital power by ganglions, I admit it, but only inasmuch as a larger nerve, *cæteris paribus*, exercises a more energetic action than a smaller one, and because all excitement stimulates the action of an organ. Reil thinks that the ganglions have the functions of modifying impressions made upon nerves. It is in this way mankind reason and rave, when they attempt to explain those matters, which are beyond our capacity.

Let it be borne in mind, that it is not the fibrous, but the gelatinous, non-fibrous substance, that is penetrated by an abundant tissue of blood vessels; that the whole formation of every organ is necessarily effected by the vascular system: is it not then conformable to physiological principles, to seek the primary origin of the nervous filaments in a substance directly secreted and thoroughly penetrated by an infinity of blood vessels? When one is forced to assert, that, wherever ganglions exist, filaments come from them; that, wherever a nerve is united to a ganglion, it goes from it increased in energy; that all the nerves are more or less accompanied by this same substance, and by it that they acquire a successive increase so as to become conical: it is difficult to understand, how one can fail to distinguish in the non-fibrous substance, the primary and sole origin of the

With the exception of the mechanical explanation of the formation of the convolutions and anfractuosities, which I have already refuted, MM. Carus and Tiédemann profess the same theory. Therefore, it is not necessary for me to defend the diverging system against the anatomists.

But those, who have not seen the unfolding of the hemispheres of the cerebellum and cerebrum; those, who have not observed the different direction of the nervous fibres of both the cerebellum and cerebrum, obstinately reject the idea of a converging nervous system of these parts.

It is, therefore, this important part of the anatomy of the nervous system, that I shall once more endeavour to demonstrate.

Converging System of the Cerebellum.

It is certain that the nervous filaments always originate from the non-fibrous substance. Now, the whole surface of the lamellæ, branches, ramifications, and layers of the cerebellum, is covered by the same; this consideration itself should dispose anatomists, who are convinced of the stability of the laws of nature, to seek, in this non-fibrous and cortical substance, the origin of another order of nervous filaments, besides those which diverge in that direction, from the ciliary ganglion of the hemispheres of the cerebellum.

This probability is rendered certain, when it is found, that the fibrous substance of the hemispheres of the cerebellum, and of the annular protuberance, is too abundant to be furnished by its primary bundles and its ciliary bodies. This increase, then, must come from another source, that is, from the non-fibrous substance situated on the surface of the cerebellum.

In fact, when the direction of the primary bundles is examined, from the peduncles of the cerebellum, after having scraped the ganglion of the auditory

nerve, on the external edges of the fourth ventricle, it will be perceived, that they dip down into the interior of the hemispheres. It is entirely different as to the direction of the transverse nervous bundles of the annular protuberance. If the small lamellæ of the external border of the hemispheres of the cerebellum are separated, without tearing away any part with the finger, following always the direction of those large and broad bundles, and upon these same bundles, it will conduct us even to the extremities of the ramifications and the layers. Sometimes, even by this simple process, the whole cerebellum may be unfolded, in the same manner as is done in a dropsical state. It is, then, evident, that all the nervous filaments, which form the annular protuberance, are only the continuation of the primary bundles, but originating from the extremities of the lamellæ and ramifications, converging and uniting themselves to the same filaments of the opposite side, forming the reunion, junction, or commissure of the cerebellum. I refer the reader, who wishes for more detailed and scientific views on this subject, to my large work, vol. 1. p. 258, in 4to.

Let us now hear M. Tiédemann: "The annular protuberance," he says, page 167, "composed of transverse fibres, originates from the middle or lateral cords, which surround the olivary and pyramidal bundles of the medulla spinalis, below which they unite together on the median line. These middle cords come from the corpora rhomboidea and the white substance of the cerebellum; so that they appear as soon as the medullary nuclei begin to form, that is, at the fourth month. M. Gall pretends, that they are produced by the particular fibres, to which he gives the name of reëntering (*rentrantes*) fibres, which, according to him, originate from the grey substance spread upon the laminæ, and especially upon the cerebellum, which, by uniting, form the great commissure or the pons Varolii. These entering fibres are imaginary things;

nervous filaments. Let the evidence in this matter be properly weighed, and the position would no longer be maintained, that, in the second month, no nerve can be distinguished, coming either from the medulla or the brain: that, even in a fœtus of seven or eight months, no fibrous structure can be seen in the two cords of the medulla spinalis, not even by a powerful magnifying glass, nor when hardened in alchohol: and, that the roots of the spinal nerves may be perceived in the second and third months, which may be very possible, although M. Tiédemann could demonstrate only that the fluid substance, which had become successively gelatinous and deposited in the canal of the medulla spinalis, is not the same substance, which I describe, as generating and nourishing the nerves; and after having denied in many places the existence of enlargements throughout the length of the medulla spinalis, one would not be compelled by the force of facts to avow, that the soft and reddish substance, into which enter numerous vascular ramifications, is, at the ninth month, more abundant *on all the points where the nerves arise from the lateral part of the medulla*, and still more abundant at the origin of the large nerves of the extremities.

In addition to all these proofs, it may be remarked, that, in the most inferior animals, the nervous ring, which surrounds the æsophagus, is provided with a mass of non-fibrous substance, which gives origin to the fibrous matter, which terminates by forming the ring and the extreme ramifications or rays: that the medulla oblongata is but the continuation of the spinal nervous cords, increased by as many ganglions as there are pairs of nerves going out, and that these same ganglions, which form a single large expansion in the superior animals, exist more or less numerous, and more or less separate and distinct, &c., in the inferior.

Hitherto I have demonstrated, that in the whole length of the medulla spinalis the nervous fibrils, whether the cords themselves or the nerves, originate

from a mass of non-fibrous cerebral substance, and that the opposition of M. Tiédemann and his partisans is so much the more gratuitous, as they themselves teach, that, in the first month, there is no sensible difference between the two fibrous and non-fibrous substances of the medulla spinalis, and that, consequently, nothing can be affirmed as to the non-existence of the non-fibrous substance. We shall refute M. Tiédemann by his own words, as to the cerebellum and cerebrum.

Page 119, he says: "I have repeatedly dissected fresh brains, either of fœtuses of six, seven, eight, and nine months, or of new-born infants, in order to acquire a just idea of the relation, which might exist between the different cerebral substances in the different portions of the encephalic organ. The uniform result has been, *that it is impossible to establish* any distinction between the cortical and the medullary substance, in the brain of the fœtus. All the constituent parts are formed of an homogeneous and white reddish substance. This redness is evidently owing to the great number of minute blood vessels which are distributed to the cerebral substance. In all parts, where we have found the grey matter in considerable masses in the adult, as in the cerebral peduncles, where it takes the name of corpus nigrum, corpora striata, optic thalami, &c., I have discovered that the vessels were larger and more abundant, than in those, which are composed of medullary substance after the period of birth. Therefore, the names given by anatomists to certain parts of the brain, are not appropriate, when they are examined in the fœtus; for example, the terms corpora striata or canniculata. In fact, the parts, which correspond to these eminences in the cerebrum of the fœtus, are not striated, but composed of an homogeneous white mass, with a reddish tinge, and penetrated by a multitude of vessels of large size. There is, moreover, no difference as regards color, between the cortical and medullary

substance, either in the convolutions of the cerebrum or in the layers of the cerebellum. The exterior layer, which corresponds to the cortical substance, is of a reddish white, like the interior layer corresponding to the medullary. The only sensible difference, which appears between these two substances in the fœtus, which are so easily distinguished from each other in the adult, is, that the exterior layer like the bark in its nature is softer, and perhaps somewhat more abundant in vessels than the interior portion."

By this extract it appears, that the non-fibrous substance much exceeds the white fibrous substance, during the period when the brain is not wholly formed; it is therefore necessarily the primary, and it is from this that fibrous substance takes its rise. M. Tiédemann often asserts with emphasis, that always the fibrous substance is increased by the non-fibrous. As we were the first to demonstrate this fact, how could he so far have committed himself as to assert, that the white fibrous matter is anterior to the reddish, grey or non-fibrous? In the corpora ciliaria of the hemispheres of the cerebellum, in the first great ganglions of the brain, or the annular protuberance, in the crura cerebri, in the optic thalami, in the corpora striata, &c., the white fibrous substance increases in proportion as the non-fibrous accumulates in these parts. Many masses of gelatinous non-fibrous substance evidently exist before the nervous fibrils, which afterwards originate from them, as the corpora genicula, the bulbs of the olfactory nerves, &c. Does not all this show in a decisive manner, that, at every period and throughout, the gelatinous substance fills the interior or the exterior surface of the hemispheres, gives rise to the nervous fibrils, or, in other words, that it is the matrix, the nourishing substance of the white fibrous matter of the whole nervous system?

Add to this, all that we have said in my large work, vol. I. p. 37 and 47, when treating of the nervous system of the vertebral column, and every doubt of

the use of the non-fibrous substance will be entirely dissipated.

Is it true that, both in the Cerebellum and Cerebrum, there is a Diverging and a Converging System?

All modern anatomists are of opinion, that the corpora restiformia, or the peduncles of the cerebellum, enter into the hemispheres of the cerebellum, that they there meet a new ganglion, the corpus ciliare, where their nervous mass is reinforced, and whence it spreads into branches and minute ramifications. It is at present admitted, that the pyramids are reinforced in their passage through the annular protuberance, whence they proceed, taking the form of the great peduncles of the hemispheres of the cerebrum. These peduncles, being enlarged by the non-fibrous substance enclosed in their interior, continue to advance, and terminate in a great ganglion, or mass of non-fibrous substance, the optic thalami; there they are increased by the addition of the fibrous matter, a great part of which is distributed in a radiated manner towards the hemispheres, and the remainder to a third great mass of non-fibrous substance, the corpora striata; it there also receives a great increase of the fibrous matter. This fibrous substance there forms great nervous bundles, which, radiating similar to those of the second great cerebral ganglion, like a fan, towards the periphery of the hemispheres, is there spread out into a nervous membrane. This does not exist in a state of health as an extended membrane, but in folds, like a furbelow, and thus showing the internal half of the convolutions and anfractuosities.

Such is the diverging nervous system of the cerebellum and cerebrum. All anatomists, who follow the progress of the science, have adopted this exposition of the structure, since our public demonstrations and the publication of our anatomy of the brain.

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for, the annular protuberance and medullary fibres composing it, already exist in the fœtus of four months, that is, at a period when there are neither branches nor ramifications, nor even laminæ, which are covered with the cortical substance. M. Gall makes them arise from parts which are formed after them." Page 93, he remarks: "Other fibres also he derives from the corpus ciliare, which are spread without and in front, surrounding the olivary and pyramidal bundles of the medulla spinalis, and uniting together to form the annular protuberance."

If the transverse bundles of the commissure of the cerebellum are continuations of a part of the primary bundles of the cerebellum, why is it that these transverse bundles do not appear simultaneously with the first rudiments of the hemispheres? Why do they appear only at the fourth month, when the hemispheres of the cerebellum have already acquired a considerable development, that is, when the hemispheres are sufficiently developed to supply the new white fibrous substance? The direction of these new filaments is opposite to that of the filaments, which are the continuations of the primary bundles. Moreover, the latter diverge in their course, while the others, coming from the surface, constantly approximate, to form the commissure. When M. Tiédemann could deduce an argument against my assertion from the fact, that, until the fourth month, the lamellæ and layers of the cerebellum are not perceptible, I again answer him, that it is neither from the lamellæ, nor layers, &c., that I refer the nervous filaments, but from the non-fibrous substance. Now, I have already shown, how, M. Tiédemann is mistaken in asserting, that the non-fibrous substance is formed at a later period than the fibrous, and that the cortical is the last. He does not suppose, then, that the surface of the hemispheres of the cerebellum and cerebrum, is enveloped with the innumerable vessels of the pia-mater; and that these same vessels first secrete the gelatinous substance,

non-fibrous and here termed the *cortical substance!* He forgets what he so often repeats, that there is no difference between the cortical and the medullary substance, either in the convolutions of the cerebrum, or in the laminæ of the cerebellum, and that the exterior layer, which corresponds to the cortical substance, is of a reddish white, similar to the interior layer, which corresponds to the medullary.

It is evident from this discussion, that M. Tiédemann did not see correctly, when he thought he perceived, p. 114, that a middle peduncle came from each corpus ciliare, the transverse fibres of which surrounded the olivary and pyramidal bundles, and formed the annular protuberance, by their union with those of the opposite side. Let us now see, if he is more successful in his views of the great commissure of the hemispheres of the cerebrum.

Corpus Callosum, great Commissure of the Hemispheres of the Cerebrum.

The evidence, which I have just brought forward to prove the converging nervous system of the cerebellum, is also applicable to the cerebrum. It is equally to be presumed, that the non-fibrous substance on the surface of the hemispheres gives origin to other nervous filaments, as those which were expanded towards this same surface, after being reinforced by the great cerebral ganglions.

It is also certain, that the nervous bundles, which radiate from the two great cerebral ganglions or optic thalami and corpora striata, do not wholly supply all the white and fibrous mass of the hemispheres. This increase of the fibrous substance, this enlargement of the hemispheres must be derived from another source. And whence must it be derived, if not from the cortical substance of the hemispheres?

The following is the explanation of this increase or

augmentation of the hemispheres, according to M. Tiédemann. "The membranous hemispheres successively cover, in the fœtus, the corpora striata, optic thalami, tubercula quadrigemina, and lastly, the cerebellum as they are thus prolonged from before backwards; their volume increases by new layers of cerebral substance, which is secreted by the blood furnished by the vessels of the pia-mater. The radiating fibres, which constitute the base, increase in their turn in these depots, *and others are applied to their surface*, which, instead of inclining inwards, on the contrary go outward, and tend towards the circumference." Page 258.

I doubt very much, if any anatomist comprehends or adopts this hypothesis. Thus M. Jourdan was much puzzled to convey the meaning of M. Tiédemann. He thus expresses himself: *Die in die Hemisphæren sich fæcherfærmig ausbreitenden Fasern der Hirnschenkel bilden sich in jene neue abgesetzte Masse fort, und es legen sich neue in die Peripherie sich ausbreitende Fasern an jene von aussen nach innen gekrum te Fasern an.* Is it not evident, that M. Tiédemann has here imagined things, which he could not see? And who will agree with him, that there are nervous fibres, which are not derived either from the optic thalami and corpora striata, or from the cortical substance of the hemispheres?

However the two orders of fibres do not pass unnoticed by him. He says, p. 86: "There is then a double radiation of fibres in each hemisphere. Some radiate directly from within outwards, while those of the internal surface have a direction, on the contrary, from above downwards."

It is probably this phenomenon, the explanation of which has been so difficult for him to adduce.

Before continuing my proofs, that the great commissure of the hemispheres of the cerebrum is formed by the fibres, which originate in the cortical substance, and which, by converging, unite the similar fibres of

the hemispheres, I will give the opinion of M. Tiédemann. "My works," he says, page 259, "confirm the results, which M. Gall has arrived at from his researches upon the course of the cerebral peduncles, through the optic thalami and corpora striata, as far as into the hemispheres and convolutions; but they refute all that this anatomist has said of his pretended system of reëntering fibres."

And also p. 264. "It is seen, that the corpus callosum is produced by the reunion of the fibres of the two cerebral peduncles, and after that they have expanded to form the hemispheres. The reëntering fibres, by which M. Gall has explained its formation, and that of the anterior commissure, are therefore things which have no existence. This anatomist pretends that the reëntering medullary fibres arise from the grey substance of the convolutions; that, in descending, they cross the ascending and radiating fibres of the cerebral peduncles, and that they afterwards converge towards the median line, where they unite to form the corpus callosum. But all these assertions are but mere hypotheses; for, the corpus callosum already exists in the fœtus of four or five months, that is, at a period when there are neither convolutions, nor layers of cortical substance, on the surface of the cerebrum. The pretended reëntering fibres therefore cannot have an origin from parts, which have no existence. But a positive proof of the incorrect views of M. Gall in this respect is furnished, by the uninterrupted connexion, which I have observed, between the medullary fibres of the peduncles and those of the corpus callosum."

M. Tiédemann, as we have seen, is forced to admit a double radiation of fibres; we have also observed this double direction of fibres, but could never discover, that the radiating fibres were reflected without interruption in their descent, and I challenge any one to show this fact; he, who proves too much, proves nothing. As we were convinced, that the non-fibrous

substance at all times throughout gives origin to the cerebral fibres, we have preferred to adopt the opinion, that this second order of descending fibres takes its origin in the non-fibrous substance, which, at every period, covers the surface of the hemispheres. Here, again, M. Tiédemann insists upon the convolutions, the existence of which he has not yet acknowledged. Here, also, I must again repeat, that I do not make the nervous filaments originate from the convolutions, but from the non-fibrous substance. Now, M. Tiédemann himself asserts, that before birth no difference is perceptible between the two substances; he even affirms, in several places, the existence of the pulpy non-fibrous substance on the surface of the hemispheres, p. 120. How then can he pretend, that the cortical substance is not formed until after birth? The corpora striata, also, do not appear until a later period, as composed of two substances perfectly distinct. Can he maintain that, in the first months, the non-fibrous substance has no existence in this great cerebral ganglion?

M. Tiédemann censures Reil, who, after my example, considers the transverse bundles of the great commissure, as aggregations of particular fibres, and wholly different from those of the cerebral peduncles. Reil saw our demonstration of the brain, and was convinced of the truth of this phenomenon. And I think that, if M. Tiédemann should witness one of our dissections, or rather one of our developments of the brain, he would soon become a believer in the two nervous systems, the diverging and the converging. In the mean time, I invite him to reflect on the following considerations, and to pursue our manner of dissecting the adult brain.

If the transverse fibres of the great commissure are continuations of the radiating fibres of the corpora striata, how could he explain why the commissure was not formed, as soon as the radiating fibres of the corpora striata and optic thalami were sufficiently extended to meet the median line?

Why does this commissure appear after the hemispheres have already acquired a considerable development, at the end of the third month? p. 262.

Why is it that the great commissure is formed from before backward, p. 264, while all the successive formations of the corpora restiformia and the peduncles of the cerebrum succeed each other from behind forwards? According to my views, the reason is evident: it is, that the transverse fibres of the great commissure are not continuations of the radiating fibres of the peduncles, but of fibres originating posteriorly, and coming from an opposite direction, arising simultaneously from the surface of the anterior lobes, which are the first, that acquire a considerable development.

Lastly, let us take an attentive view of the great commissure itself, and compare the direction of its fibres with that of the radiating fibres of the corpora striata.

After having scraped, either with the finger or with the rounded handle of a scalpel, the non-fibrous substance of the corpora striata in the lateral halves of the hemispheres, nervous bundles only are seen, more or less large, taking a direction forwards, inwards, and backwards, precisely like a fan, that is, diverging from the optic thalami and corpora striata towards the surface of the hemispheres.

Let us undertake to expose the external portion of this great mass of non-fibrous substance, which is done by pushing it gently with the end of the finger towards the anterior part of the corpora striata, and following it in its direction externally and from before backwards (an operation which unfolds a convolution, which surrounds this part of the corpora striata, and which is in contact without adhering to them): scrape in the same way this non-fibrous mass, raise the peduncles, and you see the large bands of the nervous bundles radiating in every direction, forwards towards the anterior, laterally towards the middle, and posteriorly towards the posterior lobes.

In this position, you have the internal surface of the great commissure in full view. This commissure being equally composed of nervous fibres, their direction is not difficult to discover. First, make a slight longitudinal incision in the middle of its length, and with the blade of a scalpel placed perpendicularly, separate the white mass, and you will perceive the transverse direction of all the fibres, which form the largest portion of the commissure. This direction might lead to the supposition, that these are the immediate continuations of the nervous bundles of the corpora striata, those in the centre, appearing to take a direction towards the median line: but the error is soon perceptible, when it is considered, that the bundles, proceeding from the corpora striata, are much larger than those of the commissure.

But how can it be comprehended, that the bundles, which take a direction inwards or towards the commissure, are not extended immediately into the commissure? Pass the fingers of the right hand between those of the left: it is in this same way, that the bundles of the corpora striata penetrate between the converging bundles, which come from between the diverging bundles, and go to form the transverse portion of the commissure, while the diverging are expanded more and more, to form the cerebral membrane and convolutions.

Now scrape the fibres of the commissure at the anterior and posterior extremities, and you will perceive another direction; you will find that, at the anterior extremity, the fibres, which go to the commissure come converging, from the anterior lobes, and that they cross the diverging fibres of the corpora striata, in a slanting direction. At the posterior extremity, the fibres, or rather the large nervous bundles, converge from the posterior lobes, cornu Ammonis, &c., taking a direction from behind forwards, and likewise crossing, in a slanting manner, the nervous bundles of the corpora striata, which diverging pass

from before backwards, consequently in an opposite direction to the diverging bundles; it is therefore impossible, that the former should be the direct continuations of the latter.

There is another circumstance, which evidently shows, that the converging bundles reënter the hemispheres, which M. Tiédemann has omitted to mention, because he could not explain it satisfactorily by his hypothesis. It is known, that the great commissure forms a fold anteriorly and posteriorly: and that, in these folds, the converging direction towards the commissure is very evident, principally from right to left. It remains for us to explain, how these folds are formed, &c. This explanation at the same time will give an idea of the disposition of the cerebral membrane, such as it exists in its natural state.

Take a half sheet of paper, a foot long and seven inches wide. Mark it with lines near each other, in the direction of its length from left to right, to imitate in some degree the white fibrils of the cerebral membrane. This white and ruled surface represents the cerebral membrane unfolded. There is no separation of the two halves, no opening, either anteriorly or posteriorly. The nervous fibrils, or the lines which unite the two halves (the great commissure) are extended horizontally through the whole width of the sheet. This should be the case of the two hemispheres of the brain, if they existed in an unfolded state.

In order to understand, how nature has formed the anterior and posterior slopes of the hemispheres, or their four prolonged angles, and the anterior and posterior folds of the great commissure, it may be imitated in the following way:

Fold the anterior and the posterior middle about an inch wide, but so that the four corners of the sheet remain spread out. Thus the paper will be doubled one inch in width in the two anterior and posterior middle parts, and there will be in the middle of the sheet

still three inches not folded. Therefore, there will be an interruption of the width of the great commissure, by its two anterior and posterior folds.

Then fold the two extremities of the right and left two or three inches wide, towards the median line, and this will give the slope formed by the four angles or wings of the hemisphere, and the middle folds. You will conceive how the ventricles or cavities of each hemisphere are formed; the oblong square three inches in length not folded, which remains in the middle, will represent the great commissure.

On examining the direction of the lines in the two folds, the fibrils of the cerebral membrane, you will see, that their horizontal direction, which is preserved in the length of the commissure, is changed. The lines take a direction from the four angles, returning obliquely from right to left, and from left to right, towards the median line.

After all this, place the circle radiating from the corpora striata, at the distance nearly of one inch and an half from the great commissure in the cavities, and you will be convinced that the lines, their bundles radiating like a fan, cross each other anteriorly and posteriorly, with the lines or entering nervous bundles of the folds; that, therefore, some of these bundles are not continuations of the others; and lastly, that the white fibrous substance of the hemispheres is composed of two layers, one of which is formed by the expansion of the bundles of the great ganglions, the optic thalami and corpora striata; the other, by the reëntering fibrils of the non-fibrous substance of the surface of these convolutions.

Anterior Commissure.

Page 230, M. Tiédemann says: "M. Gall regards the anterior commissure, as belonging to a system of organs composed of converging fibres, which he sup-

poses to originate from the grey substance of the cerebral convolutions. These reëntering fibres, or apparatus of reunion, are imaginary things. M. Gall says, that the anterior commissure is produced by fibres reëntering, which arise from the anterior convolutions of the middle lobes, and from some of those which are near the fossæ Sylvii, and that these fibres take a course from without inwards, so as by their reunion to produce the anterior commissure. The following facts prove, that he is also mistaken in this respect. The anterior commissure already exists in the brain of the fœtus of three and four months, consequently at a period when the brain has no convolutions; for, these do not appear until some time afterwards. It cannot therefore arise from the converging fibres of parts, which have no existence."

Can it be necessary again to prove the futility of an argument, deduced from the non-existence of the convolutions of the middle lobes? But the anterior commissure does not yet exist at the second month; M. Tiédemann has not observed it before the third; at first, it is very thin and delicate; but it increases gradually, in the ratio of the development of the hemispheres. Why does it not exist as soon as the radiating fibres of the corpora striata? It only appears at the period when the middle lobes are partly formed, and consequently covered by the pia-mater and the gelatinous, pulpy, non-fibrous substance.

"This is the manner," says Tiédemann, p. 229, "in which the anterior commissure originates: the cerebral peduncles, after having penetrated the corpora canniculata, expand their numerous medullary fibres into the hemispheres, many of which incline from behind forward, and from without inwards, connecting themselves in the form of a cord, and forming a union with those of the opposite side. The anterior commissure then is a medium of union, between the radiations of the two cerebral peduncles, the corpora canniculata, and the two middle lobes of the hemi-

spheres of the brain. M. Chaussier well understands the origin; as he makes the fibres, which form it, to come from the cerebral peduncles."

It would be interesting to know the means, which M. Tiédemann employed to discover the radiating fibres of the peduncles, expanded in the hemispheres, and inclined from behind forwards, and from without inwards, &c.; but let us refer to autopsy; this alone will refute all the ideas, which are in contradiction with nature and common observation.

After placing the brain on its convex part, turn up or remove the optic nerves, and you will perceive a white, nervous cord, of the size of a crow-quill. Scrape with the handle of a scalpel, or with the rounded blade, this non-fibrous substance, but without including the nervous cord or the anterior commissure itself. Follow the direction of the cord which goes, slightly curved in its course, from before backwards and towards the anterior part of the fossæ Sylvii. Then with the same precaution, raise the non-fibrous substance, until the whole surface of this cord is exposed. Having reached the anterior extremity of the middle lobes, you will see, that this cord begins to be divided into many minute cords, which penetrate into the fibrous substance, diverging, and, as the cerebral substance is but the cerebral membrane folded into convolutions, consequently into the convolutions of the middle lobes. It is therefore evident, that medullary fibres come from the convolutions of the middle lobes, which, approximating successively, form little cords, which, by converging and uniting, constitute the great cord, which therefore is the reunion, the junction, the commissure, of a part of the middle lobes. Through its whole course, this cord has no connexion with any other part, neither with the corpora striata, nor with the peduncles of the brain. To make this certain, cut it in the median line, and remove it carefully with the handle of a scalpel. Do this without tearing it, as far as its entrance into the middle lobes. In its

course, you will meet some nervous bundles, that you might suppose were connected with this cord, but, with greater attention, you will see that these bundles pass above, or, in this position, below, and that they come from the corpora striata. The cord being thus raised through its whole extent, leaves a groove in the non-fibrous substance of the corpora striata, which groove is perfectly smooth; which proves that there was no attachment, and that, consequently, it had no connexion either with the peduncles, or with the corpora striata.

Unfolding of the Hemispheres of the Brain.

The unfolding of the hemispheres of the brain will always be an insurmountable difficulty, a stumbling block to every anatomist, who has never seen this operation. In fact, this unfolding would be impossible, if the ideas of M. Tiédemann, respecting the structure and formation of the hemispheres, were correct.

The following is the manner M. Tiédemann explains the increase and structure of the hemispheres; p. 86, he says: "The vessels of the pia-mater, which envelope the cerebral substance, and which, no one will deny, are the organs that form and nourish this substance, separate from the blood which they carry to the encephalon, by means of ramifications detached from the internal surface of the membrane, the new cerebral pulp or mass from which it originates. This pulp then is arranged *in layers from within outwards;* it *crystalizes*, if I may use the expression, *under the form of fibres, which connect themselves to the surface of the primary fibres.* The walls of the hemispheres acquire greater thickness by the increase of the pia-mater, and by the successive depositions of new layers upon the old. An examination of the cerebral substance furnishes proofs in support of the opinion I

have advanced. When the pia-mater is detached from the encephalon, *layers, more or less thick, of the cerebral pulp*, remain adherent to its internal surface, which is evidently in consequence of the soft exterior substance, which is the last deposited, adhering still to the vessels belonging to the internal surface of the membrane. The layer which is adherent to the parts of the pia-mater, which have been detached, and the superior layer of the brain, deprived of this envelope, are both equally soft, and exhibit no fibrous appearance. Examined with a microscope, they appear to be composed of very minute globules. If the brain is torn, fibres are seen, on which is a layer of soft substance, and without a fibrous texture. This substance, *which is secreted the last, has not as yet been sufficiently matured to take the form of fibres.* Perhaps it may be said, that it corresponds to the cortical substance; but this objection has no force, for the cortical substance is not deposited on the surface of the brain until after birth."

The reader must be surprised at the efforts made by M. Tiédemann, to sustain his prejudice against the origin of the nervous filaments of the non-fibrous and cortical substance. It is hardly possible to make concessions more explicit in favor of my proposition. At all periods of life, this soft and non-fibrous substance adheres to the pia-mater; how can he know, then, that it has been the last to be secreted? To crystalize, not to have had time to take the form of fibres, &c., truly are dreams unworthy of such an anatomist as M. Tiédemann! There is no doubt, that the substance, which is soft and without fibrous texture, corresponds to the cortical, and, if it does not appear as a substance different from the fibrous substance, until after birth, it is because that, in general, both externally and internally, the two substances become more distinct, in proportion as the soft substance diminishes, after it has given origin to the white fibrous substance, and confined itself to the limits prescribed by the various periods of life.

All, who have seen the hemispheres unfolded, know that the cerebral membrane is, throughout its whole extent, of nearly the same thickness; that the external layer of the cortical substance equals in thickness the internal substance of the fibrous matter: how can this fact be reconciled with the idea, that the hemispheres, at first thin and membranous, gradually increase in thickness by new layers, disposed from within outwards, of soft pulpy substance, which finishes by crystalizing in fibrous substance, and by applying itself to the surface of the primarily formed fibres?

Would it not be better to say, that the fibrous substance of the hemispheres increases, in proportion as the non-fibrous, (whether of the optic thalami and corpora striata, or that of the surface of the hemispheres,) is successively secreted more abundantly, and gives origin to a greater quantity of nervous substance?

Let us follow the opinion of M. Tiédemann on the structure of the hemispheres, and on the origin of the convolutions and anfractuosities.

He says, p. 164: "The pia-mater, gradually increasing in extent, forms folds, which dip down into the soft and cerebral matter of new formations; from this, the transverse furrows and the lobules, which are perceptible at the fifth month, are derived, also the division of the cerebellum into branches, which lie upon the medullary nuclei. These formations are constantly in action, and the pia-mater also extends itself: this, again, produces new folds; then the transverse furrows become more numerous, and the branches divide into more minute ramifications, which takes place towards the age of six months. At the seventh and eighth months, the cerebral matter is secreted in very great quantity; the pia-mater yet forms again deep and superficial folds, which penetrate more or less, and lobules, branches, and ramifications not only appear, but also the minute distributions and layers.

Lastly, at the ninth month, there is deposited on the surface of the medullary leaves, a layer wholly external to the cerebral substance, filled with a number of vascular flocculi, having the appearance of velvet. Consequently, the cortical substance is applied to the surface of the cerebellum from without inwards, and it is the last production of the pia-mater."

So much for the cerebellum. And now we see as much even for the brain. Page 103, he says: "The fibres of the hemispheres being covered in a fœtus of seven months with a layer of soft substance, which adheres to the internal face of the pia-mater, into *which the folds of this membrane sink*;" and, page 259, he insists in saying: "The earliest rudiments of the convolutions and anfractuosities, that are perceived here and there in the fœtus of four months, take their origin from slight duplicatures of this membrane of the hemispheres. Most of these grooves and convolutions are formed during the last months of pregnancy, in consequence of the increase of the pia-mater, which, in enlarging, bends and sinks its folds into the soft layer of cerebral substance, which covers the external portion of the hemispheres."

I appeal to the good sense of my readers, and of M. Tiédemann himself, to treat, as it deserves, this mechanical explanation of the formation of the branches and laminæ of the cerebellum, and the convolutions and anfractuosities of the brain. The pia-mater is not a membrane, which, in compressing the brain, would make notches on its surface; it is a tissue of sanguineous vessels, destined to nourish, penetrate, accompany, and to excite to activity the two cerebral substances. The greatest number of these vessels, is distributed in the non-fibrous pulpy substance, placed as well within as without; the rest follow the nervous fibrils in their whole course. Let us suppose, that the tissue increases, that it forms folds. What is there that will oblige it to sink into the white fibrous substance? What establishes these depressions in such a

way, that, in the same species of animals, the same convolutions and anfractuosities constantly occur, perfectly symmetrical in the two hemispheres? What is it, that produces the folding of the leaf of corn, while it is yet enclosed in the stalk? What is that, which produces the depressions and elevations of the kernel of the nut? The same thing, which produces the convolutions and anfractuosities of the brain; a primitive law of the organization, an inherent tendency in the germ; this prevents us from wandering in the labyrinth of chimeras.

How will Tiédemann persuade us, that the cortical substance is the last production of the pia-mater? He so frequently tells us, that the pia-mater every where secretes a non-fibrous pulpy substance; that, in tearing off the pia-mater, this substance remains adherent to it, in the form of flakes. Is it not, at the present time, advancing a hazardous assertion to say, that this same substance is not the same with that, which is observed later under the form and name of cortical substance? If the skin of an animal, the rind of a fruit, the bark of a tree, are placed in the surface, are they, on that account, applied from without inwards, or from within outwards, and are they the last productions of the vascular system?

Thus, all, which Tiédemann has imagined, respecting the formation and structure of the convolutions of the brain and the laminæ of the cerebellum, is entirely contrary to the course of nature. But his ideas enable me to comprehend, how he honestly believes, page 260: "That I am deceived, when I admit that the convolutions of the cerebellum are the result of the folding of the membranes, under that form which the hemispheres originally present; and that the method that I employ to prove, that the hemispheres may be unfolded and brought back to the condition of a membrane, always causes a tearing of the internal laminæ of the cerebral peduncles; that is to say, of those which curve from without inwards, and on this account are by no means conclusive."

Where *facts* speak, reasoning is superfluous. It is true, I have little confidence in the information that I can give, to enable one of himself to unfold the hemispheres. Yet, besides referring to my large work, Vol. I., and to our answer to the Institute of France, I shall here add some remarks.

I have said, that, after having scraped the non-fibrous substance of the corpora striata, we see very distinctly the diverging fasciculi sink deep between the converging fasciculi, which form the great commissure. In this place, there is an interlacing and decussation of the fibres. If we commence scraping at the middle line of the commissure, we can very easily follow the transverse direction of its fibres to this point. But here we are stopped, unless we force and break this interlacing. However, when we take the hemispheres, without this point, the unfolding is effected without any tearing of the fibres. The way to proceed, in order to succeed, is in this manner: we cut either a whole hemisphere, without the optic thalami and the corpora striata, or a part, for instance, the middle or posterior lobe. We begin by removing the pia-mater, and, for the greater facility, we prefer a brain where the pia-mater can be detached without tearing the convolutions, which frequently happens in brains, that are inflamed or much softened. After having removed the pia-mater, the convolutions often separate and flatten so much, that we already foresee the possibility of making them entirely level; the cerebral portion is inserted, that is to say, the convolutions on the left hand. It is well to commence on the edges, for there we see the middle of the convolutions. We proceed, lightly pressing the finger on this point, and by degrees, gently applying the force, the convolution separates into the two laminæ of which it is composed. In this way, we unfold the whole circumference of this portion. Soon we perceive small grooves, which correspond with a convolution; by pressing several times in the same

manner, with the finger on one of these grooves, it will flatten, as the convolution is unfolded: or rather take a portion of the brain on the fingers of both hands; press gently from below with three or four fingers, and from above with the thumbs on the convolutions, bearing either externally upon the convolution or internally on the grooves, in a short time you will have only a membrane, smooth and white internally, and covered with a grey substance externally, of nearly a line in thickness, or a line and a half. The proof, that there is no tearing, is, first, that the internal surface is entirely uniform, and, in the second place, the small sanguineous vessels, which exactly follow the direction and fold of the nervous filaments, are unbroken.

By practice each one will discover the process, which he will succeed with, best. But those, who have no patience, or who are not possessed of a certain degree of dexterity, will be constantly obliged to have recourse to others, already versed in this artificial process. Hydrocephalic heads afford an excellent opportunity of observing the natural unfolding, and of proving its reality. But unfortunately, those cases, which have already effected the conviction of many anatomists, are yet neglected by others with unpardonable indifference.

Soon there will not be a single university, where there will not be one or many individuals, who have been present at this operation; now as easy, as wonderful.

Conclusion.

I have left untouched many disputed points of the work of Tiédemann; for the present, it was only necessary for me to refute, what he and his partisans considered as essential to overturn my principles of the comparative anatomy and physiology of the brain. My readers must have perceived, that I have almost

always taken the observations of Tiédemann himself, to demonstrate my propositions; and it is particularly in this respect, that his researches on the brain of the fœtus are extremely valuable.

As to the successive formation of the different cerebral parts, and the utility of comparative anatomy, we perfectly agree. As far as the comparative physiology of the brain is concerned, I believe that I have partly accomplished the wishes of Tiédemann. The facts, cited by him, have become for me so many confirmations, that the pulpy, gelatinous, non-fibrous substance of the nervous system, is the first secreted by the sanguineous vessels: that it is constantly in the spinal marrow, in the brain, in the nerves of sense, an apparatus, in which the nervous filaments take their origin, and where they receive their supplies.

Tiédemann, notwithstanding his dislike for the converging and diverging system of the brain, has himself been compelled to admit this double radiation of the nervous fibrils, on which we have based our opinion. Thus all our difference is reduced to the question, whether the nervous fibres of the peduncles of the brain, the optic thalami, and corpora striata, after being spread out in the hemispheres, curve uninterruptedly from without inwards, to form the commissures; or, whether the non-fibrous substance of the surface of the brain, that which is here called cortical, gives origin to this other radiation of the medullary fibrils? As it is impossible to prove the uninterrupted continuation of the diverging radiation; as the cortical or non-fibrous substance every where gives origin to nervous filaments, and as, without this supply of non-fibrous substances, the fibrous mass of the hemispheres could not much exceed that of the optic thalami and corpora striata, we have adopted the last opinion, which is also evidently confirmed in the commissure of the cerebellum, in the anterior commissure, and in the great commissure of the hemispheres.

I have demonstrated, that the ideas of Tiédemann, on the structure and formation of the convolutions of the brain, and the laminæ of the cerebellum, were erroneous, that these errors have prevented him from conceiving the possibility of unfolding the hemispheres of the cerebellum and brain.

Finally, I have believed, that I could facilitate this operation with the incredulous, in giving them an idea approximating in a trifling degree to the summary arrangement of the hemispheres of the brain, by folding a bit of linen or square paper, nearly in the same manner as the cerebral region is folded and rolled upon itself.

I have then disposed of all the obstacles which, in the eyes of anatomists less versed in the anatomy of the nervous system, could yet throw some doubts on my principles of the anatomy of the brain. But let us admit, for a moment, that the fibrous substance of the nervous system, does not derive its origin or its increase from the pulpy non-fibrous substance; let us admit, that there does not exist any diverging radiated fibres, coming from the three grand cerebral ganglia, and converging radiated fibres going from the grey substance, which covers the external face of the cerebral membrane; let us admit, that all this, and the unfolding of the hemispheres into a nervous membrane, covered with a layer of non-fibrous substance, are all chimeras; what would result from this for the physiology of the brain? Would the conclusion be, that such or such other part of the brain does not exist? That the different parts are not susceptible of a different development and energy? That the mechanical aptitudes, the instincts, propensities, and faculties do not increase in proportion as the cerebral organization is more perfect? Would it follow, that the moral qualities and intellectual faculties are not innate; that their manifestation is not subordinate to material conditions, to the brain; that the different instincts, propensities, faculties, are not among them-

selves essentially different, and consequently require different organs? and so on.

The physiology of the brain ought not to be in opposition to anatomy; this ought even to come to the support of it. But physiology has been found independent of anatomy. Nothing in the physiology of the brain has been constructed on any anatomical data whatever; nothing has been interpreted by the structure or the arrangement of the cerebral parts; the anatomy of the brain has only served as a confirmation of the physiological discoveries. These discoveries are solely due to observation, to observation a thousand and a thousand times repeated, and it is only by this, that it can be judged, refuted, or confirmed. Thus, instead of having recourse to untenable subterfuges, instead of reasoning and declaiming, we must observe; the physiology of the brain disclaims every other method: it was produced, it has grown, and it will flourish under the shield of observation.

Elementary Principles of Physiology; by CHARLES ASMOND RUDOLPHI, &c.*

After having rectified the ideas of Tiédemann, the justly celebrated professor of the university of Heidelberg, I ought to do the same with respect to those of Rudolphi, who also enjoys a great reputation at the university of Berlin. I will only refer to those assertions in his work, which he opposes to my physiology and anatomy of the brain.

It is frequently the case with M. Rudolphi, as with all my adversaries, that he maintains certain errors, either by adopting them from others or from hear-say evidence; it is thus that, § 251, he asserts, that

* Grundriss der physiologie von Karl Asmund Rudolphi, prof. d. Med. et Phisyl. d. Konnigl. Akad. d. Wiss. Zweyter Band. Erste Abtheilung. Berlin 1823.

the brains of the smallest carnivorous animals are the type of the largest; that they all have convolutions; in the rodentia, on the contrary, says he, they are all wanting. The convolutions are the folds of the cerebral membrane; they should then always occur, when the brain is at all complex. Let Rudolphi examine the brains of the kangaroo, the beaver, &c., and he will find the most distinct convolutions.

This professor has adopted the opinion of Tiédemann, wherein he regards the convolutions as the simple result of the dipping in of the vascular membrane to the cerebral mass. I have just exposed the absurdity of this mechanical idea, which is directly opposed to the procedure of nature. How, on this supposition, can they conceive, that the sanguineous vessels of the vascular membrane, every where accompany the nervous filaments of the white substance? But Rudolphi admits this false assertion, since he believes, that he can infer from it, that my theory on the folding of the cerebral membrane is contrary to the arrangement of the brain. "I have tried," says he, "all the manipulations indicated by Gall, in order to unfold the brain, and I have always found, that this cannot be effected but by severely lacerating it, and that the convolutions are never unfolded in a regular and natural manner, as he pretends." Rudolphi affirms, even, that he has dissected with the greatest care two hydrocephalic brains, and that he has seen nothing like this unfolding; he has only observed that the superior parts of the brain were thinner than natural, and he explains it in this manner: "the action of the accumulated water," says he, "is not so strong towards the inferior portions, where the cranium opposes a greater resistance, in consequence of its increased thickness; but it is more powerful upon the superior bones, which are more movable, and consequently yield more easily; so that the membranes and the brain become very thin in these situations; on the sides, on the contrary, and at the base of the cranium

they remain thicker. This is certain; and Walter, Sœmmerring, Ackermann, &c., have been perfectly correct in denying the pretended unfolding of the hemispheres."

Nothing is easier than to augment the list of celebrated men and professors, who teach their pupils, that the unfolding of the convolutions of the hemispheres into a uniform membrane is absolutely impossible. They suppose, that the white fibrillæ are directed perpendicularly towards the convolutions, which would really oppose an invincible obstacle to the unfolding; but examine a large hydrocephalic head, you will see nothing torn there; but you will see, that the radiated nervous fibrillæ of the great ganglions pursue a diverging direction forward, backward, laterally, downward, and upward, precisely like the small sanguineous vessels; that they thus form the internal, white, uniform layer of the cerebral bladder. When the water is evacuated, you can fold and unfold this same membrane, without deranging or tearing any fibrils; since you only fold or stretch the membrane, which is the result of the unfolding, naturally brought about by the action of the effused fluid in the cavities of the hemispheres.

Those, who cannot succeed in this artificial operation, certainly have a right to say, that they have not been able to convince themselves of this by their own dexterity; but to hear them, one would believe, that they accused me of imposture and charlatanism. But I repeat what I have said in the discussion of the same subject, in the work of Tiédemann; I invite Sœmmerring, Rudolphi, Blainville, &c., &c., to come and see with their own eyes this unfolding, which is so inconceivable, and, in the course of half an hour, they will be enabled to do it with as much promptitude as myself. This has fortunately happened to a number of young physicians, who did not suppose, that they were sufficiently learned to reject with impunity one of the most important discoveries in anatomy. If, even

in the two hydrocephalic cases, Rudolphi has not been able to discover the unfolding of the hemispheres, after having been so correctly informed of them, let him recollect the *dictum* of Vicq-d'Azyr, that, in order to see well in anatomy, something more is requisite than two eyes. Walter of Berlin also maintains the same opinion, founded on hydrocephalic cases, all the entire crania of which we saw unopened in his museum.

§ 252, Rudolphi also doubts, whether the nerves of the vertebral column derive their origin from the grey substance, placed in the interior of the spinal marrow. We must also admit, that he has not seen this anatomical fact; but we have seen it, and so well too, that in carefully drawing out the moderately strong nervous fibres from the longitudinal grooves from which they arise, there remains a small bulb of this grey substance adherent to them. There is but a single law for the origin and increase of the nervous fibrils; every where they arise from and strengthen themselves with the grey substance, which is not fibrous. This is evidently seen in the annular protuberance, in the *soi-disant* optic couches, and corpora striata, in the bulb of the olfactory nerve, in the grey band of the auditory nerve, &c., &c., and in approaching nearer the spinal marrow, we can see most distinctly the third pair, forming its trunk from filaments, which come out in a converging manner from the black substance, situated within the bifurcation of the cerebral crura. Finally, why does there always exist a more considerable collection of grey substance in those situations, where the spinal nerves arise, and why is it that this non-fibrous, grey substance is always in proportion to the size of the nerves, arising from it? But I forget that these protuberances, of which the nervous system of voluntary motion is composed, from the caterpillar to man, have not been seen by a great number of celebrated anatomists, and that this same grey substance, having at first only the consistence of

a transparent fluid, has not been admitted as such by Tiédemann?

It is especially at § 253, that Rudolphi discovers his knowledge of the organization of the brain. He admits, that the fibrils come from various directions to the annular protuberance; that, from this part they are continued to the optic couches, the corpora striata, and the lateral masses of the brain. Then he believes, that these horizontal fibres of the great commissure go to the hemispheres; that, from this commissure, the laminæ of the septum descend towards the fornix, which itself forms many connexions by means of its relations (*Mitseinen Schenkeln*); that the cerebellum, organized in a particular manner, dips into the annular protuberance by means of many horizontal bands; that this same cerebellum appropriates to itself a part of the fibrils of the medulla spinalis, and connects itself with the brain by means of particular fibrils and lamellæ. "Finally," says he, "if we regard the tuberculæ quadrigeminæ and their connexions; the pineal gland with its prolongations; the appendix of the brain, &c., &c., we shall observe such a connexion of fibrils, as will authorize us to believe, that these same fibres never change their direction. On the other hand, I believe that we shall find there a very important argument for the unity of the brain; for, there exists here a much more intimate interlacing than in the muscular fibres of the cavities of the heart, and in no point are they separated, as in the cavities and auricles of this last organ."

We perceive how defective and confused are the ideas of Rudolphi on the organization of the brain. We have here no connexion in the direction of the nervous fibrils; sometimes, he considers the brain from above downwards; sometimes, from below upwards; no law for the origin or increase of the white fibrous substance; in general, we perceive vague, erroneous, vacillating, contradictory, and indigested notions; and, after having spoken of the different, very distinct,

and separate parts; after having recognised the different directions of their fibrils; after having admitted, that the direction of these same fibrils is exactly the same; after having adverted to many very distinct portions, entirely separated from each other, he falls at once into the conclusion, that the brain is but a single organ in all its parts, where all is mingled and concentrated in a single uniform mass! This wonderful logic recalls to my mind that of M. Richerand, in his new Elements of Physiology, eighth edition, Vol. x. p. 166. After having said, that we can conjecture with a good deal of probability, that each perception, each class of ideas, each faculty of the understanding, belongs to such or such part of the brain; after having maintained, that it is impossible to study so combined an arrangement of the different integral parts of the brain, and to believe that it is not the effect of design, and that this division of the cerebral mass into so many distinct parts, so differently formed, does not relate to the different part, that each ought to perform in the mental operations; after all this, M. Richerand has also found there a strong argument, to prove the frivolity of my doctrine of the plurality of cerebral organs. It is thus, that great geniuses of all ages agree. Rudolphi asserts with Richerand, in a note to the same paragraph, that in different individuals, certain parts of the brain are more or less developed, and that the differences in dispositions and faculties probably depend on modifications of the development of different cerebral parts. Is not this language equivalent to an admission, that the different integral parts of the brain have each a different function?

Notwithstanding this vacillation, Rudolphi persists, § 263, in denying, that the brain is an aggregate of different organs. He says, that he has compared the external signs of the organs, with the convolutions which correspond to them, and that this comparison has shown to him, that, sometimes, many convolutions

belong to the same function, and that, sometimes, the functions of other convolutions are unknown.

We ourselves have very often compared the external form of an organ, with the cerebral part, the considerable development of which has produced this form, and we have always found a perfect correspondence between them, as I have frequently said in this work; but I have also said, that I did not as yet know the functions of all the cerebral parts; that, consequently, there were discoveries yet to be made; finally, I have more than once avowed, that it was as yet absolutely impossible for me, to circumscribe exactly the extent of each organ; I have even urged this consideration with those, who have believed that, in removing such or such parts of the brain, they would be enabled to learn its function.

"Let any one show Gall," continues Rudolphi, "the organs of robbery, murder, religious sentiment, separated from the cerebral mass; certainly he cannot do it." Let any one show Rudolphi portions of the medulla spinalis and oblongata; certainly he cannot distinguish them; it has been, however, well demonstrated, that these parts are aggregates of different nerves. But still, this argument has enabled me to demonstrate, that it is impossible to learn from an inspection of the brain, the function of any cerebral part whatever.

When Rudolphi speaks of the different functions of the pineal gland, the corpora striata, he implicitly admits the plurality of the cerebral organs. On the other hand, notwithstanding the most definite answer that I have given to his former objections, he is not, as yet, able to understand the difference that exists, between an entire organ, and the different apparatus which compose it. He, who attributes another function to the different origins of the optic nerve, than that of concurring to the formation of the optic nerve itself, — to the bulb of the olfactory, another function, than that of serving to the formation of the

olfactory nerve, shows that he is altogether a stranger to the laws of organization of the nervous system.

In the notes to the same paragraph, Rudolphi still, as formerly, denies, that the brains of animals are less complicated than the brain of man; and, § 225, he has maintained, that in animals the cerebral part placed behind the forehead, and a great portion of the posterior lobes, are wanting. Mistakes of this kind can only be committed, when we are pursuing a false path. For an answer to all this, I refer Rudolphi to Vol. II. page 368, edition in 8vo., and Vol. II. page 367, 4to edition.

It is in vain, that we demonstrate to the adversaries of the plurality of organs, that, from the lowest species of animals up to man, the cerebrum becomes more and more complicated; in vain do we show them the brains of fishes, amphibious animals, the mammalia, and, among these last, those of the inferior and superior species; those of carnivorous and frugivorous animals; in vain do we point out to them that of the monkey, where the convolutions, both anterior and lateral, are much less numerous than in man; in vain do we prove to them, by comparative anatomy, that the brains of animals are so much less complicated, or, that there are as many natural mutilations in them, as the number of their instincts, propensities, and faculties, diminishes. Obstinately bent on explaining the simplicity of the *moi*, they see in all these incontestable facts nothing but a diminution of the simple cerebral mass, which, according to them, is absolutely the same, belonging to the same function in all its parts, in all animals and in man. Rudolphi supports his position, by referring to the brain of the embryo before even the convolutions are formed. I will admit this proof, so soon as Rudolphi shall have shown me the brain of an embryo, that has possessed any moral quality or intellectual faculty. If, however, Rudolphi wishes to adduce the brains of embryos, he ought also to recollect, that Carus and Tiédemann prove de-

cisively by them the greater or less complexity of the different brains of animals, and that they maintain, that the brain of the fœtus successively passes through the different degrees of composition of the different species of animals, until that, which may be, for instance, the brain of a fish, shall come, by the successive development of new parts, to the condition of the human brain.

It is in this way, that Rudolphi flatters himself, that he has refuted my anatomical proofs of the plurality of the organs. Yet he has passed in silence, not only a third proof, but also a great number of objections with my answers.

Among the physiological proofs, he does not admit, that the instincts, propensities, and faculties, that are essentially different, require different organs. "Who knows," says he, "who can affirm, that this is necessary, and that the mind has need of different cerebral parts? Perhaps a larger brain, being a more powerful apparatus, is sufficient for it." The cerebral apparatus is heavier and more powerful in the elephant and the porpoise; would Rudolphi measure the energy of their minds? Can we not ask, with as much reason as the metaphysicians maintain, who knows, who can affirm, whether the mind, that pretended independent agent, has need of any cerebral mass whatever? A transcendental philosopher is assured, from the knowledge that he has of the soul, that the mind of Newton would have performed the same prodigies, had it been placed in the brain of a frog. Rudolphi does not believe this, considering the weakness of the apparatus. Neither does he think, that we should compare beasts with man. According to him, it is only the mind of animals, that requires different cerebral parts for the manifestation of their different mechanical aptitudes, their instincts, &c. For man, the Creator would have been able, perhaps ought, to have constituted his mind, entirely independent of this vile, inert matter.

I have mentioned, as a second physiological proof, that one species of animals is endowed with qualities and faculties, of which another species is deprived; which would be impossible, if the whole cerebral mass was but a single organ, or rather, if each essentially different function, was not peculiar to a particular cerebral part. "But," says Rudolphi, "these particular parts are no where demonstrated." This professor manifests by this, that he has never compared two brains of two different species of animals. Let him compare the brains of the dog and cat, he will perceive quite a different number of convolutions, a totally different arrangement; let him compare the middle lobe of the brain of the ox, the middle lobe of that of the dog, wolf, tiger, &c.; let him compare the brain of the hen with that of the crow, the brain of the pigeon with that of the hawk, and, if he does not constantly find the material cerebral cause of the difference of their instincts, in accordance with my discoveries, if all comparative anatomy does not disclose to him a difference in the brain, where there is a difference of instinct, I will console myself for his blindness, in saying: *non omnia possumus omnes.*

We are not now speaking of modifications of the same quality, for instance, the singing of different species of birds; the question is of the instincts, propensities, and essentially distinct faculties, such as I have ascertained them. Is there a single organ in the living organism, which governs two essentially different functions? Does the auditory nerve see? Do the kidneys secrete bile? the stomach, respire? I see one animal without eyes, hence I conclude that he does not see; in another, I find no olfactory nerve, I conclude, that he is deprived of the faculty of smell, &c.; if I see different species of animals, some of which build and others do not, some of which sing and others do not, the metaphysicians complain, that I suppose in some, the existence of organs of which others are deprived.

"If these organs exist," says Rudolphi again, "animals cannot be changed by instruction." As I have fully answered all these objections, I refer the reader to the previous volumes. Now it remains for Rudolphi to prove, that all the species of animals, either have a different mind or soul, or, that they all possess, either by nature alone or from instruction, essentially the same qualities and faculties, always proportioned, as it respects their energy, to the mass of an homogeneous brain in its whole extent.

My third physiological proof: — the qualities and faculties, which are found in all individuals of the same species, exist in these same individuals in very different degrees; which can only be explained by the different degree of development and activity of the different organs of these qualities or faculties. "But," Rudolphi opposes to this, "we see, in all individuals of the same species, the same cerebral parts; and we see no difference, except as to the mass in general, or in certain parts of it." In this objection, Rudolphi seems to admit, that the brain is only the same in different individuals of the same species, and not in all species, as he has just maintained. He is right; since the qualities and faculties are essentially the same in individuals of the same species, their brain ought to be essentially the same. He is again correct, when he says, that we see no difference, except as it respects the mass in general, or in certain places, that is to say, in certain parts; which means, that such or such organs are more or less developed, according as certain qualities or faculties of these individuals, are more or less energetic. Already once before has Rudolphi made a similar confession; how does such a conscientious admission accord with denials, so formally made on the same subject?

Thus compelled to make certain concessions, as it were, by surprise, Rudolphi appears to solace himself in saying, that we do not know the signification of these individual differences. No one will dispute this

with him, provided he only speaks of himself and the adversaries of organology; still, these differences have a signification; and are they not of sufficient consequence to engage anatomists in their study? And if Spurzheim and myself, and so many others, affirm that we have learnt to interpret these differences of development of the different cerebral parts, would it not be decorous, instead of denying, with such haughty superciliousness, such interesting relations, to examine without prejudice how far observation confirms my pretended discoveries?

In my fourth proof, I have developed the following proposition: in the same individual, the different primitive and fundamental qualities exist in different degrees; which would not be the case, if each primitive quality did not depend upon a particular organ.

"But," says Rudolphi, "this difference of propensities and faculties does not take place, as a general rule. Whoever is eminently a man of genius, as Goëthe, for instance, has brought to perfection every thing that he has undertaken with ardor, whilst a feeble intellect is never distinguished. They talk of great musicians, who in all other respects are extremely limited in mental capacity; but, if they really were great musicians, they would not be so; they perhaps devote themselves entirely to music, and neglect all other pursuits. The cunning man deems all those foolish, who take no interest in his craftiness, or that despise it. There always exists a certain equality of faculties and propensities, provided we do not judge by the superficial opinions of the multitude."

Rudolphi, in this objection, is not correct. It is certain, that those and even great geniuses, who devote themselves exclusively to a single object, are necessarily very ignorant in other respects. In this manner of expression, people generally confound knowledge, instruction, or erudition, with innate talents. The greatest musicians may be ignorant of the first rudi-

ments of history; the greatest poets may likewise be totally ignorant of the first elements of mathematics, and so on; but this lack of knowledge does not prove, that musicians and poets are incapable of learning history and mathematics. Neither will it be denied, that an eminent genius, as we usually understand the word, genius, can unite in himself many eminent dispositions, and excel in many dissimilar things; as a proof of this, we have Goëthe, Voltaire, Haller, &c. &c. Let us not, however, forget that many occupations, apparently very unlike, require the employment of nearly the same moral and intellectual powers. The faculty of observation, the force and promptitude of the judgment, prudence and circumspection, the exact knowledge of external data, constitute equally the genius of the physician, the general, and the diplomatist, &c.

But nothing is more true, more constant, than the different degree of the propensities and faculties in the same individual; not a single man, not a single animal, is an exception to this. In bringing forward this proof, I wish first to direct the attention to the different power of the external senses. The same individual, that possesses excellent vision, may have the hearing or the sense of smell, very feeble. The most quarrelsome dog, that bites at every one, has often not the least propensity for the chase; another, on the contrary, is the mildest and most peaceable animal in the world, and yet he is devoured with the desire for hunting and killing; a cowardly bitch, without any instinct for the chase, passionately devotes herself to her young; another abandons them with indifference, and defends the life of her master at the risk of her own. If Rudolphi denies these facts, so generally known in natural history, are we not justified in saying, that, notwithstanding his inexhaustible erudition, he is greatly wanting in the talent of observation, or is it because he has never lived intimately with any animal? Among animals, he certainly will not say

that *perhaps* such a dog, horse, cat, respire but for a single object.

Animals, pretends Rudolphi, prove nothing as it respects man; — well, animals require many organs for the difference of their instincts; who knows, if the mind of man requires organs at all? But it is useless to insist again on this last point; let us see if man manifests the same phenomena, as animals.

If you have ever been a parent or teacher, you cannot have failed to remark, that such a child or pupil has certain predominant intellectual or moral dispositions, which cannot rationally be accounted for, either by education or preceding exclusive application; that, in many instances, it is even impossible to divest these children of their natural tastes and inspire them with others; it is even the earliest foundation of a good education, to learn and profitably manage the strongly marked dispositions of children. Every day we see young people, who have an astonishing faculty of learning by heart, and who are wanting in intelligence; others, who are remarkable for their intelligence, but have great difficulty in committing to memory: such an one has a good memory for dates, and none for localities; another forgets individuals, and remembers a concert, &c. &c. There is not a single individual, even of the most limited capacity, that does not disprove the assertion of Rudolphi.

Furthermore, if this professor would come to the determination to observe the organization of the brain and head, he would sometimes see an individual, in whom the anterior region had acquired a very great development, and the posterior region, on the contrary, a very small one; sometimes he would see another individual, in whom quite the contrary had taken place; he would see other individuals, in whom one cerebral part predominated, and another was arrested in its development. This method is the only one, that will explain the difference in the propensities and faculties in the same individual, and which absolves us from

the necessity of referring to the biographies of all the great men, and of having recourse to *perhaps's*, sophisms, assertions, and gratuitous denials.

Finally, since Rudolphi admits, that there are men of genius and fools, and that these last, with all possible care, can never rise above mediocrity, is it to a good or evil caprice of their mind, which *perhaps* does not require organs, that we must attribute this difference? As it respects men of genius, will Rudolphi maintain with M., H., or Z., editors of the *Journal des Debats*, that it is fathers, teachers, sovereigns, that make great musicians, architects, painters, poets, generals?

Fifth proof for the plurality of the cerebral organs: the essentially different functions of the brain do not manifest themselves simultaneously, either in man or animals. Some are constantly observed, while others appear or cease to be manifested, as they are influenced by different seasons or ages, which phenomena could not occur, if all the functions depended on a single or homogeneous organ.

Rudolphi brings forward, for the third time at least, the same objection to this proof: "the child," says he, "begins by receiving impressions; it is only after he has seen much or read much, that he can commence comparing and judging; judgment then will be subsequent to impressions; for, he supposes acquired knowledge. It is the same with all the faculties of the mind; they cannot be developed until the conditions necessary for their existence are fulfilled."

Either Rudolphi has not read my answer, vol. II, p. 228, &c., or, he lives only in his vast erudition, which prevents him from perceiving the force of my arguments; therefore, I refer both him and my readers to them. Now he adds, that in the brain one faculty is developed after another; for instance, memory the first, without any division of the cerebral organs taking place. If I consult the laws of my thinking principle, I reason thus; since in the brain one fac-

ulty is developed after another; since one can be developed before or after another, I conclude from this, that one part of the brain belongs to a different function from that, to which another belongs; that consequently the brain is an aggregate of many organs. I have however thought, that I could perceive, that Rudolphi finds himself a little embarrassed, since he retires behind the action of the mind (*Geistiges Wirken*), and refers his reader to his psychology (*Seelen Leben.*) An excellent method of conciliating the minds of the spiritualist! In the mean time, the mind appears to me to be less a spiritualist, than the spiritualists themselves; it knows that, in early infancy, the brain is not yet sufficiently developed; and on this account it remains in absolute inaction. In proportion as the different cerebral parts are developed, it is partially produced upon the scene; it plays its entire part as soon as the brain is entirely developed; then, in proportion as this last is enfeebled, it is more retiring, and, when the period of decrepitude arrives, it leaves the stage entirely; when the brain is in inaction, so in sleep, fainting, the mind reposes also: when there is a very great or very little development, either of the whole brain, or of particular parts of it, it is either entirely or partially embarrassed or imbecile; when the brain is affected by intoxication or inflammation, the mind manifests its disordered state by delirium and insanity; this is the independent spiritual action of the mind!

Sixth proof of the plurality of organs: a long continued action of the mind does not equally fatigue all the intellectual faculties; the principal weariness is partial, so that we can continue our occupations, provided we change the subject in which we are engaged. This would be impossible if, in any occupation of the mind whatever, the whole brain was equally active.

Here again Rudolphi reproduces the same objection, to which I have replied in the second volume, pages 438 and 443. He is either ignorant of any

answer, or he intentionally leaves his readers ignorant of it. "The same thing," adds he, "happens for all the other organs, of which every one admits the *unity*. The same exertion fatigues, and change of action revives, until finally total repose becomes necessary. We can also pass from a severe mental exertion to one of less intensity, and finally, to absolute repose. This rest would not be necessary, if every time other organs were in activity. Our *moi* knows very well, that it is constantly in action, and a repose, which is not brought about by fatigue, brings ennui; in what cerebral part must we seek this on the hypothesis of Gall?"

On the hypothesis of Rudolphi, how can you conceive of the fatigue of the independent *moi*, the ennui of a *moi* essentially and constantly active? Multiply, gentlemen professors, more and more the occult powers; personify life, vital power, the *moi*, &c.; deprive us of these miserable material organs, the nerves and the brain; then will the physiology of the brain become simple?

And these organs, the unity of which no one denies, where are they? Is it the eye, is it the organ of hearing? Let us hear a very learned professor of the university of Berlin, M. Rudolphi; in speaking of taste, page 283, he thus expresses himself, and with great truth; "the tongue tastes on its whole surface, and particularly on its edges; yet at its tip the savor of the same substances is not the same, as on its anterior and posterior parts, as many authors have already observed. Certain kinds of savor are more developed, either on the anterior or posterior part of the tongue." And he derives this difference of taste from the difference of the nervous papillæ. Is it thus then that Rudolphi demonstrates the *unity* of the other organs!

Finally, I have spoken of the origin of certain mental diseases, and of the method of their cure; I have referred to monomania, or partial mental diseases, and I have taken them as two new proofs of the plu-

rality of the cerebral organs, in giving to the explanation of these phenomena a great physiological and pathological development. Vol. II. p. 443, 450, &c.

Rudolphi says, on the contrary: "No one will be of the opinion of Gall. By a singular incoherency, he takes for example the organ of music; is the musician perfect in every thing," says he? "is there not perhaps wanting in him delicacy, a taste for the simple, for the sublime, in his lessons? All musicians accuse each other of having false ideas in their art. Does not one stomach digest meats very well, and another very ill? Where is the man that does not deceive himself, even in the objects of his studies? Does not this happen to Gall in his work; does not the same thing happen to the author of this physiology? If all the different fixed ideas required a particular organ, there would be millions; but, slight modifications of the same parts suffice for their production."

If Rudolphi had read, or if he had had the courage to inform his readers of my answer to these same objections, vol. II. p. 462, 498, vol. II. p. 428, 449, quarto edition, he would certainly have dispensed with this unconnected raving, altogether unworthy of him. It is the duty of an author, especially if he is a professor, to acquaint his pupils with the true opinions of those whom he pretends to refute, the motives or the proofs of these opinions, and the answers given to objections made by adversaries. But Rudolphi, like all my antagonists, has not fulfilled this obligation; and this conduct will always be the signal of the triumph of the physiology of the brain.

Let us now see what are the ideas of Rudolphi on the functions or the value of the brain:

"Let us suppose," says he, "what however I do not admit, that the brain is provided with particular organs for its special operations; we are compelled to admit, that we are not acquainted with any. All that we can with assurance admit is, that certain cerebral parts are in immediate connexion with the external

senses; but this cannot be demonstrated for the organ of visions, but with the optic thalami, corpora geniculata, and in part with the anterior pair of the corpora quadrigemina, and, as it respects the olfactory nerve, the bulb of this nerve, and the anterior lobes of the brain. It is not now certain, whether the sides of the fourth ventricle are the central organ of the auditory nerve. Then we know, that lesions of the superior region of the brain (in going from the corpora striata) cause a paralysis of the opposite side; that lesions of the annular protuberance destroy the equilibrium between the anterior and posterior half of the brain. On the contrary, nothing is known of the organs of Gall. It is true, Gall believes, that he has discovered a great number, and that he has many times perfectly demonstrated them. But the source of his pretended knowledge is an untenable cranioscopy. He believes that he can find the same form of head in men, who are distinguished by a common quality or faculty; for example, the talent for music, memory of words, &c.; and, when a part of the cranium is protuberant, he believes that the cerebral part, situated behind this protuberance is greatly developed, and that the talent in question depends on this part. *Vice versâ*, he pretends, that this protuberance does not exist, when the talent is wanting; on this account he was obliged to place all the organs on the surface of the brain. The facts, favorable to his hypothesis, were placed in a strong light, while those contrary to it were kept out of sight, which proves the nullity of the whole of his system. When, for example, any one had a portion of his cranium, which denotes a certain talent strongly developed, without the actual possession of it, the answer is, that the disposition to this talent is very strong, but the talent has not been developed; yet this great disposition ought necessarily to have effected the development of the talent. So also, when in any one who possesses a talent to an extraordinary degree, the part of the cranium, corresponding to this

talent not being prominent, he escapes behind this miserable subterfuge, that the disposition is in reality feeble, but that education or application has occasioned the great development of the talent."

Rudolphi and Ackermann, since they impute to me this method of procedure, probably find it very convenient. A large number of those, who only know my discoveries by report, in their ignorance of better means, imagine that things go on in this way. I invite then Rudolphi to read, in my works, first the preface, the introduction, the exposition of the means that I have constantly employed, to discover the fundamental powers and the seat of their organs; my discourse on the difficulties of making these discoveries; my treatise on the influence of the brain, on the cranium in different ages, in health and disease; the history of the discovery of each faculty and the seat of its organ; finally, the particular treatises on each fundamental power, with the numerous proofs derived from man and a multitude of animals, and he will be astonished, if not at the uncandid manner, at least for the imprudent levity, with which he presents my works to his readers and auditors.

Every line of what he pretends to know of the anatomy and physiology of the brain, reveals his profound ignorance, and the most ridiculous pretension, that no one knows that, of which he is ignorant.

"I have had occasion," continues Rudolphi, "to examine many hundreds of brains; but I have never found any thing which was in accordance with the theory of Gall. Almost always I have found congestions; very often, an effusion of water, of a plastic lymph, of blood; very often, inflammation of the membranes; very rarely, inflammation of the cerebral substance itself; softenings of a greater or less extent, but always irregular; very often, indurations (principally in scrofulous individuals); once, an induration of the whole annular protuberance; sometimes, other tumors," &c.

Happily, the authority of Rudolphi is not of the first order. There are so many very true and positive anatomical facts, that he has not seen, or that he has wrongly seen! For instance, he has not seen the series of prominences in the spinal marrow; the true decussation or interlacing of the pyramids; he has not seen the natural unfolding of the hemispheres in hydrocephalic subjects; he has not properly observed the organization of the cerebellum and the annular protuberance, the formation of the great commissure of the hemispheres; he has not been able to see the artificial unfolding of the brain and cerebellum, the origin of the optic nerve; the relations of the brain itself, with the different brains of the different species of animals, &c. &c. In general, Rudolphi sees very little by himself; he adopts or denies by his learning. I will wager, that, at this very moment, he does not perceive that, as a general rule, the cerebellum is much smaller in proportion to the brain before the age of puberty, than in the adult period; that, in old age, the cavity of the cranium becomes more narrow, and that the convolutions of the brain are more flaccid and soft; that, in woman, the posterior lobes generally extend farther beyond the cerebellum, than in man, &c. &c.

How many things could I cite, that anatomists and physiologists did not see, a few years since, which all men, versed in new discoveries, see now? In order to see, we must have complete and exact ideas, we must have principles derived from the organization itself, and, finally, we must have learned to see.

Rudolphi reproaches me with having made changes in the organs. If I had written earlier, certainly I should have made many more. I have never wished to be talked about; from this very day, whoever will convince me of the falsity of all my discoveries, I will be the first to announce it to the public. Truth is my object. I place that above all personal and exterior considerations. May all my adversaries follow my example!

This professor also attempts to invalidate the stability of my fundamental qualities and faculties, and the seat of their organs, because M. Spurzheim has introduced some modifications into the physiology of the brain. I have already replied to this idea of M. Jourdan; if such an argument was of any weight, what would become of all the objections of my antagonists? There is not one, that has not been contradicted, undervalued, or refuted by one or the other of them. In their view, it is only their own arguments that have great weight.

Finally, Rudolphi enumerates the fundamental powers, as I have established them. He says that I accord vices and virtues to animals. Vice and virtue suppose moral motives, of which the most noble animals have, perhaps, but a very obscure notion. But Rudolphi (in his zeal for the rights of man) has confounded good and bad qualities with vice and virtue.

To prove the nullity of all these discoveries, Rudolphi undertakes to refute the existence of the organ of the propensity for propagation. Among my proofs he cites, that the cerebellum is greater, when this propensity is the most imperious, and during the rutting season of animals, and smaller, on the contrary, in those that are castrated and mules; that in those addicted to onanism, the cerebellum diminishes and becomes painful; that the propensity to propagation loses its energy after lesions of the cerebellum. The reader, who may desire to refer again to my treatise on the propensity to propagation, will see that Rudolphi has hardly glanced at my arguments. But this is of no consequence, for, in conformity with his expeditious habit, he opposes me, 1st. in maintaining that the cerebellum is smaller in animals than in man, without there existing in them less energy of the propensity for copulation. How powerful, says he, is this propensity in birds, in whom the brain is so small, compared with that of mammalia, and especially in comparison with that of man?

Rudolphi has, then, entirely forgotten what I said, vol. II. p. 280, octavo edition, and vol. II. p. 318, quarto edition, on the absolute size of the brain and its parts, compared with their functions. From the ideas of this professor, it would be difficult to conceive how ants, bees, &c., can have the instincts of propagation, love of young, construction, self-defence, laying up provisions, &c. He confounds the brain of birds with their cerebellum, and he does not remember that birds, like most mammalia, have but a single season for their loves, whilst man is influenced by this propensity both in winter and summer, autumn and spring, often from before the age of puberty, even to old age.

"2d. All trace of cerebellum disappears in moluscous animals and worms, &c., and also in those, lower in the series of beings, and yet we see them all influenced by this propensity."

So long as there exists a cerebellum in any animal whatever, there is a multiplication of their species by copulation, or an analogous act. When the cerebellum no longer exists, no longer is there any connexion between the sexes; let Rudolphi demonstrate to me the contrary of this.

"3d. If we consider the large development of the cerebellum in man, we cannot refuse to admit, that this part possesses a great proportion of the perfection of the organ of the mind."

The perfection of the organ of the mind depends on the perfection of the brain and its particular or specific action, and this same brain is not only the agent of the superior faculties of the mind, but it is also of the sentiments and propensities; the first, the most imperious, the most indispensable of these propensities, belongs to the cerebellum.

"4th. Cretins, in whom the cerebellum is small, are more or less imbecile, whilst the venereal propensity is often exalted to erotic mania."

Again, Rudolphi does not in the least regard what

I have said, vol. III. p. 333, octavo edition, and vol. III. p. 131, quarto edition, on the activity or inaction of the instinct of propagation in idiotism. He would have seen, among other things, that in salacious cretins the cerebellum has always a very great development; that, on the contrary, in those cretins that have no propensity of the kind, the cerebellum is very small. Thus, Rudolphi decides upon a question, that he has never examined in different cretins themselves.

"5th. Lesions of the posterior parts of the head easily bring about a want of memory," &c.

What memory? And lesions of the posterior parts of the head, are they lesions of the cerebellum? Rudolphi has probably read, that a certain pedagogue placed memory in the posterior part of the head. We have always erudition without personal examination.

"6th. It is not the cerebellum, but the spinal marrow, which suffers immediately by the abuse of physical love. Hence, there results dorsal consumption, with paralysis of the lower extremities."

In these cases, can we presume that Rudolphi has examined both the cerebellum and spinal marrow, when he tells us that there is only atrophia of this last, and, not of the cerebellum?

"7th. That which Gall advances concerning the increase of size of the cerebellum, during the rutting season, has never been demonstrated by experience; but he has confounded the swelling of the neck and nape with the size of the cerebellum."

I am very far from denying, that Rudolphi has never observed this increased nervous turgescence of the cerebellum, during the rutting season, or during the loves of animals. For this, it would have required a considerable collection of heads and brains of animals, killed in the moment of heat, to compare them with as many brains of animals, destroyed in the opposite season. It would be difficult for so learned a man, to have recourse to so laborious a source of true knowledge.

Finally, Rudolphi continues, that consequently I am deceived, as to the function of the cerebellum, as of the other parts. In the mean time, he has found it convenient to make no mention of the history of this discovery, of observations already made previously to mine, by Hippocrates, Apollonius of Rhodes, Van Der Haar, Tissot, &c. He says nothing of successive manifestation, increase and decrease of the instinct of propagation, always in direct relation with the development and decrease of the cerebellum in the different ages; of the very energetic activity of the instinct of propagation, in the period even of infancy, when the cerebellum has acquired an excessive premature development, whether the sexual parts are developed or not. He never has attempted any verification, nor spoken of our experiments made on men and animals, respecting the degree of their instinct for physical love. Has he compared the cerebellum, or the external sign of extremely amorous individuals, with others, who have no idea of the difference of sexes? Has he examined individuals, who were powerfully excited to the commission of certain vices, that are punishable with death in England? Has he made similar researches among animals extremely amorous, in comparison with other individuals of the same species, but quite indifferent in respect to this act? Has he compared the cerebellum of males with that of females, as it regards the different degree of the propensity to propagation; for instance, the dog and the bitch, the bull and cow, the stallion and mare? Has he compared the cerebellum of man with that of woman? Has he ever given any attention to the kind of caresses, which many animals make to excite the venereal act? Has he ever made any observations on the influence of castration, whether entire, partial, or unilateral, on the cerebellum? As a physician and physiologist, has he observed the influence of the lesion and the diseases of the sexual parts on the cerebellum, and the lesion and diseases of the cerebel-

lum, on the sexual parts? Does he know the cause of erotic mania? What does he think of those cases, where the instinct of propagation survives the destruction of the genital parts, and exists in the absence of these parts? Does he know the nature of apoplexies, so frequent after or during a very ardent act of copulation? These are so many questions, resolved in my treatise on this instinct and its organ, but which weary the patience of the antagonists of the physiology of the brain.

In treating of the functions of the external senses, Rudolphi cannot conceive, page 284, how I can attribute to animals an organ of taste of greater extent, than belongs to man. He maintains, that most animals have no taste, and that the very few of those who do taste, have the faculty very imperfectly; according to him, we find nothing remarkable in the cavity of their mouth, and in those that swallow their food whole, there certainly can be no taste. Animals do not taste in chewing and swallowing their food; it is only in ruminating, that they perceive savory substances; formerly, it was the sense of smell that directed them; thus, says he, birds of prey swallow little animals without tearing them; the échâsses and palmipèdes, the insectivorous and graminivorous animals swallow frogs, insects, and grains, whole; there are but a very few animals, that enjoy the sense of taste to such a degree as the parrot.

As my treatise, on the functions of the external senses, is not in this edition of my works, I will copy from the large edition, the following passage, which served as an answer to an objection of professor Ackermann, and which affords us the extent of the opinion of Rudolphi.

Professor Ackermann, causing the perfection of the intellectual faculties of man to be derived from the delicacy of his senses, maintains, that the nerve of taste is proportionally larger in man, than in animals; that in him, it is spread out on a softer and more mov-

able tongue, the nervous papillæ of which are covered with a much finer epidermis than in animals. But, proportionally, the gustatory nerve and all the fifth pair are very distinctly greater in animals, than man. The nervous papillæ in multiplied forms, disseminated in the pharynx, the palate, on the whole tongue, the internal surfaces of the cheeks and the lips, are much larger and more numerous than in animals. In order to make the surface of the organ of taste more extensive, the palate, in many animals, is covered with a membrane, grooved and studded with numerous nervous papillæ; and, in general, the apparatus, which serves for the action of eating, is more extensive in them than in man. In the dog, bear, monkeys, the epidermis of the tongue is as fine, as that of the tongue in man; if this organ in us is more movable than that of animals, this property is only connected with the faculty of speech, and has nothing to do with taste. Besides, if we reflect that, in the action of eating, the organs of animals procure for them the most intimate and enduring pleasure; that a great number of them, when they are awake, spend nearly all their time in eating or ruminating; it will be difficult not to admit, in animals, a more perfect and extended taste. Consequently, whoever shall be disposed to expect, from a better organization of taste, intellectual faculties, in some respects more perfect, ought at least to let us know, what are the alimentary preparations invented by the dog or ox.

We cannot admit the general opinion, that birds have an obtuse taste; at least, it seems to us impossible, that all are in this condition. Blumenbach has found the organ of taste in the duck, comparatively much larger than in the goose; so also we observe that the palate of many birds, such as birds of prey, heath-cock, &c., is garnished with nervous papillæ, very numerous and strong. A great number of birds do not swallow their food at once; the tom-tits, for instance, in a manner lick it; most birds, that live on

insects and grains, crush and bruise them; what reason should we have in this case, to attribute to them a less perfect taste than other animals? Let any one give to the canary bird, bullfinch, nightingale, or cuckoo, many different kinds of food, each will select without fail, that which he likes best; the canary prefers dogs-grass; if we give to nightingales, that are newly caught, the larvæ of ants, a great number will die of hunger, because they do not know the kind of food; if we put them in their beak, they usually reject them; but if we crush them, they swallow them with avidity. This evidently proves, that they have a very delicate taste.

Birds even that swallow their food at once, such as hens, pigeons, &c., distinguish berries and grains by touching them with the end of their beak. Let any one mix the grains of vetch with those of the *robinia caragana*, the *cytisus* of the Alps, &c., the hens and pigeons will take them all without distinction, but they will soon reject the two last. Thus the horny extremity of the tongue does not exclude taste; it seems on the contrary to be a prolongation of the lingual nerve, destined to give this part a more delicate taste. If storks have been accustomed to receive in their beak rats and frogs, that are thrown to them, they swallow them with avidity, after having tossed them many times in the air, recaught, and crushed them; but if we throw them a toad, they instantly reject him; they greedily swallow large flies and bees, but, if they catch an insect that they do not like, they reject him. Swallows and all birds, that live on insects, do the same.

It is an error, then, to suppose that a humid solution is first necessary to cause the sensation of taste. The surface of grains and insects, certainly excites on the tongue oleaginous, alcaline, spirituous impresssions, that the taste instantly perceives, by means of instruments organized for this purpose. Vol. i. p. 152, quarto edition.

Add to this, that the dog, when hungry, swallows without chewing, greedily chews filberts, almonds, chestnuts; that he laps milk with great delight; that, like almost all other animals, he loves sugar; that the hog and duck, who root and dabble in the mud, tear and chew roots, insects, frogs, &c.; roebucks and pigeons, who greedily seek dirty slime; is it possible to deny an exquisite taste to all these animals? It is then much less conceivable, how Rudolphi can maintain, that the sense of taste is wanting in most animals.

§ 315, Rudolphi makes the greater part of the optic nerve, to arise in the so called optic thalami. "I have had occasion," says he, "to dissect the brain of an infant, in whom the right eye and orbit were wanting, while the left eye was well organized. The corpora quadrigemina were of the same size on both sides, but the left optic thalamus alone maintained its natural position and size; the right optic thalamus formed at its inferior part a projection, from which arose a kind of appendix, a sort of rudiment of the optic nerve, which was wanting, and which was again lost in the brain. This case evidently proves, that the optic nerves do not at all derive their origin from the tuberculæ quadrigeminæ, although I do not protest, that some connexion exists between the corpora geniculata and the anterior pair of the tuberculæ quadrigeminæ for the origin of the optic nerve."

Has Rudolphi examined the proportions of the two hemispheres in the case cited? He is certain, that, if there was a diminution of substance in the right optic thalamus, the right hemisphere ought equally to be diminished. Quite often we have met with brains, particularly in insane hospitals, where one hemisphere was smaller than the other, and this diminution always coincided with a diminution of the corresponding thalamus. We have not observed in any of these brains, a diminution or atrophy of the optic nerve, unless there was also a diminution in one side of the

tubercula quadrigemina. Besides, the optic nerve certainly does not derive the whole of its origin from the tubercles; the internal and external corpora geniculata, &c., furnish it with a large number of nervous fibrillæ. It is on this account, that the optic nerve is not in proportion to the size of the tubercles, which, as in the mole, may be very large, with an extremely delicate optic nerve. But, what does this confused language mean; *the optic nerve certainly does not derive its origin from the tubercles, and some connexion exists between the corpora geniculata, and the anterior pair of the corpora qnadrigemina for the origin of the optic nerve?* I still oppose to the assertion of Rudolphi, that Sœmmering, Spurzheim, myself, and many others, have always seen a diminution of one side of the tubercles, when there was an atrophy in one of the optic nerves. There is not then a doubt, that, in this observation, the professor has not seen rightly.

In my large work, I have maintained that man, as well as animals, distinctly mark objects but with one eye. I have distinguished between the passive and active function of the senses. The two eyes see passively; but every individual fixes the object with one eye only. Rudolphi pretends, § 320, that it is easy to refute me. I believe, that it is still much easier to have the assent of every reader. No one doubts, that we see with both eyes at once; since, with the exception of a very few observers, every one confounds passive with active vision. Not to hold the reader in suspense, I shall be pardoned, if I copy from my large work, the passage relating to this subject, vol. i. p. 189, quarto edition.

We cannot conceive how, even to this day, so little attention has been given to this general fact: that all the operations of animal life, and, consequently, those of the senses, are, in certain circumstances, purely passive, and in others, purely active. In waking and sleeping, it is not possible for us to perceive or not

perceive the impressions of objects on our senses. We feel, taste, hear, see, touch, without the action of our will. In this respect, the senses are passive. It is quite different from this, when we direct our attention positively to the impressions of the senses. In smelling, tasting, hearing, seeing, feeling, our own internal activity acts upon the objects.

The double organs of the senses always contribute to cause us to receive the impressions passively, and to excite in the brain a sentiment, more or less obscure or distinct, of these impressions. We hear with two ears, and see with two eyes, when sound and light impinge upon these parts, without our express participation; but, so soon as we react actively on these objects, one only of the two organs acts. We hear attentively but with one ear; we accurately observe an object but with one eye.

We foresee, that this assertion will seem erroneous to most of our readers; and as, in our public lectures, we have always proposed to explain, in some sort, the reason why we see single with two eyes, it has frequently been opposed by our adversaries. To say that one single organ is active, while the other is at rest, is, according to Ackermann, to use a pitiful subterfuge. This professor believes, in relating an experiment which we shall cite, that he has demonstrated incontestably, that we observe objects fixedly with both eyes. Such also is the opinion of Autenrieth, and there is only a very small number of physiologists, who have been able to seize the idea, that we only see steadfastly with one eye.

Let us offer to our readers the facts, on which this assertion rests. One of us (Gall) in his youth, was fond of playing with a long tube slightly curved, through which he blew peas; he could always very accurately hit the objects aimed at; he frequently, on the contrary, failed when he used a tube perfectly straight; he could not account for this difference, until, finally, he placed the straight tube in a direct line

My readers know how to understand this, so far as cranioscopy is concerned; it is indeed very pleasant to observe the obstinacy of most of my adversaries, in wishing to reduce all my discoveries on the anatomy and physiology of the brain, to simple cranioscopy; they demonstrate by this, either their bad faith, or their complete ignorance of the true end of my labors. In denying the utility of cranioscopy, they not only deny the plurality of the cerebral organs, the different development of these same organs, and consequently the different forms of the brains and heads, but also all influence of the brain on the form of the head, all possibility of arriving at the knowledge of the seat of the organs. And do you know why they say, that the cranioscopists do not despise physiognomy? Because, that in visiting, in our travels, prisons, hospitals for the insane, &c., many professors, pupils, ministers of state, have witnessed how frequently we have determined, with the utmost precision, the nature of the crimes or the insanity and the predominating propensities and faculties, of the prisoners and the insane. In order to escape the necessity of rendering this homage to cranioscopy, they bestow all the merit on physiognomy. But, as they neither believe in the one nor the other, how can they explain these facts?

Yes, I have created an art of imitation founded on unshaken principles, the only one which reveals to us the mystery, the source of pathognomy, the gestures and the attitudes, that our thoughts, sentiments, propensities, internal emotions produce in us externally. Read my treatise on this principle of imitation, and you will be convinced, that each gesture that accompanies the strong action of an organ, is a proof of its seat, and consequently of the plurality of organs. But, here especially, something more is requisite than knowledge.

Let us suppose, then, that cranioscopy, or rather the physiology of the brain, has not amounted to much, organology should have taught me not to ex-

towards the object. Shut or cover one of the eyes, the other will not move at all, if it is the one with which the person is in the habit of looking accurately, but if this last is covered, the other immediately turns slightly inwards, which enables it to fix itself upon the point of observation; let then the closed eye be opened again, the other then involuntarily and unconsciously turns outwardly to the same extent, that it had previously moved inwards. This experiment proves then, that the two eyes are not equally fixed on the same object, and cannot look upon it at the same time. Even in squinting, when the object appears double, we can fix our sight but upon one of the images and with one eye; the second image is only seen passively. Animals, whose eyes are placed at the side of the head, can only look with one eye; Cuvier has also remarked this, and has concluded, that the same observation can be applied to man. In reality, man, for instance the painter, and animals that have their eyes in the front of the head, such as the dog, monkey, &c., evidently prove by their gestures and the motion of the head, sometimes on one side and sometimes on the other, that they see an object, sometimes with one eye, and sometimes with the other.

Lecat, whose excellent work would merit a revision, is the only writer, where we have found our opinion nearly expressed. "If it could so happen," says he, "that the mind should leave one of its eyes vacant, that it should use but one eye at a time, or that it should only attend to one of two images, the difficulty would be soon obviated, and it is true, that the mind generally does so. We look at an object attentively, but with the eye of that side next the object; and the other is, as it were, at rest, until its turn of activity comes to take the place of the former. I have even observed, that there are certain days, when it is almost always the turn of one eye to see objects, and I have reason to suspect, that this happens, because this eye on these days has greater vigor than the other. I am

convinced, that in many people, there is always one eye stronger or more watchful than the other, and which constantly takes charge of the greatest part of the common task." Lecat, however, believes, that this kind of one-eyed vision is not universal, and he undertakes to prove, that we also see at the same time with both eyes. But, in all the experiments which have been undertaken to attain this object, he constantly confounds passive with active vision, as do also our adversaries in the objections, they urge against us.

Professor Walter of Berlin, Ackermann, and their partisans have opposed to us the following experiment to prove, that we look fixedly with both eyes. If we observe a luminous body, such as a candle, with each eye armed with a glass of a different color, the eye which looks through a red glass will see the object red, and the one armed with a blue glass will see the object blue. But the two eyes together will neither see the object red nor blue, but green, which is a compound of these two colors.

This experiment has been imagined, believed, and copied in theory, from an erroneous supposition, but has never been confirmed in practice. We have often repeated it, and caused it to be repeated by others. If the two glasses are equally thick and transparent, we see either red or blue, as we have been accustomed to look fixedly with one or the other eye. But if one glass is thinner or more transparent than the other, its color alone gives the color to the object. Never have we been able to see the green color. It is true, that we see green when we look at fields and trees of this color, because the colored glasses do not entirely extinguish the green color. At the first instant we often perceive rays of a mixed color; but we should attribute this to the impression, which still remains in the eye, before which another glass has been held. It is in this way, that we often see spots

of a different color, when we carry our eyes from one object to another of a different color.

Consequently, in continuing to fix our attention on the difference between passive and active vision, it will be difficult to prove, that we can attentively observe an object otherwise than with one eye.

§ 323, M. Rudolphi comes to psychology (*Seelen Leben*) and passes rapidly over the following questions: Whether animals, monsters, and idiots have a soul; if the pieces, into which we can divide certain living beings, have each a soul; which, according to him would be incompatible with the unity of the individual, the *moi*. In opposition to Bichat he admits, that the affections have not their seat in the viscera, but solely in the brain.

He establishes three distinct manifestations of the mind: intelligence, sensation, and the appetitive faculty. The powers are not always manifested in the same manner, but are in different proportions, not only in different individuals, but also in each particular individual; he does not admit the existence of innate ideas, but, with me, innate dispositions, by means of which we arrive at abstract ideas.

After having explained his ideas of memory, judgment, imagination, the affections, passions, and having considered them according to the routine of the philosophy in vogue, he refutes physiognomy, with which he confounds pathognomy.

He terminates this paragraph by giving a mortal thrust to cranioscopy. "Cranioscopy," says he, "has the cranium alone for the object of its researches; it pretends to be able to know, by this, the brain, and of course the character and dispositions of men; which is absolutely false. Besides, it never despises the assistance of its elder sister, physiognomy, in creating at the same time a kind of imitation, which it merely places more in connexion with the cranium.

"Cranioscopy has had little success, and it deserves no more confidence than chiromancy."

My readers know how to understand this, so far as cranioscopy is concerned; it is indeed very pleasant to observe the obstinacy of most of my adversaries, in wishing to reduce all my discoveries on the anatomy and physiology of the brain, to simple cranioscopy; they demonstrate by this, either their bad faith, or their complete ignorance of the true end of my labors. In denying the utility of cranioscopy, they not only deny the plurality of the cerebral organs, the different development of these same organs, and consequently the different forms of the brains and heads, but also all influence of the brain on the form of the head, all possibility of arriving at the knowledge of the seat of the organs. And do you know why they say, that the cranioscopists do not despise physiognomy? Because, that in visiting, in our travels, prisons, hospitals for the insane, &c., many professors, pupils, ministers of state, have witnessed how frequently we have determined, with the utmost precision, the nature of the crimes or the insanity and the predominating propensities and faculties, of the prisoners and the insane. In order to escape the necessity of rendering this homage to cranioscopy, they bestow all the merit on physiognomy. But, as they neither believe in the one nor the other, how can they explain these facts?

Yes, I have created an art of imitation founded on unshaken principles, the only one which reveals to us the mystery, the source of pathognomy, the gestures and the attitudes, that our thoughts, sentiments, propensities, internal emotions produce in us externally. Read my treatise on this principle of imitation, and you will be convinced, that each gesture that accompanies the strong action of an organ, is a proof of its seat, and consequently of the plurality of organs. But, here especially, something more is requisite than knowledge.

Let us suppose, then, that cranioscopy, or rather the physiology of the brain, has not amounted to much, organology should have taught me not to ex-

pect much of it. Exclusive ideas, extravagancies, superstitions, futilities, fashions, make fortunes. The transcendental philosophy, metaphysics, ideology, animal magnetism, brunonianism, &c., &c., have also made fortunes. To oppose received habits, to brave the decisions of academies, to humiliate self-love, to overturn the pretended knowledge of the anatomy and physiology of the nervous system, to destroy the systems of philosophy of three thousand years, &c., how can it be expected, that one should succeed with such elements? Where is the child, that does not suffer from being weaned, even when more substantial food is given him?

Let cranioscopy, according to Rudolphi, merit no more confidence than chiromancy, this is perfectly well explained; first, he rather adopts the conclusions of others, than thinks or examines, for himself. Either M. Carus, or M. Jourdan has said so. What more is wanting?

In the second place, Rudolphi has not the slightest knowledge of the discoveries relating to the anatomy and physiology of the brain; he has not the least idea of the mechanical aptitudes, instincts, propensities, and faculties of animals, nor the fundamental moral qualities and intellectual faculties, or the philosophy of man; the comparative anatomy and physiology of the brain of man and animals, are nonentities for him. In conclusion, I refer Rudolphi to the answer which I have given to M. Jourdan, in this same volume.

Experiments on the Nervous System of Man and Animals, published in Italy in 1819,* and republished in France in 1822:† by COSTER, M. D., of the Faculty of Turin.

In the third volume, I have given my own reflections on the report of Baron Cuvier, concerning the experiments of M. Flourens. M. Coster, in a translation of the work of Rolando, has answered my observations. At that time, I was unacquainted with the dissertation of M. Rolando, and the memoir of M. Flourens. Since then, I have studied their works, and the frequent contradictions in the results, which each has arrived at from the same experiments, have tended to confirm my opinion, that mutilations are the worst methods of becoming acquainted with the nervous system. M. Coster has directed his attention, first to giving credit to his old professor for some new discoveries in the anatomy and physiology of the brain. He supposes that M. Cloquet, in his descriptive anatomy, has borrowed the description of the brain from Rolando. In order to secure to the latter the priority of these discoveries, he endeavours to establish the following fact: "the course of the medullary fibres, which expand to form the hemispheres of the cerebrum and cerebellum, as discovered by Rolando, does not differ essentially from the explanation, which Drs. Gall and Spurzheim have given of it." "It might be supposed," adds M. Rolando, "that I had had some acquaintance with the exact method of these ingenious anatomists."‡ "I may add, that I confided at the same time, to Professor Palloni, Secre-

* Saggio sopra la vera struttura del cervello del uomo e degl' animali, e sopra le funzioni del systema nervoso. Di Luigi Rolando, 1809.

† *Archives générales de Médecine*, tome Ier., mars 1823.

‡ Memoria sulle cause da cui dipende la vita degli esseri organizzati (Firenze, 1807).

tary of the Italian Academy, a memoir, containing the explanation of the functions of the nervous system, in all living beings, founded on their organization and on some experiments, which demonstrate the use of the different parts of the cerebral mass. Further, in my instructions in the theory and practice of medicine, I have not only, for some time, classified the diseases of the nervous system into affections of the hemispheres, of the cerebellum, of the medulla oblongata, and of the sympathetic nerve; but I have also shown, with the constant support of experiments and observations, that there is not one symptom, nor a single phenomenon, which dses not meet with a ready explanation; while, in the best treatises on these diseases, all is disorder, obscurity, and confusion."

"It seems to me, that one would have no difficulty in concluding from all this, that I was acquainted with the structure of the brain, such as I have described it, long before the physicians of Vienna had published their anatomical observations; since, by the aid of this structure, I explained the functions of the encephalon before that period, as well as those morbid alterations, most difficult to understand."* "I am far," continued M. Coster, "from wishing to insinuate, that Messrs. Gall and Spurzheim have profited by the anatomical researches of Rolando; on the contrary, I know that, at the time these celebrated anatomists published their first works, they could have had no knowledge of the work of which we treat. It is not the first time, that men of genius have, unpremeditatedly, coincided in the same point of doctrine."

If M. Rolando is sure of being able to explain, with the assistance of his discovery of the structure of the brain, the functions of this noble organ, he is certainly the happiest of mortals. But to leave here this nonsense, let us see, with what propriety he has argued his cause for the priority of his pretended discoveries.

* Saggio sulla vera struttura, &c., p. 89.

In the year 1807, he announced a new theory of the brain, entirely different from that, which, till that time, had been adopted by the most celebrated anatomists. The first volume of my large work, which contains the anatomy of the nervous system, together with that of the cerebrum and cerebellum, did not appear until 1809; but, for several years before my travels, I had constantly demonstrated the brain, according to my discoveries, to a great number of spectators, of all nations. I left Vienna on the fifth of March, 1805; and, immediately after, and during the whole of that year, and the years 1806–7, we made the same demonstration in presence of professors, pupils, and a great number of distinguished personages at Berlin, Halle, Leipzig, Jena, Dresden, Gottingen, Copenhagen, Leyden, Amsterdam, Heidelberg, Stuttgard, Carlsruhe, Brunswick, Hamburg, Munich, Frankfort, Zurich, Berne, Basle, Paris, &c. &c. During my travels, several of my hearers have published my course of lectures, not to mention all the journals which have given an account of it, as of an object of lively curiosity and general interest.

The works of Froriep, Bischoff, Ackermann, Walter, professor at Berlin; Walther, professor at Bonne; Blœde, Muller, Meyer of Naples, Démangeon, &c., all appeared before the year 1807. Some appeared in the same years in Italian, French, Danish, Swedish, Dutch, &c. On the fourteenth of May, 1808, we presented to the Institute of France, a memoir, containing our anatomical discoveries. The report of Messrs. Tenon, Sabatier, Portal, Pinel, and Cuvier, was sent every where; and M. Rolando was only acquainted with my anatomical and physiological doctrine, as an absurd opinion, refuted by Malacarne! I have been made to assert, that the brain was nothing more than a mass of cellular tissues. This trick came to my knowledge only by this passage of M. Rolando's.

A very evident proof, that M. Rolando has not appropriated my discoveries, is his exposition of the

structure of the brain. The course of the nervous fibres, which contribute to the formation of the hemispheres, is very coarsely displayed in his plates, though it had long before been much better drawn by Vieussens and Vicq-d'Azyr. He is guided by no physiological principle; such, for example, as the successive approach of animals to perfection; he acknowledges, that he has had but three brains at his disposal. He must have been very ill acquainted with this subject, to flatter himself with making discoveries without the means of multiplying, repeating, correcting, and confirming his researches. Hence arises his want of exactness in the description of the passage of the pyramids, through the pons Varolii, the thalami optici, and the corpora striata. According to him, the nervous fasciculi of the corpora striata, as in the opinion of his predecessors, contribute to the formation of the great commissure and its dependencies; thus, he did not observe the entirely different direction of the divergent and convergent fasciculi. He knew nothing farther of the corpora striata, than had always been known by every one; the external portion of them, which far exceeds what is seen in the ventricles, entirely escaped his observation. Like all anatomists before him, he makes the optic nerve arise from the thalamus opticus; and, like many anatomists before him, he makes the olfactory nerve arise from the anterior commissure; he had not even a doubt of the manner, in which this commissure is formed by the nervous fasciculi, which issue from within the anterior interior extremity of the middle lobes; how then could he doubt of the formation of the septum lucidum? Like every one else before us, he considers the eminences, from which the optic nerves arise in birds, as the same with the thalami optici, so called, in the mammifera. In like manner, he considers the simple enlargement of the medulla oblongata, as the pons Varolii. As he was acquainted with no law of the organization of the nervous system, he did not

observe that birds, reptiles, and fishes want this protuberance, which is nothing else than the union of the nervous fasciculi of the lateral lobes of the cerebellum; now, as these animals have no lateral lobes, they could not have this union of the nervous fasciculi. Thus he had not the slightest idea of the formation of this protuberance or commissure of the cerebellum, or its decussation with the longitudinal fasciculi of the pyramids. The entire structure of the cerebellum is a great mystery to M. Rolando. Altini at first imagined it a galvanic pile, with layers of grey substance, and layers of white substance, placed alternately upon each other; other anatomists, like Reil and Rolando, found this fiction very plausible, and adopted it. They did not know, that the cerebellum was organized according to the same law as the hemispheres; that, in cases of dropsy of the cerebellum, its folds develope themselves, like the convolutions of the hemispheres of the brain, and that instances are not wanting, in which this development might be made artificially.

Professor Rolando also denies, that the grey substance furnishes nervous filaments; but he admits, that it contributes to their nutrition. In general, his ideas on this subject are wavering; this same grey substance assists in the formation of the galvanic pile; otherwise, he adopts the opinion of Malacarne on the use of these laminæ, and makes them contribute to the perfection of intelligence. He knows no better than myself, how Malacarne counted the leaves of the cerebellum; and, although he has only examined three cerebella, he believes, nevertheless, that he has had an opportunity of confirming the observation of this philosopher; he has observed, that the cerebellum of an idiot was composed of only three hundred and twenty-four laminæ; that of an intelligent man, of seven hundred!

M. Rolando asserts, that the cerebellum in animals is larger than in man. He nowhere manifests the

slightest suspicion of the cause of the optic thalami, the corpora striata, the pons Varolii, &c.; why it is smaller in animals, such as the horse and the bull, than in man; or why, on the contrary, the tubercula quadrigemina, &c., the medulla oblongata, &c., are larger in animals than in man; always a result of a want of physiological principles.

Lastly, M. Rolando, on the strength of having made such multiplied researches on the brains of man and animals, finds no other difference between them, than that of volume.

In order to spare his readers the details of the description of the brain, Rolando refers them to the works of Cuvier. M. Coster has, therefore, acted very prudently, in not being willing to specify the immense discoveries of his old professor, whom he has styled a modest professor, because he has not said, what he did not know. Thus, this pompous announcement of the new doctrine of the brain, entirely different from any which had been hitherto advanced by the most celebrated anatomists, reduces itself to this, that M. Rolando has not avoided a single received error, nor made the most inconsiderable discovery in the anatomy of the brain. I could never have credited this surprising result, had I not myself read M. Rolando's original work in Italian.

I at first prepared a work, to oppose the results of the experiments of M. Rolando, to those obtained from the same experiments by M. Flourens; with the intention of proving, that mutilations of parts of the cerebrum can never become a method of obtaining an acquaintance with the different functions of those parts. But more recently, M. Flourens himself has come to the conclusion, that he ought to substitute some other method of experimenting, for that of Rolando, which may explain to him the reason of the difference in their results.

I shall, therefore, first oppose M. Flourens' reasons and my own, to Messrs. Rolando and Coster; we will

next ascertain, whether the improved method of M. Flourens actually produces more constant, or more conclusive results.

M. Rolando is first at issue with M. Fontana: "I was long acquainted with the experiments of the celebrated Fontana, from which it appears, that a tortoise, whose brain had been removed, continued to live for six months, and walked as before. In vain have I repeated the same, experiment; every time that I have removed the brain behind the cerebellum, the animal died sudddenly, in the same manner as one whose head had been removed.

"I had occasion to converse with M. Fontana, and asked him the reason of this difference in result. He assured me, that he had always obtained the same results, even after having entirely emptied the cranium. I then repeated the same operation with the greatest care, and with very little loss of blood. Every time, that the medulla oblongata was deeply wounded, immediate death ensued; and, in the space of twenty-four or forty-eight hours, it was no longer possible for galvanism to excite the slightest sign of sensibility."

Let us hear Rolando's account of his own experiments: "I have made," says he, page 366, "innumerable experiments on kids, lambs, pigs, bucks, dogs, cats, and guinea-pigs, to observe the results of injuries to the tubercula quadrigemina and the parts adjoining the thalami optici; *but have rarely obtained constant results;* which is not surprising, when we reflect on the intimate interlacing of the numerous medullary filaments, which are met with in these parts; for, as it is extremely difficult to ascertain what filaments have been divided in these operations, we cannot draw clear and precise conclusions, where there is some difference in the results." This is precisely the argument, I have always used against this kind of researches.

The following is the opinion of Flourens in relation

to Rolando: "To obtain determinate and constant results," says he, page 317, "I have always been obliged to isolate the different cerebral organs from each other, with the greatest care; to lay these organs open entirely, to be able to follow and guide the instrument with the eye, to remove them only in regular symmetrical layers, so as never to go beyond the limits, which unite or separate them. All these precautions were indispensable, in order to obtain them before they were known; now that we know them, the absence of a single one will be sufficient to prevent our reproducing them. We can here tell Rolando, that in operating as he always has, that is to say, without isolating or uncovering them, without seeing or knowing how far he goes or where he stops, he surely never will produce them."

"Rolando has then never observed other than complex phenomena; he never has deduced from them other than vague or contradictory consequences; he has constantly confined himself to the repetition of the experiments of Haller, Lorry, and Ziun." By and by, I shall examine once more, if this isolation of the cerebral parts is practicable. In the mean time, let us confront the experiments of Rolando and Flourens.

Experiments on the Brain of the Mammifera.

In the intention of observing what effects a current of galvanic fluid, directed from the brain to the different parts of the body, would produce, Rolando trephined the cranium of a hog; he then introduced into the hemispheres a conductor of a voltaic pile, taking care to touch sometimes one point, sometimes another, whilst the other thread was applied to the different parts of the body. Having repeated these experiments on different quadrupeds, he obtained only violent contractions, and noticed that they were

stronger when the metallic conductor penetrated the cerebellum.

M. Flourens, who does not believe, from his experiments, that the cerebral lobes, and the cerebellum, produce muscular contractions directly, presumes that the galvanic fluid is conducted to the immediate parts of contraction; that is to say, to the tubercles, the medulla oblongata, and medulla spinalis. Rolando believes, that the fibres of the hemispheres are destined to produce particular motions. M. Flourens says, that his experiments establish, that the hemispheres of the brain do not directly produce any motion.

The results obtained by Rolando were, that, whenever a large number of the fibres, which traverse the corpora striata, were cut or torn, the corpus callosum on the fornix were interested, a state of lethargy or stupor ensued; whenever the optic thalami were injured, sometimes tonic, sometimes clonic effects were produced, as catalepsy, convulsions. M. Flourens believes, that Rolando confounds here the effects of the lesion of the optic thalami, with those of the lesion of the tubercula quadrigemina, since, according to him, the lesion of the optic thalami does not produce convulsions. To the observation of Rolando, that the presence of food and a considerable noise do not induce the least motion in the kid, M. Flourens observes, that that is not astonishing, since, from his own experiments, the animal deprived of his cerebral lobes, neither hears, sees, nor smells, &c. Still, this same kid stands firm on his feet, and changes his position when seriously troubled. Can, according to M. Flourens, an animal still possess will, and sensation, without cerebral lobes? He again complains of Rolando, because he produces, sometimes stupor or lethargy, sometimes convulsions, according as he wounded at different times or all at once, the tubercula quadrigemina, the optic thalami, the corpus callosum, the fornix and its appendices. When Rolando, after having torn, sometimes the tubercula quadrigemina,

sometimes a portion of the optic thalami, attributes the irregularity of motion, or the apparent intoxication to the lesion of these parts, M. Flourens supposes, that the cerebellum has been wounded, without the knowledge of Rolando.

Experiments on the Brain of Birds.

Rolando removed two thirds of the cerebral lobes of a hen, without wounding either the medullary expansion, which is found on the internal face of the hemispheres, or the oblong portion, which is observed near their base. The animal appeared to suffer a little at the commencement of the experiment; but, after twenty minutes, began to walk, drink, and eat; she was, notwithstanding this, a little giddy and apparently intoxicated.

Flourens says, that from his experiments it constantly appears, that the animal does not feel lesions of the cerebral lobes; and he does not believe, that the intoxication can be attributed to the lesion of the cerebral lobes; it is, however, difficult to maintain, that in this experiment Rolando has wounded any other parts than the lobes, as Flourens presumes; for the cerebellum is considerably behind the cerebral lobes.

Rolando removed in the same manner a large quantity of the substance of the hemispheres; he tore, not only the above mentioned medullary expansion, but also that which is placed at the base of the hemispheres. In proportion as he wounded the hemispheres more deeply, the animal became stupid, and remained more calm. She was not then quiet here, any more than at the commencement of the experiment. Finally, she became sleepy, and lay down for some time; an hour afterwards, she rose up and continued motionless on her feet. Neither noise, food, water, nor punctures, could induce her to make the least motion.

Still, on smartly kicking her, she moved a little. They penetrated the optic thalami, in each of which they made three or four incisions, which produced no result, except that the eyes remained open, and the pupils dilated, without its being possible to close them by touching them with any foreign body. Without taking any food of her own accord, the hen swallowed some crumbs of bread, that were placed in her throat. Rolando performed this experiment on pullets, falcons, ducks, and almost always with the same success. Having involuntarily touched in a raven, on whom he had performed the same experiment, the point situated above the annular protuberance, the crow was seized with frequent fits of hiccoughing convulsions, and expired in half an hour. Having slightly touched the adjacent parts of the annular protuberance, in many pullets, hiccoughs were *twice* produced, (not *always* it seems,) but they were always followed by convulsions and death.

M. Flourens here makes the remark, as I have mentioned before, that Rolando takes the tubercula quadrigemina for the optic thalami; and, that he has never been in doubt with respect to the real functions of the cerebral lobes, since he has never observed the loss of vision, hearing, nor that of the intellectual faculties, as a consequence of their ablation. However, at a very loud noise, the raven opened his eyes; he heard, although M. Flourens avows, that the lesion of the hemispheres was deep, which explains to him the stupor and complete lethargy. In this same experiment on the hen, Rolando made three or four incisions in the tubercula quadrigemina, without producing any new results, except the same stupor, the same lethargy. Why does not M. Flourens point out this circumstance, so contrary to his experiments, from which the lesion of the tubercles ought to produce convulsions? M. Rolando again deceives himself, when, in birds, he speaks of the annular protuberance; for, birds not having the lobes of the cerebellum, neither have they the annular protuberance.

Experiments on the Brain of Reptiles and Fishes.

M. Rolando removed the two hemispheres of the brain from a very large sea tortoise. Having replaced her in the water, she swam for some time, then went to the bottom and remained quiet for some hours, turning only sometimes on one side, and sometimes on the other. When she was pulled up with the string, she swam a little, and then sank to the bottom.

He removed the two hemispheres of the brain from the squalus catulus, L., and having replaced him in the water, he rapidly swam away, and concealed himself behind a stone, where he remained motionless, unless he was irritated. These experiments were repeated in a thousand forms on tortoises, and the result was always the same.

How can M. Flourens conceive in this case of the determinations of the will, — the precipitate flight, even enough of intelligence remaining for the fish to conceal himself behind a stone, and the sensibility reëxcited by the irritation? for, according to him, the hemispheres are the seat of the will, intelligence, and voluntary motions.

Experiments on the Cerebellum in the Mammalia.

Let us first see the origin of the pretended discoveries in the function of the cerebellum.

"The structure of the cerebellum," says Rolando, "the important discoveries, made by the professor of Padua on the great number of laminæ of which it is composed, excited in me many suspicions of the true use of this organ. I believed that it was destined for locomotion." To confirm this opinion he undertook he following experiment on the cerebellum; he removed by repeated cuts all that he could, from one

of the sides of the cerebellum of a hog and a sheep. But hardly did the lesion extend beyond the trephined side, than the animal was seized with hemiphlegia, and he soon died in convulsive spasms and hemorrhage.

"It is demonstrated," replies M. Flourens, "by my experiments, that the lesion of the cerebellum never produces convulsions; that, whenever these have been believed to have been produced by it, it has happened that the medulla oblongata has been wounded without its having been perceived." All this is very well to say; but will Rolando acknowledge, that his procedure has not been exact?

The form of the voltaic pile can at most create the idea, that the cerebellum may be destined to produce commotions, but by no means locomotion. May there not rather be here, in this, some influence of the ancient theory in vogue, before and after the time of Willis, that the cerebellum secretes the vital spirits, the nervous fluid, the action of which on the muscles should produce motion? For many years the German physiologists have called the cerebellum, the organ of locomotion (*Sinn der rœumlichen Bewegung.*) However it may be, M. Rolando has always been anticipated, and here, as on other occasions, he has discovered, that which he knew, or which he *à priori* presumed, as for instance blindness, after the lesion of the optic couches in the mammalia, &c.

He cut, in different directions, the cerebellum in one of these animals; after which the animal could no longer support himself on his legs, and appeared paralytic; in twenty-four hours he died in convulsions. Rolando says, that he has constantly observed, that the diminution of the motions was in direct ratio with the lesion of the cerebellum; this is the reason, why the animal was sometimes entirely paralytic, sometimes only on one side; at other times the exterior and posterior extremities alone remained motionless, according as the cerebellum was wholly or partially destroyed.

Flourens remarks, that if Rolando means to speak of the loss of motion by the loss of the cerebellum, his conclusion is entirely overturned by the facts. Thus we have always different results, always opposition between these two experiments!

Experiment on the Cerebellum of Birds.

Rolando removed nearly half of the right side of the cerebellum of a cock; instantly the animal was struck with paralysis, and fell on the same side, without being able to use in any way the right leg, or perform the least motion with this leg. Finally, the paralysis extended to both sides. Rolando admits, nevertheless, that this cock sometimes moved his wings and lower extremities. To escape from this contradiction, Rolando attributes these motions either to the mobility of the muscular fibre solely, or to a small remnant of the cerebellum.

This loss of motion is contrary to M. Flourens, since he has shown, that all the motions remain after the ablation of the cerebellum. And to prove, that to this time the action of the cerebellum has been a mystery, he cites three observations of Sancerotte: from a lesion of the cerebellum there resulted a universal convulsion, a kind of shock combined with a trembling; a dog kept constantly turning himself, rolling over, traversing the room, using his paws continually. A soldier, in whom after a fall a considerable collection was found in cutting into the cerebellum of the right side, kept constantly turning over in bed, and was in such continual agitation, that, when they attempted to replace him, he moved away and became stiff. A ball had passed through the left part of the cerebellum and penetrated to the posterior lobe of the hemisphere of the brain. During the forty-eight hours, that this soldier lived, his judgment was sometimes good, but oftener he was delirious; he was always in agitation,

turning in his bed from one side to the other, and constantly moving his legs and arms. (See also vol. III.)

In all these cases, the cerebellum has been injured; irregularity of motions ensued, and no paralysis.

Experiments on the Cerebellum of Reptiles and Fishes.

Rolando separated the cerebellum from the medulla oblongata in a tortoise; he became paralyzed, and lived in this condition for ten or twelve days without making the least motion. Another tortoise lived two months, constantly sensible to the slightest touches, but so far immovable, that he could not stir from the place where he was troubled: the same thing occurred to a lizard and two serpents. Two fishes also lost the faculty of moving.

Rolando observed, that injuries made in the cerebellum, healed promptly, and then the pullets, tortoises, recovered their former faculty of motion. The first tortoise, in which he only tore and divided the cerebellum, remained paralytic for many hours; but soon after it acquired a surprising faculty of motion and so great was this, that it stepped with a rapidity four times as great, as it was before accustomed to do. Rolando had the curiosity to examine the cerebellum, which was only covered with coagulated blood; it appeared to him cicatrized and considerably increased in size. Could it be possible, adds he, that the cerebellum, having acquired by means of this cicatrix a greater development, can thus contribute to this unusual agility?

Finally, Rolando gives us the promised explanation of the functions of the brain and cerebellum, and the morbid alterations the most difficult to understand, and all this by the assistance of the new structure of the brain, such as he has described it:

"In considering the hemispheres of the brain, as a mass of fibres, which first unite in bundles in their crura, then diverge and ramify to form the corpus callosum, fornix, corpora striata, optic couches, &c., we find the greatest analogy for maintaining, that these parts ought to enjoy an exquisite mobility, which being destroyed, increased, or augmented, enables us to explain the different morbid conditions, the seat of which has heretofore been believed to be in the cerebral mass, without its being imagined, that it was a true alteration of this organ.

Now, continues Rolando, is it not true that if, in tearing, bruising, or destroying the hemispheres, we produce heaviness, madness, stupor, whenever we observe a simular condition, in consequence of a morbid cause, as in lethargy or apoplexy, we ought necessarily to suppose, that the energy of the fibres of the hemispheres is more or less deeply altered? On the contrary, if the activity of the cerebral fibres is increased, we shall observe, that the operations, which are produced or modified by the cerebral organs, are also increased, as is observed in the different species of mania."

Let this pass, although I by no means comprehend how any movement whatever can produce any other function, than that of communicating this motion to other parts. But let us follow the list of hypotheses.

"But how," demands Rolando of himself, "can the cerebellum be the organ of motions which take place in muscles, in such a way, that, if it becomes altered, these motions become uncertain and vague, and that they cease entirely, when the organ is completely removed? I had at first suspected, that the corpora striata were destined for this object, but a more attentive examination of the structure of the hemispheres of the brain, and the resemblance of some of the apparatus of the torpedo, with the cerebellum of birds, convinced me, that this part of the brain was a

true electromotor, in which is secreted a fluid analogous to the galvanic fluid, which being then transported by the nerves which serve it as conductors, went to stimulate the muscles of locomotion."

"In fine, if an apparatus composed of different non-metallic substances, such as schistus, carbon, muscular flesh, cerebral substance; if the electrical organ of the torpedo, silurus, gymnotus, composed of a gelatino-cartilagino-albuminous substance, and other similar substances, is fit to prepare and develope a very large quantity of the electric fluid capable of giving violent shocks, why could not a similar principle, such as the nervous fluid, be formed by the numerous laminæ of the yellow and cineritious substance of the cerebellum? What can be found more evident to establish that the cerebellum is an organ, whose structure is precisely similar to the apparatus of Volta? What other proof can we desire, to demonstrate that the cerebellum prepares a fluid analagous to that which the Voltaic instrument developes? What more direct inference can be made, if we observe that all the influence of the nervous fluid on the muscles of locomotion ceases, if this organ is injured or destroyed? It appears to me, that no one has insisted upon the necessity of admitting a particular mechanism, by means of which the fluid prepared in the cerebral electromotor, can be transmitted to the central extremity of the nerve, that may be regarded as a conductor by which this fluid is enabled to pass, in order to irritate the muscles which are to be put in motion."

The hemispheres of the brain are then the principal seat of the proximate cause of sleep, insanity, stupor, apoplexy, melancholy, and madness. The diseases of the cerebellum, *medulla oblongata*, or of some nervous branches, will give rise to the different species of paralysis, whilst the cause of epilepsies and all spasmodic affections, is an irritation either produced at, or transmitted to, the origin of all the conductor nerves,

that is to say, from the medulla oblongata to the neighbouring parts.

Unfortunately for these ingenious explanations, M. Flourens denies, from his own experiments, that the cerebellum presides over motion; he only makes it the regulator of the motions; in the second place, is it really true that the cerebellum is an electromotor? The new discoveries in physics and chemistry always become the war-horse of the physiologists. I have already proved, that the cerebellum cannot be compared to the galvanic pile, or to a Voltaic apparatus. It is, like the hemispheres, a nervous and fibrous membrane, white on its internal surface, covered with a non-fibrous substance, of a grayish color externally. This membrane is not always folded in parallel layers, but in different directions. In consequence of this kind of folding, there is always between two pretended leaves, two layers of a non-fibrous substance, and these two layers are in immediate contact with the vascular membrane, which exists here, as in the anfractuosities of the convolutions of the hemispheres, in all the folds, or, to speak more correctly, which envelopes and penetrates the whole surface of the non-fibrous substance of the cerebellum.

It is then with the explanations of the functions of the nervous system, and their application to the knowledge of morbid causes, as with the discoveries that Rolando has made on the new structure of the brain.

At the end of the experiments of the Turin professor, M. Coster has tried to prove, that the results obtained by M. Flourens, are similar to those obtained by Rolando. "I defy," says he, after having copied certain passages of Flourens, "the most subtle mind to find the least difference between the results announced in this passage, and those related by Rolando, except that the subject of the experiments of the one was a pullet, and that of the other, a pigeon." Where it is said in the report of the academy: "And cer-

tainly no one had suspected, that the cerebellum was in any way the regulator of the motions of progression of the animal." M. Coster replies; "I ask a thousand pardons of the academy; but this was one of the first things I learnt in commencing my medical studies. This discovery is so well known in the school of Turin, and in those of the island of Sardinia, that it is one of the principal subjects of discussion with the new students." M. Coster has manifested an extraordinary degree of gratitude, in reclaiming the property of his old professor from the encroachments of M. Flourens. "For fear," says he, "of being taxed with injustice and bad faith towards the French physiologist, whose works are later by thirteen years than those of Rolando, I will extract textually from the above mentioned work of Rolando the experiments that are there related, and I will place them parallel with the results of those of which the celebrated Cuvier has been the reporter. It will be seen, that these experiments and results have such an air of paternity, that it requires nothing less than the acknowledgd ability of the French experimenter, to induce us to believe, that it is not by chance, that he finds himself on the same track with the professor of Turin." As M. Flourens has preserved the same order, the same course in his researches, commencing by the brain of the mammalia, their cerebellum, and ending by the cerebellum of reptiles and fishes; as he speaks also of galvanism; as he terminates his work by researches on the action of nerves, precisely like Rolando; as I think I can perceive here and there symptoms of a similar hazard; and as it is not the part of sound philosophy to believe in chance, I conclude that for some years a new constellation reigns with an equal influence over our young experimenters.

The reader will recollect that in the third volume I have made some observations in opposition to the experiments of M. Flourens; it appears, according to M. Coster, that I at the same time attack the experi-

ments of Rolando, although I am myself ignorant of it; he believes it his duty to answer me.

1st. He wishes to prove that ablation is a good method of learning the special function of a single part of the brain. "If ablation," says he, "is not in all cases a necessary means of arriving at the knowledge of the special function of an organ, it must be admitted, that this method is at least one of the most certain in a great variety of circumstances. I suppose that a man, struck for the first time with the impression of light, is ignorant of the organ, the external instrument, by means of which this unusual impression is communicated to him; after having successively tried to deprive himself of the use of his ears, mouth, and nose, he comes to his eyes, closes them, and immediately he ceases to see; will he not then conclude, that the eyes are the instruments which transmit to him the impressions of light? Is not privation, or if you will, ablation, a sure means of judging of the special function of these organs? Let us apply this reasoning to the seat of perception of light. First we discover that it must be in the brain; but in what part? In order to know this, we successively cut away the superior thalami of the cerebral lobes, the animal continues to see; we destroy the tubercula quadrigemina, immediately the animal becomes blind; hence we conclude that the cerebral lobes are not the organ of vision, since it continues after they are destroyed; but the tubercula quadrigemina are so, and this is one of their special functions. It is then false to say that ablation is not a good method of ascertaining the special function of an organ."

The experiments of Rolando and Flourens have demonstrated, that so soon as the hemispheres are removed, the animal ceases to see and hear, although the eye, ear, and tubercula quadrigemina remain untouched. The hemispheres are then the organ of the two special functions, hearing and seeing!

Lastly, there exists a great difference between a

sense entirely isolated, and different cerebral parts so intimately connected with each other. And when I said that ablation did not make us acquainted with the special function of an organ, I spoke of the cerebral organs. I defy any one to discover any special function whatever by ablation, unless this function be previously known. There were many proofs that the hemispheres were the organ of the will and intelligence; that the corpora quadrigemina were a ganglion for the optic nerve; for a long time the nervous fluid for motion has been said to be secreted in the cerebellum. You have removed the pineal gland; what is its function? Take away the *corpora mamillaria;* the *infundibulum*, the *septum lucidum*, *fornix*, anterior commissure, &c. &c., and teach me their special functions! and again, in wounding a part, are you sufficiently skilled to limit this lesion exactly to this part? do you know the limits of a cerebral part which constitutes an organ? Why has the organ of vision so long been sought in the optic thalami? and why do Rolando, Rudolphi, &c. still find it there, even in the lesions and experiments by mutilations? &c. &c.

M. Coster continues: "Let us suppose," says Gall, "that M. Flourens wishes to verify by the ablation of the cerebellum, whether this part is or is not the organ of the instinct of propagation, how can he make the animal live sufficiently long, to be able to say whether he possesses or has lost the instinct?

"If it is recollected that the experiments of Rolando demonstrate that tortoises live many months after the ablation of the brain and cerebellum, this time would seem to be sufficient to make the necessary observations on both these organs, and to become assured of the nature of their special functions."

After removing the hemispheres, the animal neither sees, hears, feels, nor has will nor intelligence, with what can he feel the instinct of generation? after having removed the cerebellum, the animal is either entirely paralyzed, or has only irregular motions, how

can he copulate? Lastly, show me an example of a similar act in an animal deprived of his cerebellum. Cause an animal to suffer in any manner whatever, deprive him of his liberty, take from him his accustomed food, and see how much difficulty you will have in making him desire to copulate. M. Coster does not admit as authority, the different results that myself and my friends have obtained. And as to myself, I have too much experience to confide in the decisions of commissions of the academy. It is hardly possible that academies, in constituting themselves judges of every novelty, can avoid committing themselves. As a proof, among others, see the report on our memoir, that in the contradictory experiments of Legallois, &c. &c. As another proof, M. Coster himself, who says, in opposition to M. Flourens and his reporter, that the cerebellum is neither the balance nor the regulator of the locomotive motions; that it is only the centre from which proceed the irritations that the conductor nerves transmit to the muscles; that the true regulator is the brain; and that the cerebellum influences the intensity of the motions, but not their regularity.

M. Coster again observes, that, if the cerebellum has no other special function, than that of exciting the venereal act, when this organ acts alone, the cerebral lobes being destroyed, it ought especially to determine the state of the genital organs, since, all things being equal, a cerebral organ performs its function as much more irresistibly as its action is less counterbalanced by that of other organs. This admirable reasoning induces me to think that, if at any time M. Coster should have need of a more energetic will and a more correct judgment, it will be necessary to remove his cerebellum, stomach, &c. Compare what I have said on this subject, vol. III, page 407–415, and it will be seen that M. Coster, in order to give a little plausibility to his cause, has been obliged to mutilate at least two thirds of my objections.

Experimental Researches on the Properties and Functions of the Nervous System in Vertebrated Animals, by P. FLOURENS, 1824.

It has been said in some journals, that the works of M. Flourens were but a repetition of those of Rolando, published in 1809. In order that this assertion may be tested, M. Flourens has first published, at page 273 and the following, a literal translation of the experiments of Rolando. We must now examine, if by this M. Flourens has succeeded in maintaining, not precisely his modifications, but the novelty and originality of his experiments and results. "I have not spoken" says he, "in the preamble of my memoir, of the work of Rolando, because it was entirely unknown to me. Under all circumstances, I should have had fewer motives for noticing him, as his work, in my opinion, does not add any precision to the results already obtained by the works of Haller, Lorry, Ziun, &c.

"Haller, Lorry, Ziun, Fontana, and twenty others ought necessarily to produce, in their experiments, all the phenomena that I have produced in mine, since the parts on which they experimented were the same as those on which I myself operated; but, 1st, they only perceived these phenomena in mass, and all the results of detail escaped them. 2d, even as to the results which they did obtain, they knew not to what organ to refer them, because they were never sure of the organ which they had wounded. 3d, by not insulating the organs, they of course could not insulate the phenomena. Thus they were never able to excite the one to the exclusion of the others. In a word, they had observed most of the phenomena, they had experimented on most of the organs, but they did not know to what organ in particular such or such determinate phenomena belonged; and this localization of phenomena by the localization of

the organs, was precisely the end that it was necessary to obtain."

The merit of M. Flourens would consist then in having localized both the organs and results. He admits six different divisions of the nervous system: the hemispheres, the cerebellum, the *corpora quadrigemina*, the *medulla oblongata* and the *medulla spinalis*. It seems to me, especially in animals, and more particularly so in the lower classes, that these parts are so far separated from each other, the cerebellum and the tubercula quadrigemina, the medulla oblongata and the medulla spinalis, so much concealed under the hemispheres, that the experiments must find a natural localization of the organs of M. Flourens, and that, consequently, most of their results at least should be equally localized.

After having found fault with the method of Rolando, M. Flourens denies his results whenever they differ from his own.

"In one of the experiments of Rolando," says he, "vacillation in the motions (*ivresse*) comes from the optic thalami, and the tubercula quadrigemina; in another it is derived from the cerebral hemispheres. In one the mutilation of the cerebral hemispheres produces heaviness and immobility; in the other it produces vacillation, that is to say, want of harmony, an ungovernable excitement of the motions; in one the animal is stupid and calm during the mutilation, and in another he seems to suffer; finally in one, neither noise, food, nor water excite the animal; in another, he drinks and eats. Thus, according to Rolando, the cerebral lobes sometimes produce stupor and sometimes excitement of the motions; sometimes the animal is stupid and calm; sometimes he suffers, and then he eats and drinks. Finally, it is sometimes the optic couches, sometimes the tubercula quadrigemina, sometimes the cerebral lobes, that produce these phenomena of excited action. Rolando then confounds all the phenomena, as he also confounds

all the organs from which these phenomena are derived, and that because his method does not separate the parts. With an isolated method he would have seen that stupor came from the cerebral lobes, excitation, from the tubercula quadrigemina, and irregular action, from the cerebellum."

This confusion of phenomena will constantly take place, as experience has demonstrated it, since physiologists have supposed that they could discover the functions of the nervous system, especially those of the cerebral parts, by means of mutilations. And I have proved, and I will again prove, that it is impossible to avoid this disorder by any method whatever. Rolando expressly says: "The hemispheres of the brain are then the principal seat of the proximate cause of sleep, idiocy, stupor, apoplexy, melancholy, and insanity. The diseases of the cerebellum, *medulla oblongata*, will give birth to the different species of paralysis, whilst the cause of epilepsy, &c., comes from an irritation produced or transmitted at the origin of all the conductor nerves, that is to say, at the *medulla oblongata*, &c." He has then insulated the organs and results.

"But," continues M. Flourens, "what is of peculiar importance to be remarked here, is that Rolando no where speaks expressly of the loss of the intellectual and sensitive faculties by the ablation of the cerebral lobes. He has even so little suspected this loss, that he says of a hen, whose cerebral lobes had been mutilated, that she ate and drank; and of a raven, according to him in the same condition, that at the sight of a dog or moor-hen, his deadly enemies, he no longer became enraged. Rolando has no where established this important fact, that all the intellectual and sensitive faculties reside exclusively in the cerebral lobes."

Rolando, according to Flourens, has done nothing but mutilate the parts on which he has operated; and according to the same M. Flourens, a very limited portion of the cerebral lobes is sufficient for the exer-

cise of their functions, page 310. Consequently his hen with mutilated lobes could yet eat and drink. But it is M. Flourens himself who is at fault, since at one time he makes the cerebral lobes the seat of the intellectual and sensitive faculties, and at another he makes a hen, from which he has entirely removed the cerebral lobes, eat, drink, and walk; qualities, according to his own declaration, intellectual and sensitive. I read with astonishment, at page 87, the martyrological biography of a fine and vigorous hen.

"This hen, deprived of her two lobes, lived ten entire months in the most perfect health, and she would have still been alive, if, at the time of my return to Paris, I had not been obliged to abandon her.

"During all this time, I did not lose sight of her for a single day; I spent many hours of every day in observing her; I studied all her habits; I followed her in all her actions, and noticed all her ways, and the following is an account of the observations which this long study has furnished me."

This important study of a hen deprived of all her intellectual and sensitive faculties!!

"As soon as the two cerebral lobes were removed, the sight of both eyes was lost. The animal no longer heard, nor manifested any sign of volition: but she kept herself perfectly balanced on her legs, and walked when irritated or pushed; when thrown in the air she flew, and swallowed water when it was put in her beak."

Believe this, my kind reader; to stand erect, walk, fly, swallow, are no evidences of volition!

"In other respects she stirred not, unless irritated. When placed on her feet, she remained on them; when laid on her breast, like hens when sleeping or resting, she continued in this position; she was constantly plunged in a sort of lethargy, affected neither by noise nor light, but from which she could only be aroused by immediate irritations, such as pinching, blows, pricking, &c."

Pricking, pinching, blows have produced determinations in an animal, without their being perceived! This is a little too much even for Baron Cuvier.

"Six hours after the operation, the hen assumes the attitude of profound sleep; that is to say, she turns back her neck, and conceals her head under the feathers of the upper border of her wing, as animals of this species do when sleeping.

"I left her for nearly a half quarter of an hour in this state; I then briskly irritated her; she suddenly started from her sleep; but hardly was she awake, when she again relapsed into a deep sleep."

All this proves to M. Flourens, that the seat of the intellectual and sensitive faculties is in the cerebral lobes!

"Eleven hours after the operation, I caused the hen to eat by opening her beak and thrusting in food, which she swallowed very well.

"The next day she aroused a little from the sleep in which she was plunged, and in doing this she exhibited the manners of a hen awaking.

"She shook her head, moved her feathers, sometimes even cleansed them with her beak, and sometimes changed the foot on which she stood; for often she slept resting on one alone, as birds generally sleep."

Proofs still more evident that the hen has neither instinct, intelligence, will, nor sensation!

"In all these cases, we should say that a man was asleep, who without entirely awaking, and still half asleep, changes his position, takes another as a relief from the fatigue occasioned by the former, takes a more easy one, often stretches himself, straightens out his limbs, gapes, shakes himself a little, goes to sleep again, or remains thus drowsy."

Thus a man half awake is a man completely deprived of will, memory, sensation, &c!

"The third day, the hen is no longer as quiet as usual. She goes and comes, but without motive or end; and if she meets an obstacle on the way, she

knows neither to avoid it, nor turn from it. Her comb and gills are red as fire, the skin burning; she is seized with acute fever. I gave her water in abundance.

"In other respects, no sign of convulsion, no want of harmony in the motions appears; and two days after this there is no more agitation or fever; the hen becomes calm and drowsy as usual.

"I pass over many articles of my journal, and come at once to the second month of the operation.

"The hen enjoys perfect health; as I feed her with great care, she has become very fat. She sleeps a good deal, and when she is not entirely asleep, she is drowsy.

"For many days long fragments of the cranium, exposed to the air, have exfoliated and fallen off. The cicatrix is rapidly forming.

"Five months after the operation, I never saw a fatter or fresher hen than this one. The wound of the cranium; is entirely cicatrized a fine, white, and smooth skin covers the whole of its surface; and below this skin a new long layer is formed, which, although as yet very delicate, is however very solid.

"I have kept this hen from feeding, on different occasions, for three whole days; then I have put food under her nostrils; have plunged her beak in grain; have placed grain in the end of her beak; have dipped it in water; have placed her on a heap of corn: she has neither smelt, swallowed, nor drank; she remained immovable on the heap of corn, and would most assuredly have died there of hunger, if I had not fed her by putting the food in her throat.

"Twenty times, instead of grain, I have put small flint stones into the bottom of her beak; she swallowed them as she would have swallowed grain.

"Finally, when this hen met with an obstacle in her path, she fell against it, and the blow arrested and stopped her; but to fall against a body is not to perceive it by the touch. Never did the hen feel, grope,

or hesitate in her step; she meets with obstructions, and falls against objects, but she touches nothing.

"Thus then the hen without lobes has really lost her sense of taste, touch, and smell, with vision and hearing. Yet none of these senses, or, to speak more correctly, no organ of these senses has been directly affected. The eye is perfectly clear, and the iris movable. Neither the organ of hearing, taste, nor touch has been injured. A remarkable circumstance! There is no longer sensation, although the organs of the senses exist. It is not then in these organs, that sensation resides.

"Finally, the hen without lobes has lost all her senses, for she neither sees, hears, smells, tastes, nor touches any thing.

"She has lost all her instincts, for she no longer eats of her own accord, however long she has been fasting; she moves not, however much she is incommoded; she never defends herself against other hens; she knows neither to fly nor to fight; she has no more desires for coition; the caresses of the male are either indifferent to her or unperceived by her.

"She has lost all intelligence, for she neither wishes, remembers, nor determines upon any thing.

"The cerebral lobes are then the sole receptacle of the sensations, instincts, and intelligence."

We have now come to a conclusion, which should astonish all physiologists by its novelty.

Here terminates the precious narrative of the life of our heroine. When M. Flourens and his reporter shall have demonstrated to me, that to stand erect, to walk, to decide in consequence of extraordinary irritations, to fly, swallow, turn back the neck, conceal the head under the wing, shake it, put the feathers in motion, sharpen and clean them with the beak, alternately change the feet to rest them, stretch out and straighten, shake and resume the equilibrium, raise up and resist the efforts that are made to open the beak, as the pigeon did, whose two lobes were equally mutilated,

page 32, &c., are the undeniable proofs of the absence of sensation and volition, &c., I will admit the conclusions of M. Flourens.

Some weeks since, I found in my garden a tame jack-daw; he was easily caught; surrounded by sparrows and hens he continued perfectly quiet. I carried him to my apartment, and ascertained that his thigh was broken. I placed him in a cage; he remained perfectly still, neither ate, drank nor flew; I thrust food to the bottom of his beak, he rejected it; two days afterwards he swallowed, after this he ate, drank, and became wild, and flew away. He now returns every day, with the leg hanging, to seek food. I only mean to say by this, that it takes much less than the ablation of the cerebral lobes, to suspend, while the animal suffers, the exercise of his faculties.

As the hen of M. Flourens evidently manifested sensation and volition without cerebral lobes, Rolando, at least, has not established a hazardous conclusion. He speaks often of drowsiness and stupor, which is nearly equivalent to the loss of the intellectual and sensitive faculties. And if Rolando has not expressly said, that all the intellectual and sensitive faculties reside in the cerebral lobes exclusively, M. Coster his pupil has supplied the omision. Before the publication of the experimental researches, 1824, and before this reproach of M. Flourens, M. Coster had already said, *Archives Generales de Medicine*, March 1823, page 376: "The experiment that I have just mentioned, led M. Rolando to deduce very simple consequences, which will occur of themselves to the mind of the reader. In fact if the lesion, compression, destruction, or ablation of the hemispheres of the brain is constantly followed by an alteration or a complete deprivation of the intellectual functions, we are forced to conclude, that the hemispheres are the organ which presides over the functions, and that when they are interrupted by a morbid cause, it is in the hemispheres, that we must look for the seat of those alterations, which produce similar effects."

Finally, what is there new in the conclusion of M. Flourens, since my works? and as to the results obtained in a frog and hen, &c., are they applicable to man?

M. Flourens promises to show us by and by, by his new experiments, that a very limited portion of the cerebral lobes is sufficient for the exercise of their functions. It is then true, as the German philosopher, that I have already cited, says, that the brain of a frog might very well be the seat of the mind of a Newton. After this, what will become of the comparative anatomy and physiology of the brain? Ah! how much superfluous expense does nature give herself, to bestow a little more intelligence on the monkey than on the tortoise, and a little more on man than on the monkey!

M. Flourens says: "What was most difficult and which has cost me the most pains to distinguish in the phenomena of the cerebellum, was the principle of coördination entirely different from the principle producing the motions, and of which, I dare believe with Baron Cuvier, that as yet no physiological idea is entertained."

No doubt that physiology will soon be encumbered with incomprehensible ideas. To this very time physiologists have believed, that they could admit a difference between the organ that perceives, and the organ which receives the impression, between the organ which commands, directs, rules, and the organ that executes. But, it is neither the cerebellum, nor the *medulla oblongata*, nor *spinalis* which produces motions. The nervous system is the source, the indispensable condition of the motions that are executed by other instruments. Without volition, sensation, intention, no united or coördinate movement can take place. It is then contrary to reason, to look for the regulator or balancer of the motions in any other place, than that where perception takes place, where the seat of volition exists. Can we be astonished that this coördaining principle has cost M. Flourens so much labor? Since this principle exists not in facts, it was requisite that the experimenter should distil it from his brain.

"To resume, there is nothing in Rolando's work," says M. Flourens, "of the direct loss of vision and hearing by the loss of the cerebral lobes."

The loss of audition and vision or rather the loss of the perception of light and sound, is effected in the same manner by the ablation of the cerebral lobes, as the loss of every other faculty belonging to the two hemispheres of the brain. When Rolando mentions stupidity, heaviness, it may well appear to him superfluous to specify the loss of vision and audition; and when in the morbid affections of the cerebellum, the functions of sight and hearing are changed or lost, is it the cerebellum also which is the seat of them?

"Nothing is said of the *croisement* of the loss of vision by the loss of these two organs."

I hope M. Flourens will not attribute to himself the discovery of this *croisement.*

"Nothing is said respecting the preservation of all the intellectual and sensitive faculties, by the preservation of a single cerebral lobe."

See my works, volume II. page 234, octavo edition.

"Nothing is said of the regulating principle of the movements of locomotion and prehension, the seat of which is the cerebellum."

Novelties coincide with extravagancies; when I write a history of the vagaries of the human mind, the cerebellum, the regulator and balancer of motion in company with a very limited portion of the brain to perform all its functions, shall hold one of the principal places.

"Nothing is said of the formal independence of the locomotive and sensitive faculties."

This is not so, for Rolando has very well, and in many places, observed this difference. An idea, too, which is ancient and very generally admitted.

"Nothing, finally, is said touching the precise limit which separates the nervous parts, susceptible of exciting muscular contraction, for those which are not susceptible."

M. Flourens has been already told, that there was nothing new in all this.

After censuring the experiments of Rolando, M. Flourens lays down the following propositions:

"1st. There are in the nervous centres, distinct organs for sensation and motion, and consequently the property or faculty of sensation is essentially distinct from that of motion."

As M. Flourens has only the cerebral lobes, the cerebellum and the *medulla oblongata*, in view here, what will he do afterwards, with the anterior and posterior nerves of the spinal marrow?

"2d. The *medulla spinalis*, *oblongata*, tubercula quadrigemina, are alone susceptible of exciting *immediately* muscular contraction; the cerebral lobes and cerebellum are not susceptible of it."

Unless M. Flourens has recourse to the distinction of *mediate* and *immediate* influence, a thousand pathological facts of symptoms produced by the lesions of the brain and cerebellum, will disprove his assertion.

"3d. Sensations, instincts, and volitions reside exclusively in the cerebral lobes; as also all the intellectual and sensitive faculties."

Read my work, vol. II. page 153 and the following, where you will at the same time find, page 67, 69, &c., discussions on the question, viz: the functions that are usually attributed to the mind or brain; and whether we may consider the brain as the organ of all the operations of animal life? and page 69, the reasons which seem to prove, that the brain is the organ of all the sensations and all the voluntary motions. But, as if I had foreseen that the day would come, when M. Flourens would cut away from a rabbit all the cerebral parts, with the exception of the *medulla oblongata*, and that this animal would not only breathe still, but that being strongly pinched, he would be troubled and cry out, page 183; that consequently there would yet remain sensation and volition; as if

I had anticipated all this, I say, I have added other reasons, page 85, which seem to prove, that other nervous systems, entirely independent of the brain, may also produce sensations and voluntary motions. I have even established this idea on the existence of animals in whom we cannot deny voluntary motions, the senses of touch and taste, although we cannot discover any thing in them which can be compared with the brain. These animals experience hunger, seize their prey, eat; and since they have no brain, these sensations must in them have their seat in other nerves. Add to this, that every nerve destined to any particular function whatever, has, as well as the brain itself, its particular origin, its particular apparatus of supply, its final ramification, and forms even in itself a particular organ. Why should not a similar nerve thus form a whole relative to its destination? why should it not embrace a sphere of activity which should be peculiar to it? — and many similar reasons; which weaken and greatly limit the pretended exclusive property of the brain. I again ask, in this rabbit deprived of brain, cerebellum, and tubercula quadrigemina, and in those monsters that are born without brain or cerebellum, which cry and suck, what organ has determined the will to cry and suck, and what organ has rendered the motions requisite for sucking and crying, coördinate? Ought we not finally become more circumspect before we establish laws or principles?

"4th. The coördinate principle of the movements of locomotion and prehension, resides exclusively in the cerebellum."

This is in contradiction to the preceding propositions; for the coördinate principle is inseparable from that of sensation and volition, properties of the cerebral lobes alone, according to Flourens.

"5th. As the loss of the cerebral lobes does not in the least change the regularity nor order of the motions, so the loss of the cerebellum does not in the

least degree, alter the regularity or the energy of the sensations. The centre of the sensations is then essentially distinct from the centre of movement, and the sensitive faculties, from the locomotive faculties."

Stupidity, heaviness, the loss of sensation, volition, &c., will they not then in the least change the regularity nor the order of the motions?

"6th. In voluntary motion, it is necessary to distinguish the action of the nerve, that of the spinal marrow, the cerebellum, and that of the cerebral lobes. The nerve excites immediately muscular contraction; the spinal marrow connects the different contractions in united motions; the cerebellum coördinates these movements, and renders them determinate: walking, flying, standing, &c.; the cerebral lobes perceive and will."

To will and perceive are absolutely the first condition of all united and coördinate movement. How then can we believe in like motions, when the cerebral lobes do not exist, when they have been violently removed, and when they are alone the seat of will and sensation?

"7th. The loss of a single cerebral lobe only induces the loss of vision of the opposite eye; all the other intellectual and sensitive faculties remain."

The *intellectual* faculties, that the hen with one cerebral lobe manifests! As to man, I have already indicated the page of my work where this idea may be found developed, in a manner much more rational and practical.

"8th. The loss of one of the tubercula quadrigemina, also, occasions the loss of sight of the opposite eye."

Read again my large work, vol. I. page 112, on the optic nerve, and my answer to the report of the French Institute, page 101, &c., you will there find this anatomical fact very circumstantially announced.

"9th. The loss of both cerebral lobes renders the animal blind; neither the iris, nor retina, nor optic nerve, are changed by this loss."

What then: the loss of the two cerebral lobes deprives the animal of the perception of every impression whatever. Why then, only of the perception of the impressions of light?

"On the contrary, the loss of the tubercula quadrigemina, when it is complete, instantly paralyzes the iris, retina, and optic nerve."

A result certainly easy to find, since we have demonstrated, that the optic nerve takes its first visible origin from the corpora quadrigemina. It is very possible, that hereafter, when experimenters shall know the different origins of the optic nerve, that they will not find complete blindness instantly occurring on the destruction of the corpora quadrigemina.

"The origin of the sense of sight is then distinct in the cerebral mass, from the seat of the sensation of vision. The origin of the sense resides in the corpora quadrigemina; the principle of the sensation, in the cerebral lobes."

M. Flourens, apparently the better to impress his readers, says often, as here, with much pretension, what no one is ignorant of, for instance, the distinction between the sense and the perception of impressions upon the senses.

"10th. Each of the other senses, smelling, tasting, hearing, has equally, in the cerebral mass, an origin distinct from the centre, or sole receptacle of the sensations. There are then in the cerebral mass, distinct organs for the senses, sensations, and motions."

Why so many evasions? Why has M. Flourens, a few lines back, stopped so complacently at the sense of vision? and why does he admit in the cerebral lobes, the senses of tasting, hearing, and seeing, which anatomy points out to us in another place, since it suffices that the lobes are the organ of all perception? When these lobes are removed, there is no longer a perception of the natural wants, neither hunger nor thirst, &c., and hunger, thirst, and the natural wants, should they also have their seat in the cerebral mass?

"11th. When the cerebellum is entirely removed from an animal, all the regulated movements of locomotion and prehension are at once lost; but all the regulated motions of conservation (respiration and circulation) remain. The movements of locomotion are then essentially distinct from the motions of conservation."

"Every part essentially distinct from the nervous centres, has then an office to perform, peculiar functions, distinct and specific properties."

The whole of my treatise on the plurality of organs for the different instincts, propensities, intellectual faculties, essentially different, is based on this principle.

"This office, these functions, these properties now being known, every one hereafter will see the facility that pathology will have, in inferring an alteration of parts from an alteration of properties, and reciprocally a lesion of properties from an injury of parts; a double decision which is the end and perfection of all pathology."

This would be an excellent method of diagnosis, if in nature, and diseases, all the phenomena occurred in an isolated manner. But the practitioner will never forget that, throughout the system, the organs are held together, reciprocally influence each other, and easily produce a confusion of intricate causes and effects, &c. &c. Here again M. Flourens has followed Rolando, and this last, the medical doctrine of all ages.

Definitively, then, the results and the explanations of the experiments of Rolando and Flourens, are, in many respects, opposed to each other, as it has heretofore happened to all experimenters by lesion and mutilation; as it must necessarily always happen; and as it has always happened, it also happens to our two estimable associates, that always, sooner or later, we find the promises of experimenters by lesion and mutilation, evaporated almost to zero.

Let us now leave the society of Messrs. Flourens

and Rolando, and see what remains to be said on the ulterior experiments of M. Flourens. I will not repeat here what I have already said in the third volume of this work, on this subject.

M. Flourens begins by explaining to us why, before him, all experimenters, as I have just said, obtained only complex phenomena, and vague and uncertain conclusions. They always experimented on many parts of the nervous system together, and they never properly isolated the other parts from that which was experimented upon, or they only experimented on certain parts of the nervous system, and then attributed to the whole of this system, effects, which almost always, belonged only to the parts experimented upon; they then always confounded the results, given by one of these methods, with those afforded by the other.

In order to escape these shoals, he has sucessively experimented separately on the nerves, the spinal marrow, the brain, and the different parts of the brain. In operating on each of these parts, he says he has taken the greatest and most scrupulous care not to interfere with other parts, and thus to avoid all foreign complication.

There is no doubt, but that this is one of the causes why the experiments by mutilation and lesion, have been up to the present time so contradictory, in the hands of different experimenters, and why the results have always been either barren, or at least vague, uncertain, accidental, &c. There is also no doubt but that the method of M. Flourens would be infinitely preferable to that of his predecessors, if the execution of it were practicable. When we read of the experiments of our physiologists on the brain, we are almost induced to believe, that the whole nervous system, especially the brain, cerebellum, &c., are only composed of pieces of wax applied one over the other. One is removed, and another is removed, and the loss of one or another function instantly takes place. No one thinks of the state of suffering, trouble, and uneasiness

of the animal, of the blood that inundates the injured parts, and which it is necessary to stanch at every instant, which very often immediately coagulates, and it requires such compression, friction, and searing, that the part operated on rarely presents a smooth and clean surface, to enable us to ascertain with exactness how deep and to what extent the lesion or extirpation has been practised. They always assure us that the experiments have been a thousand times repeated; but, with a few exceptions, it is hardly possible to perform twice, absolutely the same operation, which explains why every time, unless the experimenter wishes to impose upon us, the accidents attending the operation vary; which also brings about a variation in the results. This single circumstance is generally sufficient to disgust, with this sort of experiments, all those who seek new truths with candor, without self-love, without the incitements of a fugitive vanity. M. Flourens assures us that, in order not to confound the parts on which he has operated, and not to attribute a result to another organ than that to which it belonged, he has by turns experimented separately on the nerves, spinal marrow, brain, the different parts of the brain, and that, in the exploration of each of these parts, he has taken the most scrupulous pains to interest that part only on which he was experimenting, and by this means to avoid all foreign complication. He adds, that it is always necessary to be as careful as possible of those parts which furnish blood; 1st. Because the loss of blood greatly abridges the life of the animal, and it is quite necessary that the animal should live to furnish the results of the experiment; 2d. Because the blood being effused in the cerebral mass, produces those compressions, the results of which being confounded with those of the experiments, complicate and often even destroy them.

I conclude from this that M. Flourens knew perhaps better than his predecessors, with what precautions similar experiments ought to be performed.

But is it not to be feared, that by this he has in a great measure pronounced his own condemnation? Is this localization of the cerebral parts and their results possible? Where is the anatomist or physiologist, who knows with precision all the origin, the extent, the ramifications, and connexions of an organ? You remove the cerebellum, at the same instant you wound very seriously the medulla oblongata and spinalis, the annular protuberance, the tubercula quadrigemina; consequently your results belong not only to all these parts, but also to all those, that communicate with these mediately and immediately. You believe that you have isolated the tubercula, but these tubercula have connexions with the corpus olivare, the medulla oblongata, the cerebellum, with the sense of vision, and with many convolutions; the optic thalami, and the corpora striata, are connected below with the crura of the hemispheres to the annular protuberance, the medulla oblongata, the pyramids and spinal marrow; above, with all the cerebral membrane, all the convolutions, the grayish non-fibrous substance; by their surface to the different commissures, such as the anterior commissure, the great commissure or corpus callosum; to the fornix or *septum lucidum*. Thus there does not exist a cerebral part, of which we do not know that it has very multiplied relations with other parts. I do not even except the corpora mamillaria, the pineal gland, infundibulum, &c.

And surely the connexions that are unknown to us, are still more numerous. This being established, how can we present the reciprocal influence of all these parts, especially when they are irritated, injured, lacerated, or removed? And how can we isolate their results? This beautiful idea of localization is then only a fine and presumptuous chimera.

To arrive at a cerebral part, we must perforate, break or cut the bony parts; we must wound and tear violently, the different membranes which invelope the nervous system, and which establish, among all its

parts, an intimate connexion by means of the vascular and arachnoid membranes. And as these membranes penetrate not only the ventricles and the convolutions, but also the whole cerebral mass, the loss of blood, their irritation, inflammation, &c., must inevitably complicate the experiment and its results.

M. Flourens frequently makes horizontal sections of the cerebral parts; this procedure would imply that the organs on the different parts of the brain, are composed of horizontal layers placed one upon another. This disposition does no where occur, not even in the annular protuberances. Upon the anterior pair of the tubercles, on the surface of the brain and cerebellum, &c., you can remove a very delicate layer of non-fibrous substance; but this substance already contains the early rudiments of an infinite number of nervous filaments, which are continued into the interior of the cerebral masses. Throughout, the white filaments of the cerebellum, brain, corpora striata, optic thalami, crura of the brain, annular protuberance, and tubercula course and diverge from below upwards; throughout, they plunge either diagonally, perpendicularly, or obliquely towards their apparatus of supply; and from thence to their ramifications. The converging fibrils in inverse order arrive from the surface of the brain and cerebellum to form the different commissures. Thus this art, so much recommended and extolled, of removing the organs by layers, is in opposition to the structure of the cerebral parts.

They talk to us of the medulla oblongata, the annular protuberance, as cerebral parts that it would be easy to isolate: not more than the tubercular quadrigemina. These are still a part, the continuation of the bundles of the medulla oblongata and medulla spinalis. They are at the same time formed by ganglions, one part of which gives origin to the fibrillæ of the optic nerve. So in a great degree, is the medulla oblongata a continuation of the medulla spinalis, besides that it contains many masses of non-fibrous sub-

stances, which, like so many ganglions, are the origin of many nerves of the greatest importance, and which belong to very different functions. The annular protuberance is not alone composed of the nervous bundles of the two hemispheres of the cerebellum, or the commissure of the cerebellum, it is also the continuation of many bundles of the medulla oblongata and spinalis, the anterior and posterior, or inferior and superior, pyramids, and it contains a considerable quantity of non-fibrous substance, placed between the transverse and longitudinal bundles, and which create new filaments for the crura of the brain, the tubercles, &c. We see, then, throughout the brain, the parts very materially complicated, which renders any localization absolutely impossible. This localization only becomes practicable where the particular nerves are already disengaged from the common masses, in order to join the apparatus where the special function takes place. This is applicable to all the nerves which take their origin from the medulla oblongata, &c. &c. More than this, you cannot isolate or localize the nerves of the senses, before they are complete and joined to the apparatus of the sense. The origin of the nerves of taste is confounded with the masses of origin of many other nerves; the auditory nerve is confounded with the nervous and non-fibrous masses of the fourth ventricle; the optic nerves, at first, with all the mass of the tubercles, with the corpora geniculata and their contiguous parts, with the crura of the brain, and with the grayish layer situated immediately behind their junction. The olfactory nerves are at first intimately united with the gray substance placed on the interior and inferior convolutions of the middle lobes, with the anterior cerebral cavities, &c.

Either those who experiment on the brain, and the cerebral parts, have never had a clear and just idea of the organization of the nervous system, or they impudently calculate to make dupes; and they succeed marvellously, since, in spite of the refined precision of

their precepts, they find their readers and judges in a greater ignorance than that in which they themselves are, of the most essential facts of the cerebral organization. See further, my treatise, volume III. page 155, &c., on the mutilations of the brain, as a pretended means of determining the functions of its different parts.

M. Flourens has generally chosen young animals for his experiments on the cerebral mass and spinal marrow. He gives many reasons for this choice. "First," says he, "the bones of young animals being very tender, we experience less difficulty in removing them; in the second place, it is invariably the case, that the younger an animal is, the less he resists mutilations. Finally, and this applies particularly to experiments on the cerebral mass, the sinuses of the dura-mater being comparatively very little developed in the early ages, we have less fear of being embarrassed with blood."

In no experiments on the cerebral mass can we avoid opening the cranium, and incising the membranes. Hence there will always be an effusion of blood. The sanguineous vessels are even more gorged with blood in young animals, for this is the most important and active period for formation and nutrition. The whole cerebral substance is much redder, much more sensibly penetrated with sanguineous vessels at this age, than later. Besides, at this period, the organization of the brain is not yet completed. The non-fibrous substance is still predominant; the whole substance of the cerebellum and brain is yet soft, a kind of gelatinous pulp, much more liable to be crushed or torn. How can any one pretend to judge of alterations of functions, which a little while after birth do not exist, and whose manifestation we cannot expect, until the successive development and maturity of the organs?

Another consideration renders the choice of young animals still more objectionable. The organs of ani-

mal life not being yet formed, they are still under the dominion of vegetative life. Many lesions and mutilations do not produce the same effects, which they produce in an older animal. To mention one example even respecting the functions of preservation, we have much greater difficulty in destroying new-born cats and dogs under water, than the same animals some months old, because the circulation and respiration are performed partly in consequence of other laws. It is then always a very uncertain thing to apply to an adult animal, what may have been very well observed in a very young animal. This application is not even practicable at any age, when we choose for the subjects of our experiments, animals of a very inferior order. First, many cerebral organs, with which animals of a superior order are endowed, are wanting in them. Every thing is much more simple, much less complicated, and if in consequence of this, even we obtain more simple results, we can never with the least probability, believe them equivalent to those that a similar experiment would produce, in a much more complicated organization, where the results manifest a complication of the reciprocal influence of many organs.

It must, however, be remarked, that my objections or observations against the lesions and mutilations, are particularly directed against those who, by this means, wish to learn the animal functions of the cerebellum and brain. I understand by animal functions, the mechanical aptitudes, instincts, propensities and intellectual faculties; but, so far as these are concerned, all the experimenters are yet at an enormous distance. Almost always, they confine themselves, as Haller, Ziun, Lorry, Lancerotte, Rolando, Flourens, &c. did, to an exploration of the nature and the relations of the phenomena of irritability, excitability, motion, whether spontaneous or voluntary, and sensibility. To this end, we ought to accord to them, especially M. Flourens, the merit of having devised very ingenious

and sometimes conclusive experiments. But he confines himself, so far as sensibility is concerned, like the philosophers, to generalities which are really very nearly the same in reptiles, fishes, birds, the mammalia, and man. All are excitable, all have sensibility, all have also volition; and if to eat, drink, walk, fly, leap, crawl, swim, can be included under the empire of the intellectual faculties, they all possess intelligence. Thus, it is in these points of view solely, that true and constant results, obtained from experiments performed with address and discernment, on young and inferior animals, merit our attention.

But so soon as we desire information on the mechanical aptitudes, the different propensities, instincts, and intellectual faculties, experimenters leave us in an absolute desert. It is as if these faculties and qualities did not exist, or that there does not exist any relation between them and the nervous system. They never make mention of an instinct, propensity, or determinate talent. It is known that animals have the propensity for propagation, that they love and take care of their young, that they travel, build, sing, lay up provisions, recollect places, things, and persons; that they unite together for life, &c., but all this is nothing according to the experimenters, but sensibility, or at most, modified intelligence. That such an animal is of a mild disposition, and another, savage; that such an one delights to live on the peaks of mountains, whilst another never leaves the valleys; that some construct and others do not; that some unite in marriage and others do not; that some live in society and others remain isolated; all this is not worth the trouble of searching out the cause in the animal organization, it is all explained by the unity of the brain, and, if we hesitate ever so little, even without a brain. Very well! gentlemen physiological experimenters, clear up to us a single one of these points. Before my discoveries, you did not think of this; now the materials are in your hands.

Cut, pinch, prick, remove, cause your martyrized animals to live as long as you will, and show us which of those faculties continues or ceases to manifest itself! You cannot deny the existence of these qualities and faculties, since all the actions of man and animals attest them, or prove to us that it belongs only to their volition, to the direction of what you call intelligence, that the tiger has the propensities of the tiger, the sheep those of the sheep; that the male nightingale sings, and that the female and so many other species of birds do not sing; that such a man, in spite of all obstacles, excels in poetry, in a spirit for observation, in a talent for music, and that another, with all the faculties, all external encouragements, never rises above mediocrity, &c.; that such a species of animals is continually on the round of gradual perfection; that such an instinct appears and disappears at such an age, such a season; where will you show us the material conditions of these phenomena at the point of your scalpel! None of you thus far have had either the philosophy or the courage, to meet these questions; otherwise you would have soon been convinced of the insufficiency and nullity of your cruel experiments.

Let us return to M. Flourens, page 20; he says in a note: "The corpora striata are wanting in reptiles, and the optic thalami in fishes; but they all possess the tubercula quadrigemina, and consequently vision."

Thus whenever animals have a common organ, they have also the common function. If certain apparatus are wanting in reptiles and fishes, it follows that certain functions are also wanting. It is not then true that animals have all the same cerebral parts, and that they all have the same parts as man. The different parts are then destined to different functions. As this difference of composition does not only exist in different species of animals, so far as the cerebellum, brain, medulla oblongata and spinalis, corpora quadrigemina are concerned, but also for the greater or less

complicated composition of the cerebral lobes, it necessarily results, that the different parts of these lobes are destined for different functions. A singular thing this! They prove the existence of one organ for muscular contractility; another for excitation; another for the connexion of partial contractions into uniform motions, and another for volition and sensation. They wish even by carefully slicing the cerebellum, to be able to destroy the faculty of flying, or flying and walking, or at the same time flying, walking, and standing, page 40. And yet they manifest an hypocritical aversion for the plurality of the organs of the qualities and faculties of the mind, so essentially different!

I can observe to M. Flourens, that the corpora striata are never wanting in reptiles, and that it is not true, as he says, that the volume of the tubercula quadrigemina is, in all species of animals, in direct proportion with the volume of the optic nerves and the eyes.

The mole has the tubercles very large and the optic nerves and eyes very small. This proposition would be true, if the whole nervous mass of the tubercles was destined to produce the optic nerve; but the greatest part of these tubercles belong still to the continuation downwards, of the spinal marrow, and upwards to the other cerebral parts; on this account it is, that irritating them produces muscular contractions, when it extends to a certain depth. Touch only the surface of the anterior part, and no effect of irritation will ensue. Touch the bulb of the olfactory nerve, the gray band on the sides of the fourth ventricle, or the ganglion of the auditory nerve, but do not push the instrument so far as the corpus restiforme; and you will have neither contraction nor convulsion.

Our celebrated experimenter maintains, that all the parts capable of exciting contraction, have the gray substance within, and the white substance without; that an inverse disposition of these two substances

constitutes the character of the non-exciting parts, that is to say, of the cerebral lobes and the cerebellum; that we can then judge, *a priori*, of the properties of these parts by their structure, and reciprocally of their structure by their properties.

All this proves that M. Flourens does not yet understand the true use of the two cerebral substances. There is throughout, where the nervous filaments take their rise, without regard to its locality, internally or externally, a non-fibrous gray substance. Already, in the horse for instance, we see the gray substance in the different nervous bundles of the medulla oblongata entirely on the surface. This same gray substance is apparent between the chords, especially the posterior ones, and towards the lumbar vertebræ. The gray substance is evidently more internal in the posterior parts of the tubercles, and more external in the anterior part. The cerebellum contains within its interior, the *corpus ciliare* or fringe-like body, composed of gray substance, and the hemispheres are formed by the annular protuberance, and by the crura; all these parts have a large quantity of gray substance in their interior. And what are then the optic thalami, the corpora striata situated in the interior of the cerebral lobes, if not great masses of gray substance to give origin to diverging nervous bundles? A little more patience and much more circumspection are necessary, before general laws can be established!

M. Flourens commences with a spite against organology; he asks if all the sensations, judgment, memory, will, if all the faculties occupy concurrently the same seat in the cerebral organs, or rather if there is a separate seat for each of them? "See," says he, "some experiments which fully resolve, in my opinion, this important difficulty."

This question is very improperly put; he ought to have asked if all the instincts, all the mechanical aptitudes, the propensities, sentiments, talents, concurrently occupy the same seat in the brain.

The true fundamental qualities and faculties of the mind are the different propensities, instincts, sentiments, and the different intellectual faculties.

I have proved in the fourth volume of my large work, and I have made it sufficiently clear in this edition, that each fundamental power, essentially distinct, includes sensation, perception, memory and recollection, judgment and imagination; since these common attributes are nothing else than modifications, different degrees of each faculty. Even each propensity, each instinct, includes volition, in the acceptation that M. Flourens himself gives it in hens, pigeons, rabbits, &c. Thus so long as a single fundamental propensity or talent exists, all the general attributes also exist; so long as there exists a single atom of matter, a single plant, all the general attributes of matter and plants exist. Hence, so long as we shall not have destroyed all the seats of the fundamental powers, sensation, memory, judgment, volition remain. Let us now see the experiments of M. Flourens:

1st. "I removed from a pigeon, by careful and successive slices, all the anterior portion of the right cerebral lobe, and all the superior and middle portion of the left."

This way of experimenting supposes an organization of the brain absolutely contrary to that which really exists. Where has M. Flourens ever seen that the brain of any animal whatever is formed by layers? If he wishes to have us believe that, in his experiments, he tries to remove one faculty after another, he must attack each cerebral part, each division of fibres into bundles, at their origin in the medulla oblongata and spinalis, in the annular protuberance, optic thalami, and corpora striata; that he follows the same bundle, or this same particular organ to its ramification; and then, in returning, even to its interior commissure. This sole method of proceeding would be in conformity with the true organization of

the brain. But, to operate thus is impossible; M. Flourens has not even the idea of it, consequently all his experiments, even should he give us millions, never can have the least demonstrative value, as it respects the seat of any propensity or faculty whatever. He mutilates all the organs at once, weakens them all, extirpates them all at the same time.

"Vision became more and more enfeebled, and by little and little, as I advanced, (while he removed the layers,) and was not totally lost until the layers in the neighbourhood of the central nucleus of the two lobes were suppressed."

M. Flourens has not told us what is the central nucleus, and this central nucleus, precisely because it is the central nucleus, the origin and receptacle of all the rest; might it not be *that very limited small portion*, but sufficient to permit of the continuance of all the faculties?

"But, from the moment vision was lost, hearing was also, and with this and sight, all the intellectual and sensitive faculties."

Why does M. Flourens always insist on vision? the destruction of the brain, since, according to him, it is the seat of all sensation, and every intellectual faculty, should necessarily bring about the loss of all the senses, and all the sensitive faculties. Why then so many evasions?

2d. "From another pigeon, I removed by successive cuts, also very carefully made, the whole anterior and posterior portion of the two cerebral lobes, to within a few lines of their central nucleus."

We have the same remark to make here as before, "*to within a few lines of the central nucleus.*" How many lines of thickness has then the brain of a pigeon?

"As this ablation proceeded, the sight gradually and sensibly became enfeebled; hearing the same; all the other faculties like hearing and seeing; and when one was entirely destroyed, they all were."

Granting to M. Flourens that he has found the

measure of the successive diminution of sight and hearing. How in making his successive ablations has he also made observations on the relative diminution of the intellectual faculties of the pigeon?

3d. "Finally, on a third pigeon, I uncovered, thus to speak, and exposed the central nucleus of the two lobes, by the successive and gradual ablation of all the superior, posterior, and anterior layers.

"At each new cut, vision lost its energy; and when the animal no longer saw, he no longer heard, willed, remembered, judged, and was absolutely in the same condition with an animal entirely deprived of his lobes."

4th. "Thus, 1st., we can remove either from before, behind, above, or from the side, a certain extent of the cerebral lobes without destroying their functions. A limited portion of these lobes is then sufficient for the exercise of their functions."

I do not doubt that M. Flourens has submitted his pigeons to proofs, as ingenious as all his experiments. He must have seen, and who would not believe it, that such a pigeon still copulates, covers her eggs, feeds her young, makes excursions in the fields, makes a circuit around the pigeon house to reconnoitre the presence of an enemy, that she is still jealous, &c. Surely these propensities and instincts ought still to be fully and entirely exercised, for they are much inferior to the intellectual faculties.

"2d. As this slicing off goes on, all the functions become weak and gradually diminish in energy; and beyond certain limits, they are entirely destroyed. The cerebral lobes then concur in their totality in the full and entire exercise of their functions."

"3. Finally, when one sensation is lost, all are lost; when one faculty disappears, all disappear. There are not then different seats, neither for different faculties nor different sensations. The faculty of perceiving, judging, or willing one thing, reside in the same place as that of perceiving, willing, judging

another; and consequently this faculty, essentially one, resides in a single organ."

Let us reason like M. Flourens: We exhaust a a man by bleeding: all the functions of the brain, cerebellum, *medulla oblongata*, *spinalis*, heart, lungs, stomach, &c., become enfeebled. We cut off his head, we kill him at a single blow: the functions of the brain, cerebellum, *medulla oblongata*, and *spinalis*, heart, lungs, stomach, &c., cease. Hence the faculties of sensation, thought, seeing, hearing, tasting, smelling, motion, respiring, digesting, circulating the blood, secreting bile, &c. &c., reside in one and the same organ. What! do you exclaim against this logic! ought it not to have the same privilege as that of M. Flourens, of being read, heard, opposed, and admired?

5th. "Each of the different organs of the senses have, no less, a distinct origin in the cerebral mass. We have already seen that the primordial principle of the action of the retina, and the play of the iris, is derived from the tubercula quadrigemina. In like manner, the senses of taste, smell, hearing, as well as vision, derive their particular origin from the particular eminence which gives rise to their nerves."

6th. "We can then, by destroying separately each of these particular organs, destroy separately each of the four senses which are derived from them; and we may, on the contrary, destroy, if not all these senses, at least all their result by a single blow, by the simple destruction of the central organ, where their sensations are effected and completed." But where is this central organ? As a very limited portion of the brain suffices for all the functions, and as all the parts concur in all the functions, this central organ is then each part, each little portion of the brain; thus this central point is either found throughout the brain, or is no where found.

"In the last analysis," says M. Flourens, page 122, "the cerebral lobes, cerebellum, tubercula quadri-

gemina, medulla oblongata and medulla spinalis, the nerves, all the essentially different parts of the nervous system, have all specific properties, peculiar functions, distinct effects; and, notwithstanding this wonderful diversity, as it respects properties, functions, effects, they do not the less constitute a single system."

How sublime is the mystery of ideology!

"One point of the nervous system being excited excites all the others; a point weakened enervates all; there is a community of reaction, alteration, energy. Unity is the grand principle which reigns throughout; it governs all. The nervous system forms then but a single system."

Unity is the constant dream, the *ne plus ultra* of declaiming metaphysicians. The universe is but one: millions of suns, planets, comets, are but one; the human race is but unity; different nations, the Chinese, French, Japanese, Indians, Africans, Americans, Germans, Turks, Greeks, are but one; man is one; the head, chest, belly, extremities, superior and inferior, the nervous, lymphatic, sanguineous systems, the liver, heart, intestines, &c., are but one. The senses, brain, cerebellum, tubercula quadrigemina, medulla oblongata, and spinalis, are essentially different; they have each different and specific properties, different particular functions, distinct effects. They are, according to Flourens, in a complete and fundamental independence of each other, page 127. Each of them can separately be preserved, destroyed, restored, as the organ of each is preserved, destroyed, or restored, page 102; and they are one!!!

The functions of the different parts of which the nervous system is composed, the functions of the brain, cerebellum, &c., may be destroyed and may subsist separately; the number of the senses and their functions is different in different species of animals; the functions, instincts, propensities, and intellectual faculties, are multiplied and modified, as the brain of different species of animals is more complicated and

modified; the origins, reinforcements, ramifications of the different parts of the brain are different and separated from each other; the intellectual faculties differ from the moral or affective faculties. One instinct, propensity, sentiment, differs from another; the instinct of propagation differs from that of killing; the instinct of the love of offspring, from that of travelling; the talent of painting is not the sentiment of pride; the talent of music, architecture, calculation, cunning, attachment, circumspection, memory of places, of persons, poetry, firmness, &c., are essentially different. These different instincts, propensities, talents exist separately, in the different species of animals, according as these animals are endowed with, or deprived of, certain cerebral parts; they exist in different proportions in different individuals, and in the same individual, as certain parts of the brain are more or less developed than others; the instincts and propensities of the same species are manifested at different epochs, not simultaneously, in the same individual, as certain parts of the brain arrive sooner or later at their maturity, or as certain parts undergo changes by the influence of climate, food, seasons; in the same individual certain parts and certain functions of the brain may be changed, while others remain untouched. The same man excels involuntarily in one moral quality or intellectual faculty, and is for ever condemned to an unchanging mediocrity in another. These are undeniable facts. M. Flourens is wizard enough to reconcile them all with a single organ, with unity. You, with your good common sense, see this contradiction and absurdity: it is because you are not initiated in the art of foolish reasoning on the principles of high metaphysics.

Now I have nothing more very essential to say concerning the experiments of Flourens. It is nothing that a hen, page 124, deprived of her cerebral lobes, of all sensation, of all intelligence peculiar to the species, did not the less preserve, so soon as excited,

the faculty of running, flying, hopping, walking, with equilibrium and perfect regularity. It is nothing, again, that a duck, page 130, without cerebral lobes, without sensation, intelligence, walked, ran, jumped, flew with harmony, equilibrium, and perfect precision in all her motions; — that, page 131, a swallow, in the same condition, flew, ran, hopped with the same precision and grace as before the destruction of her sensations, volition, and intelligence. It is still much less that an *effraie* which, having lost by the ablation of its cerebellum the power of balancing and regulating its motions, presented notwithstanding, its beak and claws to its enemies, and was enabled, it is true with difficulty, to replace itself on its feet after having fallen over. Wonderful indeed is it, that that beautiful little animal, the dormouse, page 145, who, after having lost the cerebellum, sprang, seized, and bit the stick; the cat, page 144, the dog, page 145, who, after the same operation, preserved all their instincts and intelligence; the cat caught the rat that M. Flourens submitted, immediately after, to the same gentle operation, and the dog went to the chase, to furnish more ample materials for the indefatigable zeal of his master; and all this, as M. Flourens attests, during the torments of cerebellic mutilation; for without it, how would he have had a knowledge of the presence of all the instincts and intelligence of the cat and dog?

In the chapter on the application of his experiments to pathology, M. Flourens explains the difference of opinions on the seat of the soul, by the concurrence of the whole brain in all the functions: "the cerebral lobes," says he, "can lose, either from before, behind, above, or from the side, a certain portion of their substance, without losing their functions."

Yes; without losing the common attributes of every propensity or determinate faculty.

So long as a single organ remains, perception, sensation, recollection, memory, judgment, imagination, passion, affection, will remain. In all the experi-

ments of M. Flourens, there is not one, where the presence or loss of a single propensity or talent is proved. His assertion, then, is entirely gratuitous. Finally, if M. Flourens had not affected, in the whole of his work, to be ignorant of mine, he would have found this subject treated in the second volume, page 182 and the following; and he would have found the answer in the same volume, page 197.

"When the loss of substance exceeds a certain extent, the functions are destroyed."

No doubt: organs being destroyed, their functions are also destroyed.

"The seat of the intellectual and sensitive faculties, provided the lesion does not extend beyond certain limits, may then be attacked in almost all points, without losing its functions, whatever may be the part attacked; on the contrary, if the lesion goes beyond certain bounds, all the functions are destroyed.

"The preservation or the loss of these functions depends, then, not precisely on such or such a given point of the cerebral lobes, but upon the degree of alteration of these lobes, whatever may be the point or points attacked."

This reasoning is contradicted by a great number of pathological facts. Often, very considerable lesions of the brain have not, according to some authors, particularly according to those who hold to common attributes in any way, at least not ostensibly deranged the functions of the brain, while, frequently, very slight lesions have produced a general derangement of all the functions. I repeat it—the appreciation of cerebral lesions and their consequences requires, 1st. an exact knowledge of the organization of the brain and the reciprocal vital influence of its different parts; 2d. a detailed knowledge of the functions of the brain, of the different fundamental qualities and intellectual faculties, the instincts, propensities, and talents, &c. So long as an experimenter is not acquainted with these two indispensable conditions, all his experiments

to ascertain the *animal functions* of the brain and the different cerebral parts, are but the groping of a blind man. With this knowledge, he will acknowledge at the same time the impossibility of obtaining this end by any other means, than those which I have indicated, vol. III. page 106, 140, 141, 146, 151, 155, 160, 166, and the following, to page 216.

In all my researches the question was to discover, not the vital functions or the reciprocal vital influences of the different parts of the nervous system, but the *animal functions*, *moral qualities*, and intellectual faculties, and the seats of their organs.

"The cerebral lobes," continues M. Flourens, "effectively concur, altogether, in the exercise of their functions; it is very natural that one of their parts can supply another; that intelligence can consequently subsist or be lost by each of them."

Now I conceive that in natural or magnetic somnambulism, the solar plexus perceives and sees all the interior of the body; that the ear can be metamorphosed into an organ of smell, and the nose and the ends of the fingers, into organs of vision!

Thus then each part of the brain will be charged with all the functions; each part being placed, places there also all the faculties; each part removed, removes them all. To what good then does our study of the gradual perfection of animals tend? But, reply some, many cerebral parts, although all endowed with the same faculties, increase the energy of these faculties, which explains the different degrees of intelligence in the different species of animals.

In consequence of this supposition, the different species of animals should not differ among themselves, but by different degrees of the totality of the moral qualities and intellectual faculties, very nearly in the same way that a piece of lead of six pounds, differs from another piece weighing an ounce. But as certain species are deprived of certain faculties with which other species are endowed, it follows, that some

must be deprived of certain cerebral parts, with which others are possessed. How can we explain, on this hypothesis, the development and non-simultaneous destruction of the animal functions of the brain? How can you conceive of partial geniuses, partial idiots, partial mental alienations, precocious geniuses under one single relation, the different degrees of our different qualities and faculties, the contradiction, frequently so painful, of our qualities, the double man within us? Truly, if we consult ever so little, the most ordinary facts, the pretensions of our experimenter appear more and more absurd.

What M. Flourens says of the sympathetic nerve and solar plexus, is only the repetition of what I have said in my large work, vol. I. pages 42 and 78.

At page 236, M. Flourens explains himself, as it were from remorse of conscience, in a more reasonable manner, on what he understands by the unity of the nervous system. "But," says he "independently of this peculiar and exclusive action of each part, there is a common action for each part, that is to say, of each upon all, and of all upon each."

Thus the cerebral lobes will and perceive; it is their *peculiar action;* the suppression of these lobes weakens the energy of the whole nervous system; this is their *common action.* The proper or peculiar action of the cerebellum is coördinate with the movements of locomotion; its common action is that of influencing the energy of the whole system, &c. The proper action of the brain, cerebellum, tubercles, &c., constitutes them *distinct parts;* but the energy of each of these parts influences the energy of all the other parts, and it is this which constitutes them parts of the single system."

Without these subtile evasions; I had said, vol. I. page 77: "Each partial nervous system has its peculiar functions, although they all exercise a reciprocal influence, and are all more or less subordinate to each other."

"This being admitted," continues M. Flourens, "the whole question of the *unity* of the nervous system, is visibly reduced to the experimental estimate of the relation, according to which each distinct part of this system concurs to the common energy."

That being admitted, the whole question of the unity of the nervous system is reduced to a play upon words. I believe that I have expressed myself better when I said, vol. I. page 78; "The plurality of the organs does not exclude the unity of their action. A life takes place with many organs, and a single volition, with many instruments of voluntary motion. But if it were the reciprocal influence, which could impress on a system the character of the unity of an organ, all the parts of the animal would be an unity, since all the parts influence each other.

Since Flourens acknowledges this reciprocal influence, which I have always opposed to mutilatory experiments, *since an excited point of the nervous system excites all the others, since a weakened point enervates all the others; since there is a community of reaction, alteration, and energy: since the nervous system forms but a single system,* how can he boast so much of his isolation of mutilations and results?

I will say a word more on the physical researches of Flourens, touching the determinate or specific action of certain substances on certain parts of the brain.

His new and very ingenious experiments have two principal objects in view: the one, to confirm the speciality of the functions of the different parts of the brain, established in his other memoirs; the other, to show that the diversity of action of the different substances, is entirely the consequence of these substances acting specially by an affinitive election, on a different part of this organ.

The specific organization of the different parts of the body, and consequently the specific action of external agents, are admitted by all physicians. But has M. Flourens obtained as clear results, as well

marked and isolated by the employment of different substances, as he assures us?

"The rapidity," says he, "with which opium, belladonna, alcohol, act on small animals, hens, pigeons, rabbits, and especially small birds, allows us to multiply the experiments almost instantaneously, and to vary them in a thousand ways. The thinness of the walls of the cranium, interposes an almost transparent veil, between the observer and the phenomena."

"It was known that opium, taken in a certain dose, produces stupor, reverie, a certain intoxication of the senses, to which convulsions and derangement in the motions only ensued, when the dose was exceeded.

"It was known, that in the intoxication produced by spirituous or alcoholic liquors, the intoxication of the motions, the senses, volition, and intelligence, survive a very long time the loss of the equilibrium."

I add to this preamble of M. Flourens, that the different kinds of intoxication produced by wine, brandy, beer, &c., are different. Drunkards stagger, some forwards, some backwards, others sideways; some are dejected, others gay; some talk foolishly, others are eloquent; some give themselves up to an effusion of benevolence, others become maniacal, &c. It remains to be proved by experiment, when it is the cerebral lobes, when the cerebellum, and when the tubercles, that are specially affected.

"The watery extract of opium given to a sparrow in the dose of half a grain, produces after some time a slight lethargy. A stronger dose, one of two grains, produces as complete stupor, as the complete ablation of the cerebral lobes. In these cases, and as it is understood, in cases infinitely repeated, after the bones of the cranium are exposed, the whole region of the cerebral lobes is found exactly circumscribed by a spot of a very deep vinous red color; the posterior portion of the cranium presents its ordinary appearance. The osseous parieties being removed, the cerebral lobes appear red and gorged with blood;

and this color and this *engorgement* penetrate even to the most intimate molecules of their substance. The other cerebral parts, the tubercula quadrigemina, cerebellum, medulla oblongata, are neither changed in their color nor tissue."

"Now for the tubercula quadrigemina. A greenfinch, after having swallowed two grains and a half of the watery extract of belladonna, became, some time after, entirely blind, without any derangement of the other senses and faculties. The cranium being removed, all the region of the tubercula quadrigemina, that is to say, all the lateral and interior region of the parieties of the cranium, was found of a deep vinous red color. This experiment was frequently repeated, and always with the same result."

The cerebellum also is subject to this exclusive influence of spirituous agents.

M. Flourens caused many small birds, as sparrows, greenfinches, larks, linnets, goldfinches, &c., to swallow some drops of alcohol, not exceeding eight, and as the phenomena of intoxication manifested themselves, he laid bare the long parieties of the cranium. In all, the region of the cerebellum, and cerebellum itself, were found to the exclusion of other regions and other cerebral parts, colored with a deep red and gorged with blood.

Alterations, so strongly marked, so exactly circumscribed, so deeply impressed, the cerebral lobes by opium, the tubercles by belladonna, the cerebellum by alcohol, would certainly confirm the results of the experiments of lesion and ablation by Flourens, if both were not equally liable to doubts.

MM. Bailly, &c., and myself, have caused many small birds, sparrows, greenfinches, linnets, &c., to swallow the watery extract of belladonna, opium, and alcohol, in the doses indicated by Flourens; none of these birds have manifested an insulated symptom. All saw and heard many hours afterwards; all walked, flew, and most of them even sought food. We gradu-

ated the doses successively; they all became more or less sick and dejected; but they continued to see, hear, walk, and even fly; they all endeavoured to conceal themselves. A little stronger dose of alcohol suddenly destroyed life. We decapitated the whole of them, whether they had taken the prescribed dose, or had swallowed a stronger one; the crania laid bare in all, presented the transparent color of the brain such as it is in a state of health! Neither the lobes, cerebellum, tubercles, nor even the bones corresponding to these parts, manifested any spot of a deep red color. Under the cerebellum only, where the heads had been separated from the trunk, there was in all an ecchymosis or *engorgement* of coagulated blood, evidently produced by the decapitation.

A remark, which throws a good deal of doubt on the experiments of M. Flourens, is, that the tubercles are situated so deeply on the base of the cranium in birds, that I cannot understand how he could remove a tubercle, and even two, and the animal should continue to stand erect, walk, fly, &c. The wound that this operation must necessarily make, is one of the most severe and dangerous, since it is necessary to extirpate the whole base of the cranium.

M. Flourens properly tells us, that these tubercles are placed at the inferior lateral region of the head, but he also tells us, that he sees them transparent when the head is fairly exposed. Now this is impossible. In the first place, the region of the cranium which corresponds to the external surface of the tubercles, is not only covered by muscles, but is very thick and spongy; in the second place, the tubercles do not touch entirely the internal lateral parts of the cranium; they are situated within them, exactly on the base of the cranium. Hence we have reason for suspecting, that our ideologist experimenter has a desire to regale us, after the fashion of romance writers, rather with fictions than realities, or like the transcendental philosophers, of constructing his world *a priori*.

We have given to a cock, two months old, thirty-six grains of the watery extract of opium. He ran about, flew, ate, without at all appearing sick, enjoyed all his moral and intellectual faculties; after having gone to roost, he awoke the next morning crowing and gay, and merrily joined his companions.

To a rabbit, four months old, we gave a drachm of the watery extract of belladonna; but neither sooner nor later, was the sight nor any other sense lost; his moral and intellectual faculties continued the same, as if nothing had happened to him.

How then can we justify these glorious declamations on the utility of similar experiments, on the important applications, that it is pretended can be made of them, to the physiology and pathology of man?

Let us terminate as we have commenced, by saying that in a thousand experiments of lesion and mutilation, nine hundred and ninety are either absolutely barren in results, or embarrass us, whenever they are performed by others, in interminable contradictions; that ten times at most, they serve to confirm what was already known, and that all this disposition to torment animals, in order to discover truths, will be constantly but a trifling amusement, of no consequence to science.

In order to justify my aversion to these mutilating experiments, I shall copy a passage from a very fine work of M. C. P. Ollivier, *on the spinal marrow and its diseases*, page 74.

"It results," says he "from the observations and researches recently published on the nervous system by MM. Foville and Pinel-Grandchamp, that the *corpus striata* and medullary fibres, which correspond to it preside over the motions of the leg of the opposite side; that the *optic thalamus* and its medullary fibres, that is to say, those of the posterior lobe, govern the motions of the arm; that when hemiplegia is perfect, we find an equally deep injury of both of these parts; and when it affects the arm and leg unequally,

it is because the alteration is not carried to the same degree in the optic thalamus and corpora striata; that finally, the cerebellum is the seat of sensibility; opinions, which accord with what experiments have demonstrated respecting the functions of the spinal marrow."

M. Flourens has frequently removed the lobes with the *optic thalami* and the corpora striata, and never has he seen paralysis ensue.

"This function of the cerebellum, (that is to say, that of being the centre of sensibility,) relative to the cerebro-spinal system, is not that which M. Flourens has pointed out. He believes himself justified in thinking, from his own experiments, that the cerebellum presides over the regularity of the motions of progression of the animal. The integrity of this organ must be perfect, says he, in order that the animal may find the necessary equilibrium in his locomotion. I do not believe that this conclusion, derived from experiments made solely on birds, can be applicable to all the vertebrated animals; for, the cerebellum is wanting in many of those in which the motions are not less well ordered, as frogs, toads, &c."

On this last point, M. Ollivier has been mistaken, as well as M. Desmoulins. But he might have added that Rolando makes the cerebellum the organ of the motions of locomotion, whilst M. Flourens only makes it the regulator or balancer of these motions; that the adder, which is not less agile than the eel, has a very little cerebellum, whilst the eel has a very large one.

"From recent experiments, M. Majendie regards the integrity of the cerebellum, as necessary to the performance of forward motions; for, he has observed that a moderately severe wound of this organ renders progression forwards impossible, and that it most frequently developes, on the contrary, a combination of motions which resemble the action of going backwards."

Another experimenter has maintained, that the cer-

ebellum was the cause of backward motions, and the brain, forward ones! Tell me, if these contradictory reveries ought not to disgust us entirely with this kind of researches?

Let us cite another passage of M. Ollivier, page 71.

"We have seen that the threads of the anterior roots, of the spinal marrow, are remarkably inferior in size to those of the posterior roots. This material difference is also connected with a difference of functions, which has been demonstrated by the experiments of MM. Charles Bell and Majendie. It results from these, that the posterior roots are for sensation, and the anterior, for motion. Nevertheless, adds very prudently M. Ollivier, it does not appear that each of these functions is exclusively given to each order of roots; for, when we excite the nerves of sensation alone, that is to say, the posterior roots, contractions are produced in the muscles to which these nerves are distributed, although generally they are much stronger and more complete, when the excitation is applied directly to the anterior nerves."

This want of complete isolation of the two functions in question, seems to me to depend on the circumstance that the two gray bundles of each lateral half of the marrow, are entirely confounded in each other at their point of contact; in another point of view, the very intimate union which takes place between the two roots below the spinal projection, must also influence their respective properties, and contribute further to unite them, if this expression is allowable, and combine them together."

M. Majendie expresses himself in a more decided manner, in his memoir on some recent discoveries relative to the functions of the nervous system, page 10.

"I have proved," says he, "by direct experiments, that these distinct roots, (anterior and posterior,) have also functions entirely distinct. The anterior are destined for motion, the posterior for sensation. If we cut off the first, the animal loses all motion, but

he preserves his sensibility untouched; and, *vice versâ*, if we cut the second, sensibility is lost, but the animal preserves his power of motion."

"I have recently had an opportunity to confirm on man, these different functions of the roots and nerves."

An individual had lost the motion of his arms for many years; he still preserved a lively sensibility in them. He died, and on the examination of his body, we found the posterior roots in their state of integrity, whilst the anterior ones, which were evidently changed, had lost their medullary substance, and were reduced to their membranous envelope.

Although I am a little suspicious of this autopsia, other observations present themselves in support of the proposition of M. Majendie. M. Ollivier, page 334, cites an observation of M. Royer Collard, where the softening of the anterior part of the spinal marrow coincided with a paralysis of the inferior extremities. It is to be observed, that the motion of the superior extremities remained, although all the anterior part of the spinal marrow was converted into a sort of pulp. The paralyzed extremities had preserved their sensibility; but observations are not wanting, where the contrary takes place. In general, it is the same with diseases, compressions, lesions, inflammations, &c. of the spinal marrow, as with mutilations of the different parts of the nervous system. Almost always, the accidents are confounded. Often the part above the place where the brachial nerves arise, is diseased, and there is neither paralysis nor convulsions except in the inferior extremities. In a man of twenty-one years of age, I have found the anterior face of the cervical and lumbar marrow exceedingly inflamed. He had had convulsive shocks in the arms and thighs, hiccough, vomiting, an extreme sensibility of the eyes, an insupportable heat in the chest, throat, palate, and tongue; with convulsive motions and sensibility at the same time; in a word, physicians will never be able to arrive, by the most exact observation of symptoms, to the knowledge of the seat of disease.

Professor Burdach,* before the year 1819, page 363, had already performed experiments, to determine the difference between the functions of the anterior and posterior chords of the spinal marrow. He and professor Baer cut the anterior roots of the nerve of the right thigh of a frog; it at once lost all turgescence, became flaccid, insensible, and motionless. The animal hopped with the left hind foot. Then they cut the posterior roots of the nerve of the left thigh, and instantly the left thigh was paralyzed like the right. The frog crawled with the fore feet, and dragged the dead hind feet as a foreign body. They charged with the galvanic pile the spinal marrow positively, and the thighs negatively; there were convulsions in both thighs, without any observable difference in them. M. Burdach observes, that it is necessary to make new experiments as well on the anterior and posterior roots of the nerves, as on the anterior and posterior chords. He is induced to believe that the posterior chords are more irritable than the anterior. Already in 1815, Gross (in Thomson's *Annals of Philosophy;* February,) had declared that the anterior chords were the organs of sensation, the posterior, the organs of motion, &c. &c.

In my large work, vol. i. page 68, I have inquired if it was necessary to make any difference between the nerves of the sensations, and those of the motions?

This is my answer: Erasistratus had made this distinction; Torrigiano had rejected it, because, generally, the same nerve is the seat of sensation and motion. We add to this that the pathological phenomenon, in which, sometimes motion, sometimes sensation, is lost, takes place in those parts which receive nerves of voluntary motion only. We cannot demonstrate this difference by any method, neither in the different bundles of nerves at their origin, nor in their external course. It is besides certain, that all

* Vom Bau und Leben des Gehirns. Leipzig, 1819.

the nerves of voluntary motion can also excite sensations in the whole surface of the body, and particularly at the extremities of the fingers, where they produce the sense of touch. Yet, why do the nerves of the senses have particular nerves for their special functions, and others for motion? Would it be sufficient, in order to explain the pathological phenomena, to suppose that they come from a simple modification, from a varied alteration of the same nerves?

In this uncertainty we have thought, that the posterior roots are stronger than the anterior, since we require more strength to straighten up and resist a burden, than to bend and stoop. The extension of the body even which takes place after death, seems to indicate this preponderance of the posterior nerves.

The idea has occurred to me, that perhaps the origin of the nerves of motion and of those of the senses, might throw some light on this point. But still here there is nothing permanent. The nerves of motion and those of the senses have their roots indifferently, sometimes in the posterior, and sometimes in the anterior face. The brain even and the cerebellum are the reinforced continuation, as well of the anterior chords as of the posterior and lateral ones. Thus the questions, viz., whether there are nerves solely belonging to sensation, and nerves solely destined for motion; whether these two functions are conjoined in the same nerves; whether in the same nervous chords there are filaments of sensation and of motion; whether, according to Scope, the ganglions belong solely to the posterior bundles; whether the posterior roots rather are destined for the sensations, and the anterior ones for the motions, or whether the inverse takes place; these questions, I say, are as yet, beyond the reach of our knowledge. The uncertainty becomes still greater, if it is true, that all the nerves evidently destined for motion, or the third, fifth, and sixth pairs, derive their filaments from the anterior and posterior continuation of the spinal marrow.

Comparative Anatomy of the Brain in the four Classes of Vertebrated Animals; vol. I. by E. R. A. Serres, &c. Paris, 1824.

Most decidedly the transcendental philosophy of Germany has taken possession of the heads of our French philosophers. MM. Berard, Jourdan, Flourens, Serres, &c., have constituted themselves proselytes of MM. Ocken, Carus, Rudolphi, Burdach, &c.

To hear these gentlemen, every thing in the nervous system is homogeneous, all is unity; the white fibrous subsubstance gives origin to the non-fibrous substance; the nerves are formed from the circumference to the centre, and not from the centre to the circumference, &c. Before these physiologists, every thing was confusion, uncertainty, and error. Malpighi, Ruisch, Albinus, Haller, de Graf, Sœmmerring, Arsaky, Harvey, &c., *have all interpreted nature in an inverse sense; they have always supposed in her a course directly opposite to that which she pursues; ought we then to be astonished if her laws have been misunderstood?*

M. Serres proposes to himself, to unite in one body of doctrine all our acquired knowledge on the anatomy, physiology and pathology of the nervous system. The propositions announced, so piquant by their paradoxical appearance, constitute the object of his numerous researches. We shall follow him step by step, at least so far as his principles are opposed to ours.

Homogeneity, Unity of the Nervous System.

"Follow," says M. Serres, page 17, "the human mind and nature in the physical and moral order: you will every where see man who separates and divides in his thought, and nature which unites in its action."

The philosophy of nature, and M. Serres, do quite the contrary of that which nature does. She operates

entirely in individualities; each different effect is the result of a different cause. The transcendental philosophers operate by abstractions; "they form from all their experiments one single fact, and from all truths, one sole and single truth. At the aspect of the varied forms which organized beings present, at the aspect of the innumerable modifications which their organs present, the mind is arrested, and overwhelmed under the weight of so many details; and after long years of meditation, it proclaims the unity of organic composition," page 21. After this, is it man or nature which divides and unites?

Page 54, M. Serres says without any preceding proof: "Thus then the brain of all classes of animals is brought back to an identity of composition, which does not permit us to mistake the homogeneity of its elements; but by the progress of its development, this identity is effaced; dissimilitudes are established either in all or only in some parts. The higher we ascend in the superior animals, the more numerous these dissimilitudes become, the more strongly are they pronounced; the farther we descend in the lower animals, the more do they diminish and become indistinct; the more does the brain retain its early physiognomy." This identity can only efface the forms, since, according to M. Serres, the elements are always the same. For their elements changing form and position, each subsisting in each class of new transformations, the whole of the brain is so far modified as to be no longer recognised from one class to the other. This is of no consequence to M. Serres; there is no less a perfect unity.

After having spoken of the modifications that the different cerebral parts undergo in fishes, reptiles, birds, and the mammalia, he applies his logic to the cerebral hemispheres. "Certainly," says he, page 61, "if any one should wish, at first, to reduce the cerebral hemispheres of monkeys, to the cerebral lobes of fishes, he would fail in his undertaking. He would

perceive, on the one part, very simple organs, on the other, very complicated ones, having no external relation in their form, configuration, or structure. All the characters, which assist anatomists in distinguishing the homogeneity of organs, being absent, we should be induced to believe, that these parts are entirely dissimilar, and have no analogy with each other."

"But let us go very far back to the uterine life of the mammalia; we shall first perceive the cerebral hemispheres rolled as in fishes, into two vesicles isolated from each other. Later, we shall see them affect the configuration of the cerebral hemispheres of reptiles; later still, they will present to us the forms of those of birds; finally, they will acquire at the epoch of birth, and sometimes later, the permanent forms which the adult in mammalia presents."

"Suppose we reduce the whole of all these evolutions to four periods; we shall see at the first period, the cerebral lobes of fishes arise, and their *homogeneity* in all the classes; the second will give us the hemispheres of reptiles, the third will produce those of birds, and the fourth, finally, will give rise to the complicated hemispheres of the mammalia."

To this analytical demonstration, M. Serres joins that by synthesis:

"Take a monkey at birth: you will find in his brain all the parts, which distinguish the mammalia from the other vertebrated animals. Go back to the uterine life, you will first see certain lobes of the cerebral hemispheres disappear, also the hemispheres of the cerebellum, the corpus callosum and annular protuberance. What remains corresponds to the brain of birds. Examine an embryo younger still; the fornix disappears, the hemispheres contract posteriorly, the tubercula quadrigemina are exposed on the superior surface of the brain; we have then two geminal lobes as in reptiles, of which this encephalic mass reproduces the type. Finally, go farther back still in the uterine life, you will find the cerebral mass formed by

lobes placed symetrically in a right line, the one by the side of the other; you will find a cerebellum formed either of two parts, the one right, the other left, or, of a delicate layer partly covering the fourth ventricle; you have, finally, the whole of the brain of fishes. Thus in ascending in the animal scale, from fishes to monkeys, you observe the brain gradually becoming more complicated, as in descending from adult mammalia to their different epochs of fœtal formation, you will perceive this organ successively become more simple. You come by these two courses to the same result, *to the unity of their formation and composition.*"

We must either refer this inference to a pure declamation that M. Serres wishes to partake with the transcendental philosophers of Germany, or the condition of writers is indeed melancholy. In proving the plurality of cerebral organs, I have based my inferences on the same facts which have induced M. Serres to decide on the unity of formation and composition. Let us admit, what is not true, and which M. Serres has very poorly copied from the Germans, that the brains of mammalia in the early periods of uterine life, resemble the brains of fishes, reptiles, and birds; it is not the less true that the brains of the mammalia are, later, according as the species differ, more or less complex; that in one species such a particular part is wanting, which is possessed by another. "In ascending from the inferior to the superior classes, we see this organ, at first so simple, approach gradually, in reptiles and birds, to that admirable organization which we know it possesses in the mammalia; and to that structure, more admirable still, which man presents." From this very language of M. Serres, how can he establish as an axiom that "the brain of vertebrated animals is constructed on a uniform type, and *with the same elements?*"

Are the brains of a blind or deaf animal, or those deprived of the sense of smell, composed of the same elements, as those of animals that see, hear, and smell?

And can the brains of the rabbit, fox, tiger and elephant, of the pigeon and falcon, be composed of the same elements? Yes; the fibrous, and non-fibrous substance, the cerebellum, tubercles, hemispheres, &c., &c., are constantly found; but first, these parts are more or less simple, more or less complicated; in the second place, it is an absolutely gratuitous supposition, that the constituent parts of analogous organs, are identical in the different species of animals. All trees have ligneous fibres, and a bark, between which is deposited the cambium. Are these ligneous fibres, these barks, cambiums, on this account, homogeneous? All animals have a stomach, but we have not yet had a physiologist so silly, as to maintain that the stomach, which digests only vegetables, is identical with the stomach which digests only flesh. We possess the five senses, in common with the greatest number of mammalia; but is our taste identical with that of the goat, that feeds upon euphorbium with avidity? Many emanations which are powerful excitants to certain animals, are unperceived by us, &c. I have already so frequently refuted the identity and unity of the different parts of the nervous system,* that I feel ashamed to be obliged to tell my readers, that, at this very time, partisans of this absurd fiction still exist.

"The nervous substance," say they, *Archives Generales de Medicine*, Vol. IV., January, 1824, page 27, "is every where identical. It is nothing more than the rectilinear disposition of uniform globules. It has every where the same properties, those of sensation and motion. The diversity of its functions is merely apparent. This diversity results from a different arrangement of the same homogeneous matter. On this account, the organs the most varied as to form and position, can have the same functions. There is

* See in the first volume of my large work, my treatise on the difference of the nerves and the functions of the senses.

no sensible difference in the globules of the olfactory nerve, and those of the optic, of the nerves of the anterior, and those of the posterior face of the spinal marrow."

Thus, since there is no sensible difference in the pretended globules of the different nerves, we must conclude that there is no real difference! By similar reasoning, the whole universe has been made to consist of identical molecules, the different arrangement of which constitutes the essence of all organic and inorganic beings, living and dead; a very convenient hypothesis for minds that are easily satisfied!

"In the mammalia," says M. Serres, page 9, "all the parts of the brain are very nearly the repetition of each other. Families induce some changes in their proportions and relations; but with very little attention, it is easy to restore them to the classical type, of which they are but a slight modification. In birds, this organ is still more permanent than in mammalia; all the families of this class are remarkable for the identical composition of their brain. From the smallest to the largest, it is but the repetition of the same elements, preserving always the same forms and the same connexions."

Let us dwell a moment on these passages, as remarkable for their falsity, as their boldness. Without again becoming tedious in relation to the different elements which must necessarily enter into the composition of the analogous parts of the brains of the different species of animals, let us compare only their brains, as to the forms which come under the observation of the senses, and under the relation of the parts of which the hemispheres of the cerebellum and brain are composed. They pretend to find a striking resemblance between the brain of the ourang outang, and that of man. But the difference of their volume is, first, as five to one; their convolutions differ greatly, as to number and structure; the anterior lobes, especially, are conically constructed, flattened above, exca-

vated below, &c.; the difference is much more sensible still in the other species of monkeys. Even from one species of monkey to another, you will perceive the hemispheres differing, as to the number and structure of the convolutions. Can we call the entire absence of essential parts, a simple modification, or a modification only of the proportions of the different cerebral parts? Now, compare the brains of most of the mammalia, either with each other, or with that of man, and each species will present essential differences. Compare the middle lobes of the frugivorous, with those of the carnivorous animals; the brain of the hare with that of the cat, the dog with the sheep, the goat with the hog, the mole with the lemming, the brain of the guinea-pig with that of the weasel, the shrew-mouse with that of the rat. Do not forget at the same time, that all these differences are in direct relation with the difference in the instincts and faculties of these animals, and thus the path will be traced, by which you will be enabled to discover the functions of the different cerebral parts. Without doubt, in all brains the fundamental parts have received the same names; but have the oak and the ivy the same organization, because both grow from a seed, because both have a stalk which ramifies, has leaves, flowers, and fruit?

Cast the same investigating glance on the brains of the different species of birds. Compare the brain of the cock with that of the eagle, the brain of the stork with that of the swan, the sparrow with the goldfinch, the brain of the gros-bec with that of the cardinal, the pigeon with that of the cuckoo, the brain of the owl with that of the parrot; think, at the same time, of the difference and modifications of their instincts, and decide, if it would ever be pardonable to admit homogeneity of elements and composition.

You yourselves see; you delineate these differences; you admit the great difference that exists in the brains of reptiles and fishes. For what purpose, to what

end, are all these differences? Are they an idle freak of nature, or are they material conditions of the diversity of their faculties? But all this language of nature, so clear, so precise, is not understood by the physiologist, infatuated with the idea of centralization, and of the unity of conformation: by those who pride themselves in a high and elevated conception, in regarding the cerebellum as a reversed brain, the brain as a repetition of the spinal marrow, and the most distinct parts of the brain, as the simple repetition of the same homogeneous parts; by physiologists, who seem to be ignorant, that, when nature repeats an apparatus, she repeats also the function, and that when she has for an object functions essentially distinct, she creates also essentially distinct apparatus.

Is it not a pitiful caprice of our physiologists, to make such uncertain and minute researches on thousands of brains of reptiles, of fishes, &c., of the habits of which they have hardly the most superficial knowledge, — to tell, with more or less plausibility, what part is the olfactory nerve, the optic, auditory nerve, cerebellum, brain, tubercles, &c.?

Is it not ridiculous to treat these matters, which for the most part escape our senses, and on which the most experienced anatomists are not agreed, as objects of the highest importance, while they never dare to direct their attention, either to the difference of the cerebral organization in animals analogous to man, or towards the diversity of the mechanical aptitudes, instincts, propensities, and faculties, which constantly attend this variety of organization. The physiologist is always away from the question, when he reasons as a metaphysician; there is but one correct philosophy on the moral and intellectual nature of man and animals, which can safely guide him in his researches and inductions.

Let us return to the homogeneity of all the parts of the nervous system, and examine if each part is fit for all the functions; or, in other words, if the function

of one nerve, or one part, can be transferred to every other nerve, or every other part of the cerebral mass?

The ideas of the centralization, unity, homogeneity of the nervous system, are, as I have already said, reveries of the transcendental philosophy of Germany. They have been very warmly received; 1st, because they were thought proper to combat the plurality of the cerebral organs, and 2d, because they favored the juggleries of animal magnetism.

Here again we have a proof of the power of induction of M. Serres: as a conclusion he repeats, page 567:

"The cerebro-spinal axis forms a single organ; the two substances which compose it, are continued from the vertebral column into the cranium, in all the vertebrated animals. This continuation is not a simple relation of contiguity. The medullary bundles which compose both parts, correspond in an admirable manner, from the brain to the superior part of the spinal marrow, or from this to the brain. This correspondence serves to complete all the proofs, that we have given, of the identity of the principal elements of the brain in the four classes of animals.

If you consider the pyramids, you observe that they are in direct relation with the cerebral hemispheres in all classes of animals. Whatever is the difference in form and size of the hemispheres, they are always in connexion with the anterior bundle of the spinal marrow, as may be seen in fishes, reptiles, birds, and the mammalia.

If you observe the cerebellum, you will constantly perceive its relations with the posterior chord of the spinal marrow in the mammalia, birds, reptiles, and fishes.

If, finally, you examine the tubercula quadrigemina or the optic lobes, you can constantly follow their connexions with the middle bundles of the spinal marrow or the *corpora olivaria*.

"This last relation is very important to observe in

birds, fishes, reptiles, and the mammalia, because it completes all we have said, on the analogies of these fundamental parts of the brain in all the classes of vertebrated animals."

First, M. Serres confounds the middle bundles with the corpora olivaria. These bundles exist in embryos before the appearance of the corpora olivaria; they exist in fishes, birds, the amphibia, which are notwithstanding deprived of corpora olivaria. Then what relation can parts, that do not exist, have with the brain or with the determination of cerebral parts, in fishes, birds, reptiles, and the amphibia?

Finally, if all these connexions prove the unity of the organ of the cerebro-spinal axis, every animal and all its parts will constitute but a single organ, since there is a connexion between them all. How can M. Serres and the partisans of this unity, conceive of the identity of the spinal marrow, medulla oblongata, brain, and cerebellum, seeing that there is always an augmentation of the two substances in these different parts, and that their functions are evidently and essentially different?

At page 2d of his preliminary discourse, M. Serres finds the idea of M. Dumeril sublime and classical. This philosopher said that the cranium of animals was but a vertebra, and the brain but the spinal marrow swollen out. Later, the cerebellnm has been transformed into a reversed brain. *O tempora, O professores!*

Can the Function of one Sense or Organ, be transferred to another Sense or Organ?

After speaking of the different development of the different cerebral parts, in the fishes, reptiles, birds, and mammifera, Serres, following Carus, says, p. lxxxii; "Finally we shall find, that the faculties may be transferred from one element which is subordinate, to an adjacent element which then becomes the domi-

nant one." In the *Archives générales de Médicine*, T. II. Oct. 1823, p. 235, is the following passage. "It is very probable that in somnambulism, some nerves quit their proper sphere of action, and produce sensations similar to those, produced by the proper sensorial nerves in their sound and natural state."

Carus had already said, p. 305, with a thousand other credulous and metaphysical German physiologists, that the whole cerebral mass is homogeneous; that nothing prevents the functions of one part from being transferred to another, and that it would not be contradictory to any thing we already know, if, after the entire destruction of the hemispheres, the intellectual faculties, or consciousness, should still remain. On this supposition, the spinal marrow and nerves, the nerves of the senses, the plexuses and ganglions of the sympathetic nerve, may all, indiscriminately and reciprocally exercise any function whatever, of the nervous system. Nothing hinders an ox or a horse, from being equal in understanding, at least, at the moment of the magnetic influence, to Plato, Locke, or Kant, since the identical, and preponderant nervous mass of their senses, spinal marrow and sympathetic nerve, will amply supply the deficiency occasioned by the much smaller mass of their brains.

Do the French deserve the reproach of disdaining the productions of the German soil! We refute the calumny, by pointing to the history of animal magnetism, of the transcendental philosophy, of absolute spiritualism, of the centralization of the human brain, and of the homogeneousness and unity of all the parts of the nervous system. Can more sublime and generous concessions be required, to impede the progress of positive knowledge and check all spirit of observation?

"One of the physical laws of organic matter," says Serres, p. 407, is, "that dissimilar organs may discharge the same function. Thus, the skin and lungs concur in respiration; and this function is performed by

the gills of fishes, and the treacheæ of insects, — organs exceedingly different from the lungs of mammifera and birds. The skin and urinary organs may reciprocally perform each others functions. Locomotion may be transferred from the limbs, by which it is performed in mammifera and birds, to the coccygeal apparatus which occurs in the case of fishes, as has been happily observed by the author of philosophical anatomy, (Geoffrey St. Hilaire.) The sense of smell, Professor Dumeril has ingeniously observed, may be transferred from one nerve to another, and according to the observations of Scarpa, Carus, Jacobson, and Treviranus, the sense of hearing may, in part, be entrusted to the fifth pair. My own researches have proved, that the chrysochloris, (*Talpa Asiatica, L.*), the rat-mole, (*Mus maritimus*), the zemni, (*Mus typhlus, L.*), and the proteus, see by means of a different nerve from the optic nerve. Why may not the ganglion of the fifth pair, in the invertebral animals, be the seat and point of reunion of their different sensations? Had not Cuvier such facts in view, when he promulgated his general law of the action of the nervous system?"

On page 385, Serres mentions this general law of Cuvier, viz., the diversity of the functions of nerves depends more on the different organization of the parts to which they are distributed, than on their own nature.

Serres, then, has forgotten — what he might have read, in my chapter on the difference of the nerves, T. I., p. 127, 4to. — that Cuvier, in his *Anatomie comparée*, p. 192, has disavowed this general law, laid down, p. 95. There he says; "Analogous parts invariably receive their nerves from the same pair, in all animals, whatever may be the position of these parts, or however much this pair may be obliged to deviate from a straight course, in order to reach them. Analogous nerves always have a similar distribution; they always go to the same parts. Even the small pairs,

whose distribution is more circumscribed, or whose place may be more easily supplied by the adjacent pairs, as the fourth and sixth, preserve their existence and use."

As Serres is resolutely bent on giving to Baron Cuvier, the honor of a general law for the action of the nervous system, which will he choose, that on page 95, or the subsequent more precise and circumtantial one, on page 192? Being well aware, that such a paradoxical notion needs to be well supported by facts, he cites his own researches on the moles chrysochloris, rat-mole, zemni, and proteus, which showed that these animals see by a different nerve from the optic. I have never dissected the chrysochloris, rat-mole, zemni, nor proteus; but I have examined the organ of vision in the mole, and I have found the optic nerve exceedingly small, it is true, as in all the species of rats, mice, and other small mammifera. M. Bailly has subsequently confirmed my observation, and demonstrated it to Geoffrey St. Hilaire and Cuvier. I conclude it is the same with the other animals, where the investigation is a little difficult, on account of the smallness of their eyes, and visual nerves. On page 129, T. I, 4to., I have refuted this same error, committed by Treviranus, both in regard to the auditory nerve, which he says is simply a branch of the fifth pair, and to the optic nerve, the origin of which he derives from the same root, as that of the muzzle. What confidence can be placed in anatomists, who, like Treviranus, *Biologie der Lebenden Natur*, B. 1, page 459, maintain that the cerebral convolutions are wanting in many species of the dog family; that mammifera have no pyramidal bodies, and that their cerebellum, consisting almost entirely of the vermiform process, contains no nodule of gray substance, or ganglion? I shall have occasion to prove, that Serres is also very often deceived about things, far more obvious than the optic nerve of the mole, &c. When such gross mistakes are made in regard to large ani-

mals and man, how can we confide in researches infinitely more delicate, particularly when their results are in contradiction to the constant laws of nature? If these things were true, where would be the uniform type, so much vaunted on all other occasions?

The opinion expressed by Dumeril, *Memoire sur l'Odorat des Poissons, lu à l'Institut en* 1808, not respecting the smell of fishes, as Serres pretends, but their taste, which he banishes from the mouth and transfers to the organ of smell, I have also combated, T. I., p. 154, "but," says Serres, "by assertions, that can have no weight with men, who evince no partiality in their inquiries after truth." Let us see these assertions. "Supposing, with Dumeril, that fishes have no hypoglossal nerve, this, then, can serve only for motion, and the branches of the fifth pair, which they possess, are ramified in the different papillæ of their tongue and mouth. According to Dumeril, the constant pressure of the water blunts the taste of fishes; but why does not this same pressure also blunt their smell? Why, notwithstanding our habit of walking, does the sole of our feet preserve such an acute sensibility? Besides, the tongue of most fishes is moveable, and is furnished anteriorly with a fine, supple skin. It would be idle to spend more time in refuting an opinion, which charges nature with having created a special apparatus for nothing at all."

Here, too, are some more assertions from my *Treatise on the Difference of the Nerves*, which tend to destroy the opinion of Dumeril, Serres, Treviranus, &c.

A difference not only exists in the external, but a very distinct one, too, in the internal apparatus of the nerves. Their point of departure, their number of ganglions of reinforcement, their consistence, color, commissures, all their conditions, in fact, vary in different nerves. They are developed at different epochs. In man, the spinal marrow, the nerves of the muscles of the eye, and the trigemini are firm

and fibrous, and the olfactory nerve is large, and presents distinct filaments, while the brain and cerebellum are yet pulpy, and the optic and acoustic nerves seem to be entirely composed of gray substance. There is a striking difference between the soft, red, and whitish nerves of the sympathetic system, and the hard, white nerves of the spinal marrow. On the other hand, the delicate, nervous fibres of the brain and cerebellum are distinguished from the spinal nerves, by their whiteness, as well as softness. All the nerves differ in their configuration. The nerves of sense are not at all similar in point of color, consistency, form, and texture. Oftentimes, different filaments of the same nerve even, are visibly unlike. Not only different nerves, but the filaments of the same nerve, may issue from different ganglions, situated in different places. All these peculiarities remain the same in the same nerves; and, therefore, the cause must be a primitive difference of internal structure, which is essentially necessary to a diversity of functions. This is the reason why it seemed so natural to Cuvier to conclude, "that the nerves are not entirely similar, and do not, for example, convey absolutely the same fluid as the arteries do; but there is, in the structure of each, and in their mode of action, some peculiarity relative to the functions, and to the nature of the organ which they animate." Page 192.

The proofs derived from anatomical principles, of a difference in the nerves, are strengthened by others, drawn from physiological principles. It is admitted, that the external apparatus convey different irritations and impressions to the nerves; but if all the nerves are of the same nature, how happens it, that these different impressions from their peripheric extremities, are transmitted to the brain without alteration? Ought not the impressions of the optic nerve to be transmitted differently from those of the auditory or olfactory nerve? Supposing the mode of communication to be the same, but only stronger in one sense,

and weaker in another; then, as Sœmmerring has well observed, they would be only stronger or weaker, and consequently, would not be essentially different. A difference in the mode of propagation, therefore, necessarily requires one in the internal structure of the nerves. The same rule must apply to all the nerves, whatever may be their functions, since they are designed to propagate determinate, or specific impressions. The internal structure of the nerves must differ, when their action on the different parts differs. The secretion of the saliva of the gastric juice, of the bile, of the semen, of the tears, and the different kinds of irritability in all the parts, absolutely require different actions, and consequently different nerves.

Hence it is, that the nerves of the senses are able to perform their special functions, in consequence of inward irritations only, and without the concurrence of the external world. Our sensations in dreaming, are the same as those produced by external objects. A man who has lost his sight, dreams that he sees; a pain is imagined to be felt in an amputated limb; the flow of blood to the eye, makes us see sparks and brilliant objects; a flow of blood to the ears gives rise to a singing and buzzing, and the same flow to the surface of the skin, makes us dream of being in the warm bath; a blow on the eye, and the contact of two different metals, one of which is applied upon the upper lip and the other placed under the tongue, occasion light; and finally, illusions of the senses in disease, are all derived from internal causes. Why, then, do you admit one class of nerves for motion, and another for sensation?

Many nerves, commonly regarded as simple, originate by filaments arising from different points; the fifth pair, for instance, arises from three different places, having three entirely different main roots. The olfactory and optic nerves, in mammifera, receive their filaments in their course, be it more or less long. The third pair arises in part in the blackish substance

in the bifurcation of the peduncules of the brain, and in part, in the gray substance lying over the bundles that are situated a little more externally. Thus, all the nerves arise from a greater or less extent of surface, and this apparently explains the numerous modifications, that the same nerve may receive. We see more than one color, and hear more than one sound; it is not a certain color or ray only, that we see, nor a certain sound only, that we hear. In one animal, the nervous filaments are sensible to certain odoriferous particles; in another, they are designed to receive others.

Why should a nerve invariably have the same origin, the same course, and generally, the same organization? Why does not an external apparatus receive its nervous filaments, sometimes from one adjacent nervous branch, and sometimes from another? Why this exactness, this minute adherence of nature to its usual ways? Why such a number of apparatus, if nature, which is always economical, could have attained its object with only one? Why is a whole sense annihilated, when the optic or auditory nerve is destroyed? Could not nature have prevented this loss by numerous communications of different nervous filaments, in the same way, that it remedies the effects of an obstacle in the usual course of the circulation of the blood, by anastomoses of vessels? If such assertions as these have no weight against the homogeneousness and unity of the nervous system, with men who evince no partiality in their inquiries after truth, I should be tempted to believe that M. Serres' impartiality expects more profitable returns from the incense which he flings out, hit or miss, to his guardian idols.

The localization of certain cerebral parts, the tubercula quadrigemina, for instance, is very justly used by Serres, as a ground for determining other parts of the encephalon. But how could any part whatever, or its function be determined, if this localization were not constant; if a certain cerebral part could occupy,

sometimes this place, and sometimes that, or if all the parts enjoyed indifferently, the same functions? Where would be the use of determining parts from their localization?

Another Discussion of the Question, whether the Non-fibrous Substance of the Nervous System gives Origin to the White, Fibrous Substance.

The non-fibrous gray substance is not first formed, and cannot give origin to the fibrous white substance.

The nervous system, as well as the whole organism, is not formed from the centre to the periphery, but from the periphery to the centre.

These are the two propositions to which Serres recurs on almost every page of his work. They are there so blended and interlaced with each other, that it is very difficult to isolate them. However, I shall try to render the matter a little clearer, and treat of each separately, as far as possible.

"The hypothesis of Gall and Spurzheim," says Serres, "is so blended with their facts, as to be incorporated with them, and we know not where it would have led us, had not Cuvier, in his memorable Report to the Academy of Sciences, paralyzed its effects." Page xlviii.

This memorable report, as well as all the writings of my opponents, will always be the most precious voucher I can have, of how far in the rear, the anatomical and physiological knowledge of the nervous system was at that time, and how much, in this respect, science is indebted to me! Without reminding M. Serres, that almost every point that was disputed in that report, has since been generally acknowledged and received by Cuvier himself; let me ask him to read in that memorable report, one of the eighteen propositions acknowledged to be true by the Committee, expressed in the following terms:

"That the gray substance is the origin and matrix of all the nervous fibres, and by its means, they are reinforced and multiplied." Considering this discovery a little too good for us to make, they tried by all manner of sophistry, to prove that it expressed a generally received opinion; but we refuted this position in our reply to the report, p. 70, &c.

Serres continues: "Gall's hypothesis is founded on the idea of the central development of the nervous system. It supposes, that the spinal marrow and encephalon, are formed from the centre to the circumference. The gray matter in the cerebro-spinal axis is considered to exist previously to the white matter at the periphery; to the nerves implanted in it; to the intervertebral ganglions, still more excentric; and finally, to the nerves that, from these ganglions, radiate to every part of the animal. This opinion, therefore, depends on the common notions relative to the development of this system."

"But if its formation is excentric; if all these parts follow an inverse order in their appearance; if the nerves are first formed in the organs; if, later still, the intervertebral ganglions are developed before the spinal marrow is in existence; and if this axis is itself developed from the circumference to the centre, we see that this hypothesis is utterly opposed to facts."

"We see that the intervertebral ganglions do not furnish the substance of the nerves which radiate from them, since these nerves exist before they do."

"We see that the spinal matter is not, and cannot furnish the substance of the chords that are implanted in it, since these chords do not primitively communicate with it, and frequently even exist without it."

"We see, finally, that the gray substance of this spinal axis, cannot be the organ of the nutrition of the white substance, since the latter is invariably formed first; since, in some animals, as the Asterias, for instance, the nervous system is formed exclusively

of white substance; and since in others, as certain fishes, we can scarcely find the slightest vestige of gray substance in the centre of the spinal marrow."

Besides, that all these passages are false assertions, the reader must be struck with the fact, that Serres could gainsay my proposition in no other way, than by espousing another extravagance of *natural* philosophy, and reversing the mode of animal organization.

Let us for a moment admit, with my countrymen, that the nerves proceed in a miraculous manner from the circumference to the centre, that is, from parts also formed before the centre. Let us admit, what indubitable facts establish, that nerves may exist without a brain, or spinal marrow; yet, does it follow that these nerves have not originated in the non-fibrous substance?

In our Memoir to the Institute, we compared the cortical, gray substance, with the mucous body that lines the skin, all its internal processes, the interstices of the muscular fibres, &c. Vicq-d'Azyr had already said that this mucous substance was analogous to the cortical substance of the brain and cerebellum. It forms with the nervous terminations various apparatus, in the brain, as well as in the intestines and external senses, such as the retina of the eye, the gelatinous tissue of the cochlea of the ear, and the papillæ of the tongue. Haller, too, had arranged the different peripheric terminations of the nerves under one category, in saying that the cutaneous nerves, whose trunks are so hard, are softened according as they part with their cellular tissue, and finally become pulpy in the papillæ of the skin.

"Although these papillæ," he says, "are never destitute of their envelope, and cellular substance, yet they are very soft in the tongue, skin, mammæ, &c., and are always penetrated by blood vessels. The same is the case with the expansion of the nerves in the muscles and heart. The difference of color observed in the net-work of the skin, is not contrary to that

analogy; for if the mucous body, known by the name of the *rete Malpighii*, is differently colored in the skins of different men and animals, the cortical substance varies no less; it may be grayish, blackish gray, reddish, pale, or yellow. The same diversity of color is found in the retina, in the pituitary membrane of the nose, in the nervous papillæ of the tongue and palate of different animals. The mucous net-work expanded under the epidermis of animals, presents an astonishing variety of colors. Van der Haar says: 'It is certain that the cortical part of the brain is a soft, pulpy, almost inorganic substance, covering the white part; but it must be observed, that we find the same constituent parts and the same integuments in the nerves, with some insignificant changes. Can we not, and ought we not thence to infer, that cerebral substance exists in the smallest nervous filaments? How much farther is this pulpy or medullary substance expanded, when separated from its neurileme, or envelope, it is lost in the mucous body! Hence the reason why we cannot prick the skin with the finest needle, without touching the pulpy cerebral substance.'"

Serres cites Fouquet and Bordeu, who also liken the gray substance to the mucous tissue of the skin. Carus and Sprengel are of the same opinion.

If therefore the mucous tissue is nothing but the pulpy, non-fibrous substance of the nervous system, then the latter always gives origin to the nerves, whether they are formed from the centre to the circumference, or from the circumference to the centre. I appeal to the good sense of M. Serres, who appears to be so accessible to the demonstrative force of general laws, and present him the following:

The brain and cerebellum at first contain, in their interior, some large masses of gray substance, or ganglions, for the production and reinforcement of the fibrous, white substance; and the whole surface of their nervous membrane is also covered externally, with the non-fibrous gray substance. This latter has

the same organic function as the interior; that is, it gives origin to the white, nervous fibres, which converge towards the centre, to form the various junctions or commissures. The existence of the pulpy substance in the extremities of the nerves of the senses, is beyond all doubt. Why then may it not be so with the extremities or expansions of all the other nerves? and why should not this pulpy substance have the same organic function, when placed at the extremities of the spinal nerves? Why should it not furnish nervous filaments, as well as when it lines the extremities of the nerves of sense, and of the hemispheres of the brain and cerebellum?

Those filaments, returning from the peripheric surface of the nerves, very satisfactorily explain how there may be nerves in the extremities, where there is no spinal marrow, medulla oblongata, nor brain. As the commissures are formed by the returning filaments, we understand why they are not formed, till after the hemispheres are sufficiently developed, to furnish returning filaments, and why also the chords of the spinal marrow and medulla oblongata, are not united by commissures. Let me add another remark of much greater physiological importance. I have proved that the organs of animal life have a double mode of function; their function is passive when they receive impressions, active, when they react on those impressions. We smell, and we scent; we see, and we look, &c. An apparatus is required therefore to receive impressions and transmit them to the brain; and another for external action and reaction; "one for sensibility and sensation; the other, for mobility and motion."

If I were not afraid of throwing a new apple of discord among experimental physiologists, I would say, that here is the mystery of the two orders of nerves which some physiologists seek for in the anterior and posterior, or inferior and superior roots of the spinal marrow. However this may be, it will

always prove, that, at least, one part of the nervous system is formed from the circumference to the centre; but that, at the same time, this order of nerves takes its origin in the non-fibrous, pulpy substance.

Let us see now, if in any respect whatever, we can admit that the fibrous, white substance, exists prior to the gray, or non-fibrous pulpy substance. None who have made the most faithful researches on the embryo, have found either nerve, organ, or intervertebral ganglion, existing previous to the spinal marrow; and the reason is, that they made their researches with the intention of seeing what actually is, not like others, prejudiced in favor of an hypothesis, which they are interested in maintaining. They all have seen, that at first, the canal formed by the membranes, is filled with a limpid fluid, which is nothing else but the pulpy substance, in a liquid, transparent state. At this period, it is impossible to recognise any organ. The extremities not yet existing, their nerves cannot exist. Thus the existence of the gray substance is prior to that of the nerves, and as I have proved, while refuting Tiedemann, prior even to the existence of the white substance of the spinal marrow.

In the second month, and not before, the rudiments of extremities begin to appear in the shape of little tubercles; but the cerebral vesicles are already distinct, and the liquid substance of the spinal canal begins to lose its liquid and pellucid appearance. In the embryos of the seventh and eighth week, we recognise the mouth, eyes, and the nasal and auricular openings. The limbs are terminated by a flattened part, from the rounded margin of which the fingers and toes subsequently appear. The head and spine have lost their transparency. The spinal column, the bones of the cranium, and the muscles of the back and neck, are not yet formed. The cerebral substance, at this time, has attained the consistence of the white of an egg. In embryos hardened in alcohol, we distinguish a part of the structure and disposition of the

brain and spinal marrow. The latter is very large and thick, compared with the size of the embryo. As yet, we distinguish only its two chords, but not a trace of fibrous structure. We see the rudiments of the cerebellum, of the tubercles, of the optic thalami, and of the corpora striata. Tiedemann has seen no nerve, at this period, coming from the spinal marrow, or brain. He presumes that their extreme minuteness renders them imperceptible. Neither has he been able to recognise any fibrous substance.

At the third month, we see the restiform bodies forming a thin, narrow cerebellum; and the peduncles, the optic thalami, and corpora striata are more perceptible; but the apparatus of junction, such as the corpus callosum, the fornix, the cornua Ammonis, have not yet appeared. It is not till the eleventh week, that the extremities are developed. The spinal nerves appear on the two sides of the marrow, and the optic and olfactory nerves are seen, terminated by a swelling.

From the anterior and outer margins of the optic thalami and corpora striata, arises the membrane of the hemispheres, produced by the radiation of fibres issuing from those ganglia, or masses of gray substance, which are the apparatus of reinforcement. All the spinal nerves have made their appearance, but the extreme softness of their tissue, and the thickness of their investing membrane, have prevented Tiedemann from tracing them to their origin. As even in adults, the nerves are very easily torn away at their origin, especially, the third, fourth, and sixth pairs, and all the pairs that come from the medulla oblongata, and medulla spinalis, an anatomist, without particular care, might be induced to think, that these nerves have no communication with the pulpy substance, their real origin. It is evident, therefore, that the gray substance, whether liquid and transparent, or thick and opaque, always exists prior to the white substance, to the chords of the spinal marrow, to the hemispheres, to the cerebellum, and to the nerves.

The white substance is never, in the slightest degree, formed previous to, or independent of the pulpy substance. Serres's assertions to the contrary, are entirely gratuitous. He relies on the authority of Cuvier, who once said, that in the asterias, the nervous system is composed exclusively of white substance. Cuvier once maintained too, that in fishes, the sympathetic nerve has no ganglions. Subsequent and more faithful observations have shown the contrary. I have examined the asterias, and have found as many ganglions, or masses of gray substance, in their nervous ring, as there are radii, or large ramifications from this ring. In Burdach's work, (*Vom Bau und Leben des Gehirnes*), T. I, fig. 1, this ring and the ganglions are very well represented. Burdach expressly says, that in the asterias and holothurias, these ganglions cannot be overlooked. Merkel and Conrad have also described and figured them. Burdach adds, p. 205, that Carus had maintained, on the authority of Cuvier, that there was no difference in the nervous substance of the invertebral animals, but that Swammerdam had already distinguished the two substances in bees. He recognised, like Reil, some gray substance in the mollusca, and like him, too, Merkel holds that the gray substance exists, wherever there is any nervous system whatever. In insects, the gray substance occupies the interior; the white, the exterior. Even Carus has observed, that in the invertebral animals, the whole ganglion, or at least the nucleus, exists in the gray substance. In the Ascaris lumbricoïdes, Baer has observed the same swelling, and the nerves which proceed from, or have, he says, with Burdach, proceeded to them; a view which is adopted by Serres.

"Pursuing his notions on the encephalon," continues Serres, "Gall says that the grayish swelling of the brothers Wenzel, is the matrix of the auditory and facial nerves. This supposes, that the swelling exists previously to the nerves, but not only are these nerves formed without the cranium, and at first with no com-

munication with the encephalon, but even when they have reached the spinal marrow, the gray matter of the tænia of the Wenzels, has not yet appeared. This swelling is not developed, till many months after the nerves are implanted in it."

There are several things in the passage, which M. Serres will pardon me, for not believing, merely on his word. Let us admit, for a moment, that the auditory nerve exists before this swelling. We have never said, that the tænia is the sole origin, the only ganglion of the auditory nerve. I have always thought, that it was with this nerve, as with almost all the rest — that the more perfect the function is, the more numerous are the origins; and the origins multiplying, the number of their ganglions increases, the nearer the nerves approach the epoch of exercising their functions. Thus, Serres himself acknowledges, the two largest swellings of the spinal marrow, coincide with the appearance of the limb. Thus, too, the olivary ganglions and corpora geniculata also appear, subsequently, though not after the nervous filaments to which they adhere, to give origin to new filaments, designed to reinforce those already formed. Serres deceives himself or his readers, in attributing to us the opinion, that the corpora geniculata are the sole origin of the optic nerve, in order to fasten upon us the conclusion, that the nerve exists before the gray substance. How could Serres imagine, that nerves coming from the circumference, could plunge into these ganglions, if they did not exist, at least, simultaneously?

Serres says, p. lii, that the medullary bundles of the pons Varolii are developed before the gray substance of the pons itself, and that the peduncles of the pineal gland are invariably formed before the gland. To publish such errors with so much assurance, leads us to suspect, that M. Serres counts upon the ignorance of his readers and judges. So long as the ganglion called the pineal gland, does not exist, its peduncles do not exist. Tiedemann never saw this

ganglion till the nineteenth day, when he could also recognise two little peduncles. The medullary bundles of the pons Varolii, are the commissures of the hemispheres of the cerebellum, and their existence and successive increase coincide with the formation of the folds of these hemispheres. It is precisely in the canal, in the medulla oblongata, and in the pons Varolii, that the gray substance abounds, before we can distinguish any fibrous substance. The numerous instances of such incorrectness, must caution us how we give our assent to Serres's assertions, before verifying them ourselves.

What Serres says of the centrum ovale and of apoplectic cysts is founded, partly, on a mere chimera, since the centrum ovale is an artificial production, and partly, on an interpretation so arbitrary, that I may dispense with replying to it.

Unless Serres is willing to admit an eternal vacillation in the laws of the formation of the nervous system, we can, every moment, find in his own observations, things that refute his hypothesis. He says, page 45, that the surface of the optic lobes assumes a whitish aspect at the tenth day of incubation, by which they are distinguished from the anterior lobes that are always gray, and from the cerebellum, which is of a reddish gray. This white color becomes more and more marked, at the fourteenth, eighteenth, twentieth, and twenty-first days of incubation, and this constitutes the normal state of the interior of these lobes in all adult birds. The aspect of these lobes is grayish, until the ninth day, when there appears in their interior some whitish striæ, which gradually enlarge, till their margins touch and unite together, and in this manner is produced a medullary layer, which forms a kind of cortex over their whole periphery. Until the twelfth day, the whole mass of the exterior lobes is of an ash gray; but at this period, and during the fourteenth, fifteenth, and sixteenth days, even till birth, we perceive some whitish

fibres, forming a thin layer on the inner part of the lobes, and which may be very readily distinguished by separating them. At their base, we see them uniting together in a pellicle.

In the spinal marrow of lizards, observed twelve days after birth, Serres has seen in the interior of the gutter that forms the spinal marrow, a substance browner and more liquid than the lateral parts of the chords, extending the whole length, and lining the whole inside of the spinal marrow. He says, page 105, that the spine, or canal, is at first filled with a liquid, and that the layers of the marrow become successively thicker, in proportion as the liquid takes the consistence of gray matter.

Now I leave it to the reader to decide, whether Serres is wrong in maintaining the priority of the existence of the fibrous, white substance, or whether the laws of the organism are complaisant enough, to accommodate themselves to the caprices and inconsistencies of anatomists.

In the following passages, particularly, Serres declaims against the idea of the white substance being posterior to the gray, and originating in it.

"I remark, in the first place, that in the system of the German physiologists, the gray matter is supposed to be the matrix, or nutritive matter of the white; —a revival, apparently, of the hypothesis of the secretion of spirit by the gray substance, of which the fibrous matter constitutes only the excretory ducts."

The stem nourishes the cherry, therefore, according to Serres's reasoning, it follows, that the stem secretes the spirits, and that the cherry is the excretory duct. To find a man guilty, it is merely necessary to invent a crime, a manœuvre that has been very often practised upon me.

"The two hypotheses," he continues, "suppose a direct communication between the two substances, which indeed is the case in the cerebellum and cerebral hemispheres of adult animals, but not in the spinal

marrow and the corpora striata; for, in the mammifera and birds, we may remove every layer of the gray substance of the spinal marrow, without in the least involving the white substance. In the mammifera, we may also remove the gray matter of the corpora striata, without tearing or otherwise affecting the fibrous matter."

These are bold assertions wherewith to astonish novices in anatomy. Wherever there is gray and white substance, there exists a direct communication between them. Nervous fibrils, however, which issue from the gray substance, are so fine and delicate, that the slightest force is sufficient to rupture them. What precautions are necessary, in order to preserve the adhesion, the direct communications of the third, fourth, sixth, eighth, &c., pairs of nerves! The communication of the nerves with the gray substance of the spinal marrow, can be seen only by carefully pulling out one of the stoutest nerves, when there will always be found a little bulb of gray substance, adhering to the central extremity of the nerve. Can an anatomist, on whose faith we are required to believe so many invisible marvels, assert that the corpora striata have no direct communication with the white substance? What then is the use of those numerous large, white, and fibrous bundles in the corpora striata, and which, having traversed them, expand like a fan, in order to form a part of the inner layer of the cerebral membrane? And how are those white, fibrous striæ and bundles formed? Make an incision in the gray substance which presents itself in the ventricles, or remove a thin layer by scraping, and you will see an infinite number of very white filaments, proceeding towards the large bundles for the purpose of reinforcing them. The same thing is evident in the outer half of the corpora striata, enveloped in some little convolutions under the middle lobe, and also in the optic thalami, in the great peduncles, pons Varolii, &c. In fact, we may raise and unfold these little

convolutions, that envelope the outer and greater half of the corpora striata, without affecting the latter; but these convolutions are not formed directly by the gray substance, — they are nervous bundles, white striæ, resulting from the confluence of innumerable filaments formed in these large masses of gray substance.

Serres continues: "In the primitive state of young embryos, the layer, which forms the cortical substance of the cerebral hemispheres, is placed only in juxtaposition to the layer of white matter; they do not even adhere together. Ruisch removed in an infant, the whole cortical layer of the hemispheres, without affecting their white substance. If we believe in nutrition, how is it effected? Are there canals of communication between the two substances, as is admitted in the hypothesis of animal spirits? What is the nutritive fluid, and how does it circulate? What is the matter of reinforcement? These things are not explained."

Our anatomist, then, does not know that the blood-vessels of the pia-mater or vascular membrane, penetrate into the cortical layer, traverse it and follow, uninterruptedly, the fibrils of the subjacent layer of white substance? In separating the gray from the white layer, these vessels are necessarily torn — the first reason, why the white layer *is* involved. I have often removed the gray layer in adults and children of different ages, and I have invariably seen, that the gray substance of this layer, is every where penetrated by white filaments, which are continued into the white layer, and which we cannot avoid breaking — a second reason, why the white layer must inevitably be involved. If, then, the blood-vessels have any thing to do with nutrition, Serres will discover in this disposition, the means of nutrition and reinforcement.

"In the second place," adds Serres, "a consequence of this hypothesis is, that the gray matter should always be in proportion to the white. But, in the

spinal marrow, this relation, instead of being constant, is, in fact, inverted. Thus, as we descend the scale of mammifera, from the monkeys to the rodentes, and from them to the birds, the white matter goes on increasing, and the gray diminishing. In all the fishes, the predominance of white matter is still more marked, and in many, we shall hardly find a vestige of gray matter in the spinal marrow. This hypothesis, therefore, being in manifest opposition to facts, is not admissible."

What may be the proportion between the two substances, I cannot say, but not permitting myself to give supposition for facts, I can announce it to be a constant fact, that the more copious the white substance is, the more copious also is the gray. The layer of gray substance, that furnishes the numerous filaments of the olfactory nerve, and its bulb of gray substance, as the cribriform bone, are much larger in the mole, dog, ox, &c., than in man. The tubercula quadrigemina, one of the origins of the nerve of vision, and the tænia, the ganglion of reinforcement of the auditory nerve, are much larger in the horse, &c., than in man. The optic thalami, the corpora striata, the pons Varolii, the crura cerebri, are always in proportion to the hemispheres, — much larger in man for instance, than in the greatest part of the mammifera.

The medulla oblongata is proportionally more swelled, and more abundantly furnished with gray substance, in most of the mammifera, because it gives origin to larger nerves. In the spinal marrow, the swellings whence the brachial and crural nerves arise, so predominate over those that give rise to the other pairs, that anatomists, for want of sufficient attention, still overlook the latter. Here then is a general law, that undergoes many modifications indeed, but admits of no essential exception.

In the polypi, &c., the two nervous substances are still confounded, and here, there might be some ground for talking about homogeneousness, and unity of com-

position. The gray, or rather the non-fibrous substance, nowhere exists, not even in the brain of the mammifera, entirely pure, completely isolated from the fibrous substance. Examine carefully the gray substance of the pons Varolii, of the tubercula quadrigemina, the pineal gland, the olivary bodies, the corpus fimbriatum, the fourth ventricle, the peduncles of the brain, the optic thalami, the corpora striata, and corpora geniculata; examine the gray substance that surrounds the union of the optic nerves, that which gives origin to the numerous filaments of the olfactory nerve in brutes, the bulb on the cribriform bone, even the striæ of gray substance, which accompany the olfactory and optic nerves in man; examine the gray substance of the mamillary bodies, that which is found in many animals, the wolf and dog, for example, on the posterior fold of the great commissure of the hemispheres, and you will see, that it is every where mixed with nervous filaments, and thus intimately penetrated with white substance, which proves, that those filaments arise there, and that it is not always essential to their function, that they should form nervous chords, separated and distinct from their very origin. How, in this case, are we to estimate the different proportions of the two substances, in birds, ophidians, saurians, &c.? According to Serres, it may be, exclusively, the gray substance, or exclusively the white substance, that exercises the functions of the whole nervous system; for he asserts, though in opposition to Swammerdam, Meckel, Konrad, Reil, Carus, Burdach, &c., that in the invertebral animals there is no gray matter, and that their nervous system is formed exclusively of white substance.

In Burdach's work, T. I, Pl. I, fig. 4, is a faithful drawing of the nervous system of the crab. All the little collections of gray matter, that give origin to the nerves; that is to say, all the ganglions are very well marked, particularly those that send nerves to the nippers. Even the five ganglions of the tail, form very

distinct swellings. Serres's figures are far from being true to nature; they are very inaccurate, and coarsely executed. In my large work, T. 1, Pl. I, fig. 2, is the spinal marrow of the hen. At first, the collections of gray substance form ganglions at the origin of each cervical nerve; then comes a very broad, and pretty long swelling for the nerves of the wings; the other ganglions form swellings, till we come to the largest of all, those for the crural nerves. In birds, however, whose powers of flying predominate over those of running, the order of size in these two large swellings, is reversed. But it is invariably the case, that the gray substance is as abundant in birds, as in the mammifera.

In his remarks relative to the gray substance of the spinal marrow of fishes, Serres appears to have reference to an observation of Arsaky, who professes never to have seen gray substance in the spinal marrow of the zitterochen, (*Raia torpedo, L.*) But he found that this canal has a cavity, presenting the same form as that produced by the gray substance in the interior of the spinal marrow in other animals. It is to be presumed, therefore, that Arsaky made up his opinion hastily, and for a still stronger reason too, that in all other fishes, the gray substance of the spinal marrow is managed in the same manner. As in the mammifera, it is more abundant in the upper than in the lower region, which makes the dorsal furrow deeper than the abdominal; it is visible externally on the sides, at the origin of the spinal nerves. See Carus, p. 131, and Pl. II., fig. 16 and 15. Tiedemann also has observed, p. 86, that in all species of fishes, the walls of the canal of their spinal marrow, are furnished with gray substance.

The same is the case in the nervous system of voluntary motion in the caterpillar, (large work, Pl. 1, fig. 1), as Serres himself acknowledges. But he maintains, with some German anatomists, that this system is not analogous to the spinal marrow of fishes, birds,

and the mammifera. This system reaches from one extremity to the other, on the median line, and presents very distinct cords on the right and left. At each segment of the animal, these chords swell into a ganglion, which furnishes to the right and left side nervous filaments, that are distributed to the muscles of each segment, that executes voluntary motion. A man must have a rage for singularity, to mistake this system, which is not merely analogous to, but is precisely the same as that of voluntary motion in fishes, birds, and the mammifera.

Serres denies, p. 557, apparently on the authority of Carus, that the spinal marrow presents any swelling, formed by the gray matter at the insertion, according to him, and the origin, according to me, of the spinal nerves. "In no class," says he, "do we see a series of swellings, corresponding to the series of the insertions of the spinal nerves. The spinal marrow of fishes is particularly remarkable in this respect. We have observed no swellings in it, though the spinal nerves are very much developed, especially in the cartilaginous fishes."

Carus says, that these ganglions of the spinal marrow do not harmonize with the organization of the mammifera, p. 218. Why not?

I was the first to recognise, in the spinal marrow, the two large swellings of the lower and upper limbs, because they had no idea of the use of the gray substance. And now they would voluntarily sacrifice this truth, if their eyes did not present too large an obstacle to the spirit of party. What anatomist dares to deny the existence of these ganglions in the caterpillar? and if they are disinclined to acknowledge the most striking analogy, I appeal to birds of all classes, and to all the mammifera. What confidence can be put in anatomists, who refuse to believe the testimony of common sense, and their own eyes? They see, that wherever there are swellings of gray substance, there arise, or if Serres prefers, there are inserted, nerves. They

see, and are forced to avow, that where the largest nerves originate, we have the largest swellings. They profess to be the partisans of general laws, and are inconsistent enough to pretend, that the other smaller nerves do not require smaller swellings. Snakes, having neither anterior nor posterior limbs, are also devoid of the two large swellings in their spinal marrow; but, at the origin of each pair of nerves from their long spinal marrow, there is invariably, a little round swelling. Carus also says, p. 173, that after careful examination, it can no longer be denied, that these swellings exist at the origin of the nerves, in the spinal marrow of the *Coluber natrix*. The same is the fact in the eel, and all fishes, even in the *Tetraodon mola*. Although the length of the spinal marrow does not exceed that of the brain, yet these swellings are very distinct, (Carus, p. 128.) It is understood, that the swellings, corresponding to the fins, are the largest. The Trigla genus, remarkable for the separation of the rays of their pectoral fins, are also remarkable for a series of swellings proportioned, in number and volume, to the number and volume of the same rays, to which they correspond, (Cuvier's Report on Serres's work, p. xxii.) The electric fishes have also a considerable swelling, corresponding to the nerves that are distributed to the electric apparatus, (p. xxiii.)

Again; if we will examine those animals whose vertebræ are quite long, we shall see, that the canal in each vertebra is invariably enlarged at the two extremities, where it is contiguous to the other vertebræ; and it is in this place, at this enlargement of the vertebral canal, that the ganglions are placed. In order to avoid repetition, I refer the reader to what I have said on this subject, T. I, 4to. p. 37, &c. &c.

Why does Serres admit, that the medulla oblongata, pons Varolii, optic thalami, corpora striata, present swellings of gray matter, in a certain relation to the white substance, which originates in it, or, as he says,

that these swellings are in relation, in the different classes, to the volume and number of the medullary bundles, which traverse them? He admits it, because these parts are so voluminous, that his readers could not be imposed on, unless they were totally blind.

"But," says Serres, "does this prove that the white matter originates in the gray? Anatomy returns a negative to this question; for Ruysch never succeeded in reddening the white matter in his injections, and Willis never could demonstrate fibrils, issuing from the gray matter and proceeding to form bundles. Malpighi failed in his attempts to trace the white bundles from the glandular follicles, of which we considered the gray matter to be composed. Have Gall and Spurzheim succeeded any better? I find no proof to that effect in their works."

Yes, Gall and Spurzheim have succeeded better; and M. Serres may enjoy the same happiness, whenever he is inclined to consider the swellings of the spinal marrow and medulla oblongata, the pons Varolii, the tubercles, the optic thalami, the corpora striata, the bulb of the olfactory nerve, the pineal gland, the mammillary bodies, &c. &c.; his eyes will every where light upon numerous nervous filaments, which are formed in the gray substance, and issue from it, for the purpose of forming nerves and nervous bundles. Serres goes so far, p. 569, as again to rest upon his great authority, M. Cuvier, who, as I have already shown, from a passage in his report, was one of the first to recognise this discovery.

It is said again, that, if these swellings of the spinal marrow did really exist, we ought to see them in embryos, where, however, we find nothing like them. How far, we may ask, has this been well observed? The olivary body, the corpus geniculatum, are not seen in embryos; are we to conclude with Tiedemann and Serres, that they do not exist in adults?

After these digressions, Serres reminds us again of some of his numerous errors; for example; "that in

all embryos without exception, the white matter is formed before the gray in the spinal marrow." Refuted in the review of Tiedemann's work. Again, that in the olivaria, the white matter is developed before the gray. "Frequently even," he says, "the latter is not formed at all, as in birds, reptiles, and fishes."

Such assertions prove, how little Serres knows of the true laws of the successive formation of the parts of the nervous system. So long as the gray substance is not in existence, the white, which is formed and continued by it, does not exist. At this period, the parts of the brain dependent on this ganglion (the olivary bodies) have not yet appeared, and never do appear in the simpler brains of the reptiles, fishes, birds, and even the mammifera, excepting man only, and perhaps the monkeys. This is the reason, why these animals never possess the olivary bodies. As soon, however, as the new cerebral parts are to be formed, the matter to be used for this purpose must be deposited from the circulation; the olivaria appear, and with them their white substance, that is, a particular bundle, whose direction is different from that of the bundle wrongly called the middle bundle, from the erroneous impression that there are three bundles, on the anterior surface in man, and the inferior surface, in brutes, of the spinal marrow.

Carus has charged me, (T. I, p. 280, and 287,) with having declared the olivary bodies to be ganglions of the hemispheres, or as he expresses it, ganglions of the optic thalami and corpora striata, which he has called ganglions of the hemispheres. It is notorious that we were the first, who, upon physiological principles, conceived and published these peculiar views of the use of the ganglions. (See T. I, p. 282 4to. and a thousand other places.) In respect to the olivaria, we held the following language. "The olivary bodies are only a ganglion, like the corpus fimbriatum of the cerebellum. A large bundle proceeds from the ganglion, which ascends with the posterior bundles of the

great swelling, behind the coarse, fibrous bundles. All these bundles ascend, like those of the pyramids, between the transverse fibres of the commissure of the cerebellum. In their passage, they are reinforced. Above the ganglion, they constitute the posterior and inner part of the large fibrous bundle. They acquire their greatest increase, at their entrance into the large fibrous bundle, from the great mass of gray substance collected there, and which, with the nervous filaments it produces, forms a ganglion, pretty hard, flattened in the middle, and unequal above and behind." The olivaria, therefore, according to our views, only concur with the gray substance of other ganglions, in successively augmenting the fibrous bundles. Carus rejects this opinion, because, says he, the olivaria exist in but a few mammifera. Once I really thought, that the olivaria existed in the large mammifera at least, since their medulla oblongata is very much swelled out on the outer side, and that being much smaller than in man, they were buried in the prominent part. Since Carus's work appeared, I have again examined the medulla oblongata in the ox and horse, and as I have never been able to discover any thing like the interior of the olivaria in man, I believe, with him and Serres, that the olivaria do not exist in them. But I cannot agree with Carus, that we ought not to admit a series of several ganglions, as the complement of the organization of a nerve, or a hemisphere. The nerve of vision, certainly, has several ganglions of origin and reinforcement, and so has the olfactory. So, too, besides the pyramids, the olivaria, the annular protuberance, the great fibrous bundles, the optic thalami, the corpora striata, must be considered as so many apparatus of origin and reinforcement for the hemispheres of the brain. As in the formation of the nerves, so it is in that of the hemispheres, the more perfect the hemispheres are, the more numerous are these ganglions, or apparatus of origin and reinforcement; so that sometimes

the corpora striata, sometimes the optic thalami, and sometimes the olivaria are wanting. Carus says that this view involves the idea, that one part is produced by another part, which would be incompatible with organization, because each part, he thinks, originates in the place where it actually is. In fact, each part does originate in the place where it actually is, but it is necessary, that the organization should first arrive at that place, where a new apparatus is to originate. I do not say that the ganglions originate from one another, but that each ganglion produces a certain number of nervous fibrils, which, in order to acquire a fresh increase, must pass through a new collection of non-fibrous substance.

We have taken some pains to follow the nervous bundles produced by the olivaria, and we have never succeeded in tracing their course into the tubercles, as every body else professes to do. According to Carus, these tubercles exist in man, at the third foetal month; according to Tiedemann, much later; and according to Serres, they are not visible till the fifth month, when the olivaria have not yet appeared. The latter are evidently wanting in the reptiles, fishes, and birds, where these tubercles are very large. These tubercles are much larger in the large mammifera, than in man, and if the olivaria be not altogether wanting, they are, at least, not distinctly visible. Thus our first idea is confirmed, that the olivaria are a true ganglion for the same convolutions, which acquire their entire mass of fibrous substance in the optic thalami, and that they have no connexion nor relation with the tubercula quadrigemina.

3. "The white bundles constituting the trapezium, are developed before the grayish swelling of the Wenzels, which is considered as their ganglion."

Why not say, which is considered as one of their ganglions — a ganglion of reinforcement. As to the rest, we have the same error, and we return the same reply.

4. "The medullary bundles of the pons Varolii, appear before the gray matter scattered among them."

Does Serres refer to the longitudinal medullary bundles of the medulla oblongata, of the pyramids? If so, I have proved that the gray substance exists in the whole vertebral canal and annular protuberance, before the white substance, either in a liquid state, or possessing more or less consistence. Or does he mean the transverse bundles of the commissure of the cerebellum? The commissures rarely have any gray substance, but they originate from it, especially that of the cerebellum from the gray substance, covering the whole outer surface of the fibrous membrane of the cerebellum. Besides, both are swimming in gray substance from the first moment of their appearance.

5. "The white bundles of the optic nerves, that proceed to the corpora geniculata, exist long before the gray matter composing the latter."

The same remarks relative to the olivary bodies, are also true of these bundles and the corpora geniculata.

6. "The peduncles of the pineal gland are formed before this body; therefore, this body is not their ganglion, nor matrix."

The same error, the same gratuitous, arbitrary assertion; already refuted above.

The fact of cicatrization, which Serres invokes in his favor, proves absolutely nothing. Wounds cicatrize wherever there are vessels, and all nervous filaments from the brain, are accompanied with blood-vessels. Very often, particularly in young subjects, the transverse striæ of the great commissure, are intermixed with a substance of a dusky white, or yellowish tint, which leads us to presume, that they are not entirely devoid of gray substance.

All Serres's arguments against the priority of the non-fibrous substance, and in favor of that of the white, are reversed, therefore, by the most exact disposition of the nervous system in all classes of ani-

mals. Finally, we have arrived at Serres's favorite hypothesis. "Why," he asks, "have anatomists constantly persevered in attributing the origin of the white matter, to the gray? It is owing to a fundamental error laid down as a general principle, — to a preconceived idea, that the nervous system is developed from the centre to the circumference, and that the gray matter is formed before the white."

Is the Nervous System formed from the Centre to the Circumference, or from the Circumference to the Centre?

"It is strange," exclaims Serres, "how they have interpreted nature in precisely the inverse direction. They have supposed a course directly opposite to what she really pursues; ought we then to be astonished, that her laws have been misunderstood?" "From this eccentric course result the laws of organization; every organ being primitively double, its parts, at first isolated, proceed to meet one another and unite on the centre of the animal, forming organs which are called single."

Either the liver, spleen, and pancreas, are not organs, or Serres's assertion thus generalized, is false. It has always been a familiar fact, that animals are chiefly composed of two symmetrical halves, and I have proved, that the organs of animal life are all double. I do not recollect that these organs were ever called single; the os hyoides, the lower jaw, and sternum, have always been known to be composed of two halves. Now Serres believes, that the formation of membranes, bones, intestines, trunks, canals, &c., is eccentric! He invokes the judgment of the Royal Academy of Sciences. I much prefer facts to the judgments of Academies. But if the latter should have had the preference, where should we be, now that Academies have come into existence, with

their thousand reports, more especially too, if these reports had been received as law by the whole world!

According to this hypothesis, the fingers and toes are formed before the trunks of these extremities, and the latter, before the central parts of the body. In the same way, the leaves and flowers are formed before the branches; the branches, before the stem; and the stem, before the root! But let us leave all these gratuitous suppositions and arbitrary assertions, and confine ourselves to the nervous system. Let us follow its progressive development, or origin.

At the first month, the swellings representing the head and spinal marrow, contain a thin transparent fluid. At the second month, this fluid becomes whitish and less diaphonous, and is gradually transformed into the spinal marrow and brain. By the seventh, or eighth week, the head and spine have lost their transparency. At this period, the vertebral column, the cranial bones, and the muscles of the back and neck, are not yet formed — another proof against the eccentric formation. A little later, this substance, once so transparent, and which is said to have no resemblance (no relation according to Jourdan) to the fluid that before occupied its place, becomes pultaceous and of the consistence of the white of an egg. Its anterior face (exterior of Jourdan!) presents two cords, in which we can, as yet, discern no trace of fibrous structure. Recollect now, that they wish us to believe, that the fibrous substance exists previous to the non-fibrous substance! On each side of the fourth ventricle, there rises from the spinal marrow, a thin narrow layer, which is folded inward and laid against that of the opposite side, but without uniting, or being blended into a single mass, with it. These two cords are the rudiments of the cerebellum, in front of which, we also perceive two other membranous productions, the rudiments of the tubercula quadrigemina. Then come two rounded protuberances, the optic thalami, in front of which, are placed

the rudiments of the corpora striata. From these two last eminences arise two membranous productions, recurring from without inward, and from before backward, which form the commencement of the hemispheres of the brain. Tiedemann has been unable to find, even at the ninth week, a trace of any other part of the encephalon, particularly of the annular protuberance of the commissures, of the corpus callosum, of the fornix and its dependences. He saw no nerve proceeding from the brain, or spinal marrow, the substance of which examined by a magnifying glass, presented no fibrous structure. During the second month, we recognize on the spinal marrow, seven cartilaginous nodules, but see nothing of ribs, nor limbs. At the eleventh week, we can scarcely discover any traces of the muscles of this region, which is still soft and whitish. At this time, we can only perceive the swellings of the origins of the nerves designed for the thoracic and pelvic limbs, and that of the medulla oblongata, as well as the cerebral and spinal nerves, quite large in proportion. The olivaria have not yet appeared, nor the annular protuberance. The hemispheres are still separated from each other longitudinally, by a deep fissure. In the cerebellum is no trace of processes, lobes, or laminæ. The anterior cerebral lobes are more developed than the middle and posterior, and in the anterior lobes, we observe the first origin of the commissure of the hemispheres. This origin of the great commissure from before backwards, evidently proves, that the commissure is not formed of fibres that come from the peduncles, the optic thalami, or corpora striata, because if it were, it ought to be formed from behind, forwards. At the fourth month, the spinal marrow has a fibrous texture on its anterior face, and sides. The posterior cords as yet, present, no fibres. The annular protuberance begins to appear. With the ciliary body there successively appear the ramifications of the cerebellum, and the annular protuberance is more and more enlarged,

just as the commissure of the hemispheres becomes longer, in proportion as the middle and posterior lobes are more developed. This development of the middle lobe also gives rise to the anterior commissure.

Thus, therefore, we have in the spinal marrow, at first, a transparent fluid, which is transformed into a gelatinous, non-fibrous substance, then the cords of a white fibrous substance, and finally, swellings which give origin to the spinal nerves. In the cerebellum, the middle, fundamental part, or as Serres calls it, the little thin tongue, exists before its lateral parts. In the brain, the tubercula quadrigemina, the peduncles, the optic thalami, the corpora striata, the anterior, middle, and posterior lobes of the hemispheres, are successively formed.

Is there any better proof, that the formation of the spinal marrow and brain takes place from the centre to the periphery? If the formation took the opposite course, the nerves would exist before the swellings; the swellings, before the fibrous substance; the fibrous cords, before the gelatinous, non-fibrous substance; the hemispheres of the brain would precede the corpora striata and thalami; the corpora striata and thalami would precede the peduncles, and all the parts would be anterior to the tubercula quadrigemina.

Since Serres maintains, that the brains of embryos at first resemble those of fishes, then reptiles, and finally, birds, it is equivalent to acknowledging that the most central parts are first formed; for, fishes and reptiles have only the rudimentary parts of the brain of the mammifera.

When Serres adduces, as an argument in favor of his hypothesis, the fact, that the right and left cords of the spinal marrow, and the hemispheres of the brain and cerebellum, are not at first united by commissures, he shows, that he does not understand the laws of the organization of the nervous system. I have demonstrated, that it is the nervous filaments, engendered in the non-fibrous substance of the surface of the cere-

bellum and brain, which, by converging towards the centre, form the annular protuberance, or commissure of the cerebellum, and the anterior commissure and septum lucidum, or commissures of a part of the middle lobes, and the corpus callosum, or great commissure of the hemispheres with the fornix. Now, the surface is last formed, consequently the unions or commissures must also be formed last.

Is his theory any better supported by the succession of the muscles? On the contrary, it furnishes new proofs of the centric formation. They all begin near the spinal column, the centre of all formation; first, the muscles of the vertebral grooves, then the intercostals, and finally, the muscles of the sternum. On the abdomen, the oblique on the sides come first, and afterwards, the secti and pyramidales which are farthest removed from the vertebral column, since, in embryos, the abdomen presents a vast opening. As the muscles proceed from the circumference, where they have been last formed, to meet their congeners, they shut up the abdomen and enclose the intestines.

Serres explains the monstrous formations of the nervous system, by saying that their evolution is arrested at the fundamental parts of reptiles, fishes, birds, or such or such of the mammifera. Now this explanation is intelligible only, on the supposition that the nervous system is formed from the centre to the circumference.

If it be true, that the lateral nerves of the trunk, head, and pelvis are first formed; that they exist independently of the spinal marrow; that they acquire all their development, while the cerebro-spinal axis is yet in a liquid state, &c., as Serres says, I have given the reason above, in speaking of the origin of the nerves from the mucous tissue of the muscles, skin, &c. But let us be on our guard, whenever an author is interested in misapprehending facts, in order to favor a published opinion!

Serres strongly insists on the anatomical truth, that

the development of the nervous system of the cerebellum and brain, is under the influence of the arterial system. But certainly, the arterial system is not developed from the circumference to the centre, and admitting that the venous system follows this course, we then embrace a proposition which I have already maintained in several places, viz., that there are nerves designed for the perception of outward impressions, and for their transmission to the sensorial organs. This disposition would be analogous to the returning, converging system, and the commissures of the brain and cerebellum, which I have demonstrated. Another order of nerves would be the nerves of reaction, equally analagous to the nervous system that diverges from the brain and cerebellum. Thus there would be nerves, formed from the centre to the circumference, and others, from the circumference to centre.

It is pretended, that the optic nerve is already formed before being connected with the brain. It needs a pretty strong authority to establish as a fact, a disposition, which, considering the precocious existence and development of the tubercula quadrigemina, presents no appearance of probability.

Serres himself says, p. 119: "The radiation from the central nucleus of the hemispheres of the cerebellum, is in relation to the divisions of the hemispheres. At the fourth month, the scarcely perceptible nucleus presents no apparent radiation; at the fifth month, one or two radiations are seen, and then there are two or three lobes; at the sixth month, a third radiation coincides with the fourth lobe; and when there are four radiations, there are also five lobes on the outer surface of the cerebellum." It results from these relations, that the development of the fissures and lobes, is immediately dependent on the central, medullary nucleus. The formation of the cerebellum, therefore, is from the centre to the circumference. And as this nucleus, which Serres, with some Germans, calls

the medullary nucleus, is, in reality, nothing but a nucleus of gray substance, he, in fact, admits, that the white, fibrous substance of the cerebellum takes its origin from the gray, non-fibrous substance.

After adding, that the development of the cerebellum is subjected to the successive increase of the calibre of the vertebral artery, he ventures to deduce, as a legitimate result, the following conclusion, the very contrary of which flows from his premises. "We see, from this description, that the cerebellum is developed from the circumference to the centre, and not from the centre to the circumference, as Tiedemann thinks." Serres's whole work swarms with such conclusions, diametrically opposed to his premises, and solely designed to take by surprise, the credulity of inattentive or ignorant readers.

Serres himself cites observations, that most evidently prove, that even the formation of the limbs is dependent on the ganglions of the spinal marrow. In two human embryos without lower extremities, the lower part of the spinal marrow was not swelled. In two cats and one dog, destitute of the hind feet, the inferior swelling of the spinal marrow was wanting. In a human embryo destitute of the upper limbs, the spinal marrow was not swelled in the cervical region, and a cow affected with the same monstrosity, presented the same disposition. If the formation commenced at the circumference, the swellings would not be necessary, while it is altogether different on the supposition of central formation. The ganglions not existing, in consequence of a defective organization, the nerves that control the limbs, could not arise.

On Serres's hypothesis, the organization of the nervous system would be subject to one law, in one place, and to another, in another place. It is evident, that the pyramids go on enlarging, till, after their decussation, they are found on the anterior or inferior surface of the medulla oblongata; that in their passage through the annular protuberance, they form large, nervous

bundles, or the peduncles, which are again enlarged in the thalami and corpora striata to such a degree, as to produce a great part of the expansion of the white substance of the hemispheres. It is equally evident, that the olfactory nerve increases during its whole course, until it reaches its bulb, where it receives a fresh increase, preparatory to its expansion in the nose. It is evident, that the optic nerve, after taking the first demonstrable origin in the anterior pair of tubercles, increases in mass, in the inner and outer corpora geniculata, in the peduncles, in the gray layer situated behind and upon its junction, and even in its course thence, to its insertion in the bulb of the eye. It is demonstrated in the same way, that all the nerves enlarge or become conical, in proportion to their distance from their origin, being always accompanied with blood-vessels and gray substance. This successive increase, is perfectly explained, on the theory of the formation from the centre to the circumference, by the fresh filaments, which are added in the new beds of gray substance. But, admitting the formation from the circumference to the centre, the nerves should go on diminishing, notwithstanding the different masses of gray substance they encounter in their course. Finally, how are we to explain the existence of the diaphanous, liquid substance, successively transformed into gray substance, in the spine, and the gray substance between the exterior and posterior cords, of the marrow, long before the existence of nerves?

If the transmission of impressions to the brain, proves any thing in favor of the peripheric origin of the nerves of sensation, the propagation of irritation and motion, towards the extremities, when we irritate the nerves of motion, is a proof in favor of their central origin.

I therefore declare Serres's hypothesis, taken generally, to be contrary to the laws of formation in the vegetable, as well as animal kingdom. I declare it to be a most extravagant hypothesis, designedly adopted because it afforded a ground for finding fault with, and

utterly depreciating every thing done by anatomists and physiologists, before Serres. I say *designedly adopted*, because it was not in Serres's researches, but in the inflamed imaginations of the transcendental philosophers of Germany, that this fiction took its rise. See the language of Burdach, in his work, printed in 1819. "The nervous system exerts its action in a double direction, from without inwards, and from within outwards. The former will first occupy our attention. Every physiological consideration of the nervous system must begin at the periphery, and proceed to the centre, for it is necessary that the exterior should be first formed, in order that it may be able to act towards the interior. In the embryo, the veins are formed before the arteries, and the upper half of the intestines is developed, sooner than the lower half. At birth, inspiration occurs before expiration, and through life, nutrition begins by the action of the absorbents and veins. The action of a nerve from the periphery to the centre, is the primitive and essential action. The nerve acts in a purely dynamic manner; it receives impressions at its periphery, and transmits them from all sides to the common centres, where they meet and form a unity."* Here begins such a mystical and absurd rhapsody on the universal soul of the world, on materiality transformed into spirituality, and spirituality transformed into materiality, &c. &c., that it is impossible for me to discover in it, any sense whatever, or to continue the translation. But this passage is sufficient to show, where Serres borrowed his grand conception.

In the mean time, however, Burdach modifies his notions. "Sensibility does not originate from a single point, thence to be spread over other parts; it is manifested in every point of the nervous system, so long as each one preserves its reciprocal action with all the rest. Considering its double reciprocity, we cannot

* Vom Bau und Leben des Gehirns, p. 41.

say of a nerve, that it arises here, and terminates there. We can only say, it extends between its central and peripheric points. Its origin, in respect to sensation, is at the circumference; in respect to reaction, at the centre. Though, in neurography, it would be more convenient to derive the nerves from the brain and spinal marrow, it better expresses the physiology of the subject, to start from their peripheric extremity, since sensation precedes motion, and impression, reaction." Page 60.

Burdach adds, p. 216: "In following the nervous system from its peripheric extremity towards its central points, I may seem to be seeking for singularity. It will be said that I have reversed well-known things to give them an appearance of novelty. My manner of considering the nervous system of the trunk, is founded on the general principle, that *unity* is the essence of sensibility, and that, to comprehend the *origin* the *genesis of the soul*, we must proceed from the circumference, and stop at the centre.... The nervous system of the trunk is a network, and in order that intuition should not stop in this network, we must seek for the points, where the commencement is subject to no doubt. But where could this take place, if not in the peripheric extremities? It is only by starting from these, that we uninterruptedly acquire a general knowledge. But if we begin at a plexus, the cœliac for example, it is a matter of chance altogether, and we can give no reason why we should not rather begin with the cardiac plexus or the plexus of soft nerves." And thus he heaps up, nonsense upon nonsense. I shall not attempt to expose all the false reasoning in the transcendant declamations and magnetic reveries of Burdach. It is enough for me, to have shown the noble origin of Serres's favorite hypothesis.

If it were the result of observation, there would be no need of hedging it about with so many arbitrary and contradictory propositions, many of which I might easily have destroyed. I will call the reader's attention to a few of them.

It is false, to say that the nerves proceed to the ganglions, instead of saying that they arise, or depart from them. It is, as if we should say, that the branches proceed to the trunk, instead of growing from it. While the substance of the cotyledons, the farinaceous, starchy substance of the seed, is still liquid and transparent, the germ is already formed, drawing its nourishment and its elements from this substance. As soon as the germ is developed by means of external influences, it is nourished by this same substance, which is used in the same degree that the germ with its radicles is buried in the earth, and its plumule ascends into the air. The starchy substance being exhausted, the shrunken cotyledon falls, and the plant is nourished from the soil and atmosphere. How does nature manage to form a tree, but by first accumulating at various points the substance called *cambium*, deposited between the bark and wood all along the trunk and branches. This cambium first forms a swelling, whence arise new radicles that are united below to the stem, and also a new plumule appearing under the form of an eye or bud, and which is developed into leaves, branches, flowers, &c. Thus, by one swelling to another, and one new formation to another, the tree enlarges and obtains its entire development, its head. Notwithstanding all these formations from the centre to the periphery, there is not the less a retrograde action established in the branches and leaves. The leaves, composed of veins and parenchyma, absorb the nutricious substances of the atmosphere, which are distributed to every part of the plant. Here then are the same laws of formation which we see in the nervous system.

It is false, that Cuvier exploded the opinion, that the olfactory nerve takes its origin from the corpora striata. Before the publication of our memoir, Cuvier still derived the olfactory nerve from the corpora striata, and the optic, from the thalami. He even maintained with Jacobson, that the olfactory nerve, extremely

small, exists in the Cetacea, so that, since the cetacea have the corpora striata, he could not infer from this fact, as Serres says he did, that the olfactory nerve does not originate from them.

It is false, that in man, the external root of the olfactory nerve, is inserted as Serres expresses it, p. 291, by one of its bundles, on the outer rays of the anterior commissure. This commissure has no connexion at all with the olfactory nerve; for, it begins with the converging bundles of the middle lobes, traverses the anterior-inferior part of the corpora striata, without giving to, or receiving a single filament or bundle from the olfactory nerve.

It is false, that the olfactory nerves and the fifth pair increase in volume as that of the brain decreases, as Serres says. If it were so, the horse, ox, &c. ought to have a brain much smaller than the tiger and lion; the sheep's should be smaller than the cat's; the mole's much smaller than the rat's, &c. In one word, all that Serres parades so pompously about the proportions of the different parts of the nervous system, varies in respect to individuals, age, and variety of species. The only determinate proportions are between the integrant parts of a special division. For example, there is a proportion between the restiform bodies of the cerebellum, and the annular protuberance; between the pyramids, peduncles, optic thalami, corpora striata, and hemispheres.

It is false, that in the olivaria, the white matter is developed before the gray. If, as Serres says, p. 564, the gray substance is not developed in birds, fishes, and reptiles, it is because the olivaria and the nervous bundles that arise from them, do not exist in these animals.

In general, every thing that Serres has advanced, to prove that the white substance is formed before the gray, is arbitrary, contrary to the established laws of the organization of the nervous system, and, considering his disposition and intention, I venture to say, contrary to his own conviction, at least, without any positive proof drawn from nature itself.

It would require a work as large as Serres's, to refute in detail, all his erroneous assertions, without mentioning what he has borrowed, without acknowledgment, from Oken, Carus, Tiedemann, Burdach, Meckel, Treviranus, Arsaky, and finally from ourselves.

Let us look at the extracts inserted in the *Archives generales de Medicine*. The writer has faithfully copied Serres's propositions, without suspecting their error. He particularly insists on the following: "The question of the preëxistence of the different parts of the nervous system, is embraced in that of the preëxistence of its different arteries, and the order of their formation indicates the course of the development of the encephalon and spinal marrow."

This is very much as if I should say, the preëxistence of the different parts of the tree, is embraced in that of the preëxistence of the bark, and the order of its formation indicates the course of the development of the branches, &c. Undoubtedly, before an organ begins to exist, the parts which are essential to it do not exist. We may say with just as much reason, that the existence of the arteries is dependent on the existence of this or that organ.

As Serres and his reviewer make the arteries and nervous system, proceed together and in the same order, he seems to have forgotten to prove, that the formation of the arteries is also from the pheriphery to the centre.

Conclusion.

Thus have I brought forward and refuted all the most important objections, that modern anatomists and physioligists have urged against the reality of my anatomical and physiological discoveries. I have proved;

That the fate of the physiology of the brain is in-

dependent of the truth or falsity of my assertions relative to the laws of the organization of the nervous system, in general, and of the brain in particular, just as the knowledge of the functions of a sense is independent of the knowledge of the structure of its apparatus;

That the pulpy, non-fibrous, gray, cortical substance, is anterior to the white, fibrous substance, which takes its origin from the former;

That the different nervous apparatus, and the different parts of the brain, are each appropriated to a particular specific function;

That one nerve or cerebral part can never take the place, or function of another nerve, or cerebral part;

That it is absurd and contrary to the clearest indications of nature, to maintain, that the smallest part whatever of the brain or nervous system, may be sufficient for the different functions belonging to the different nerves and cerebral parts;

That it is impossible for the different parts, that constitute successively the brains of the lower animals, to form, in the human brain, with its peculiar cerebral parts, a single organ, a centralization of all the organs into one unique, indivisible organ, performing, as a whole, the most varied and essentially different function;

That the notions about the *unity* and *homogeneousness* of all the parts of the nervous system, were begotten by the speculative philosophy of Germany;

That the partisans of this chimera, while proclaiming this unity and homogeneousness, prove, themselves, the universal isolation, independence, and specific difference of the different parts of the nervous system, and the special nature of their functions;

That the experimental physiologists, in order to obtain pure and exact results, require the isolation of the parts on which they experiment, as an indispensable condition, and that, while they proclaim the unity and homogeneousness of all these parts, they

consider the isolation of lesion and mutilation, and consequently, also of the result, as impossible, since, they admit, that a part being wounded or irritated, wounds or irritates all the rest.

That it is in fact impossible to prevent the reciprocal influence of the different parts of the nervous system, or to isolate irritations, lesions, and mutilations, and obtain specific, isolated results;

That it is impossible to perform exactly the same operation, or experiment, a second time, and that not only each different experimenter, but the same man, in each new experiment, must necessarily obtain different results;

That it is absurd to think of applying the vague, arbitrary, varying and perhaps, poorly observed results of experiments on hens, pigeons, and rabbits, to the moral and intellectual faculties of man;

That it is repugnant to the organic laws, to lay down as a general law, the formation of the nervous system from the periphery to the centre, and that this extravagance is a spoilt child of the speculative philosophy of the mystic soil of Germany, &c. &c. &c.

In all my demonstrations and refutations, I do not so much rely on my own reflections, as on the confessions and imprudent falsehoods with which the works of my opponents are filled.

Memoires du Docteur F. AUTOMARCHI, *ou les derniers momens de Napoleon*, T. II, p. 29.

Here again are some passages directed against my discoveries, and which are interesting, more from the source whence they come, than from any intrinsic merit.

"Lady Holland had sent a box of books, in which was also contained a bust in plaster, the head of which was covered with divisions and figures, according to the craniological system of Dr. Gall. 'There, doctor,'

said Napoleon, 'that lies in your province; take and study it, and you shall then give me an account of it. I should be glad to know what Gall would say of me if he felt my head.' I immediately set to work; but the divisions were inexact, and the figures misplaced, and I had not been able to put them to rights, when Napoleon sent for me. I went, and found him in the midst of a mass of scattered volumes, reading Polybius. He said nothing to me at first, and continued to run over the pages of the work he held in his hand; he then threw it down, came to me, and taking me by the ears, and looking me steadily in the face, 'Well! *dottoraccio di capo Corso*, you have seen the bust? — Yes, sire. — Meditated the system of Gall? — Very nearly. — Comprehended it? — I think so. — You are able to give an account of it? — Your majesty shall judge. — To know my tastes, and to appreciate my faculties by examining my head? — Even without touching it (he began to laugh). — You are quite up to it? — Yes, sire. — Very well, we shall talk about it when we have nothing better to do. It is a *pis-aller*, which is just as good as any other; and it is sometimes amusing to notice to what extent folly can be carried.' He now walked up and down, and then asked, 'What did Mascagni think of these German reveries? Come, tell me frankly, as if you were talking to one of your brethren. — Mascagni liked very much the manner in which Gall and Spurzheim develope and point out the different parts of the brain; he himself adopted their method, and regarded it as eminently fitted for discovering the structure of this interesting viscus. As to the pretended power of judging from protuberances, of the vices, tastes, and virtues of men, he regarded it as an ingenious fable, which might seduce the *gens du monde*, but could not withstand the scrutiny of the anatomist. — That was like a wise man; a man who knows how to appreciate the merit of a conception, and to isolate it from the falsehood with which charlatanism would overcharge it;

I regret not having known him. Corvisart was a great partisan of Gall; he praised him, protected him, and left no stone unturned (*fit l'impossible*) to push him on to me, but there was no sympathy between us. Lavater, Cagliostro, Mesmer, have never been to my mind; I felt, I cannot tell how much aversion for them, and I took care not to admit any one, who kept them among us. All these gentlemen are adroit, speak well, excite that fondness for the marvellous, which the vulgar experience, and give an appearance of truth to theories the most false and unfounded. Nature does not reveal herself by external forms. She hides and does not expose her secrets. To pretend to seize and to penetrate human character by so slight an index, is the part of a dupe or of an impostor; and what else is that crowd with marvellous inspirations, which pullulates in the bosom of all great capitals? The only way of knowing our fellow-creatures is to see them, to associate with them frequently, and to submit them to proof. We must study them long, if we wish not to be mistaken; we must judge them by their actions; and even this rule is not infallible, and must be restricted to the moment when they act; for we almost never obey our own character; we yield to transports, we are carried away by passion; such are our vices and virtues, our perversity and our heroism. This is my opinion, and this has long been my guide. It is not that I pretend to exclude the influence of natural dispositions and education; I think, on the contrary, that it is immense; but beyond that, all is system, all is nonsense.'"

Already, in the *Mémorial de Saint Hélène*, by the Count Las Casas, the following passage had appeared:—

"I have greatly contributed to put down Gall; Corvisart was his great follower; he and his fellows had a strong leaning to Materialism; it would increase their science and their domain. But nature is not so poor; if she was rude enough to announce her meaning by external forms, we should soon attain our ends,

and we should be more learned. Her secrets are finer, more delicate, and more fugitive; — hitherto they have escaped every one. A little hunchback is a great genius; a tall and handsome man is often a great ninny; a large head with a big brain, sometimes has not an idea, while a little brain is often in possession of vast intelligence. And yet, think of the imbecility of Gall; he attributes to certain bumps, dispositions and crimes which are not in nature, and which take their rise from the conventional arrangements of society. What would become of the bump of thieving if there was no property? of the bump of drunkenness, if no fermented liquors existed? of that of ambition, if man did not live in society?"

Sovereigns are always deceived when they ask advice from the ignorant, the jealous, the envious, the timid, or from those who, from age, are no longer accessible to new opinions. Napoleon acquired his first notions of the value of my discoveries, during his first journey to Germany. A certain metaphysical jurisconsult, E——, at Leipzig, told him, that the workings of the soul were too mysterious to leave any external mark. And, accordingly, in an answer to the report of the Institute, I had this fact in view when I terminated a passage by these words: — "And the metaphysician can no longer say, in order to preserve his right of losing himself in a sea of speculation, that the operations of the mind are too carefully concealed, to admit of any possibility of discovering their material conditions or organs." At his return to Paris he scolded sharply (*tança vertement*) those members of the Institute, who had shown themselves enthusiastic about my new demonstrations. This was the thunder of Jupiter overthrowing the pigmies. Immediately, my discoveries became nothing but reveries, charlatanism, and absurdities; and the journals were used as instruments for throwing ridicule — an all-powerful weapon in France — on the self-constituted bumps. Napoleon was made to believe that "Gall's

imbecility" had led him to imagine a bump or organ for drunkenness; and in this case I certainly should have merited this laconic epithet. "*He attributes to certain bumps, dispositions and crimes, which are not in nature, but arise from the conventional arrangements of society.*" And whence does society arise? If Napoleon had read all that I have said in this work on society, on the social life of man and animals, and on the pretended artificial qualities and faculties, he would have acquired profounder views of all these objects. In regard to my doctrines, the ideas and prejudices of Napoleon differ in no respect from those of the vulgar. *What would become of the bump of thieving, if there was no property? of that of ambition, if there was no society?* What would become of the eye if there was no light?—but light exists. What would become of taste and smell, if there were no odorous particles, and no savory qualities?—but these qualities and particles exist. What would become of the propensity to propagation, if there were not two sexes?—but two sexes exist. What would become of the love of offspring and of children, if offspring and children did not exist?—but they do exist. What would become of the carnivorous instinct, if animals did not exist to be devoured?—but these animals do exist. In the same way, property and society exist in nature, as I have already proved in treating of these subjects. I conclude, then, that neither Napoleon nor his advisers had penetrated sufficiently far into the nature of things, to perceive that the organization of man and animals, is calculated for and adapted to the existences of the external world, and that we have no connexion with external objects, except in so far as we have received organs which are in relation and in harmony with these same objects; and that, whenever any given organ is wanting, the thing in relation with that organ, has no longer an existence for such an individual.

"If Napoleon wished to destroy the tendency to

materialism in the way he understood it, he ought to have begun by prohibiting the study, not only of the anatomy and physiology of the brain, but also that of natural philosophy, natural history, of the influence of nourishment, of the seasons, climate, and temperament, upon the character of man, &c. &c. And after having ordained it to be taught, that the eyes and ears were not necessary for seeing and hearing, nor the brain for thinking, he ought to have employed three hundred thousand bayonets, and as many cannon, to render the functions of the mind absolutely independent of matter. This victory once promulgated and acknowledged, he would easily have put down the anatomy and physiology taught by a feeble son of Esculapius. But coffee is swallowed, potatoes are eaten, and vaccination is performed, without regard to the outcries of some physicians against them; the blood circulates in spite of Gassendi; the earth revolves in despite of the anathema of the Pope; animals are no longer automata, notwithstanding the decrees of the Sorbonne, and the anatomy and physiology of the brain, discovered by the German doctor, subsist and will subsist in spite of the efforts of Napoleon, and of his imitators, and of all their auxiliary forces.

M. Antommarchi had but a very meagre and superficial knowledge of the physiology of the brain, and was not at all prepared to rectify the prejudices of his august patient. After the fashion of superficial and officious ladies, a plaster-bust, with the organs marked on it, was sent like a play-thing to Napoleon. But it was quite above an ordinary conception to send him my work, or to ask him to become acquainted with my own ideas. In this way the emperor and his physician continued, in the midst of their amusement, to be ignorant of the principles and tendency of the physiology of the brain. M. Antommarchi amuses his readers with a vague enumeration of the organs of which he perceived the indications in Napoleon. He found the organs of Dissimulation and of Conquest,

which last is apparently my organ of the Carnivorous Instinct; the organ of Benevolence; that of Imagination, which is not to be found in my work; and the organs of Ambition, of Individuality, of Locality, of Calculation, of Comparison, of Causality, or the inductive spirit.

Let us now give the final result of our observations, —the true theory of the moral qualities and intellectual faculties of man.

PHILOSOPHICAL CONSIDERATIONS.

ON THE MORAL QUALITIES AND INTELLECTUAL FACULTIES OF MAN.

Philosophy of Man.

In the course of this work, I have often said that my predecessors never succeeded in making discoveries on the functions of the brain in general, nor of its particular parts, because they suffered themselves to be guided by a false philosophy of the human qualities and faculties. This censure is applicable, not only to the doctrines of this or that philosopher, but is deserved equally by all. I have promised to substantiate the charge, and have already done so, in several places, particularly in vol. I. Now that the reader is familiar with the real fundamental powers, I consider him sufficiently prepared to follow me step by step in the following considerations.

I shall not introduce the systems of my predecessors, in order to refute them by a comparison with mine, for it would be idle to fight with darkness. It will be sufficient for me to bring in light. I shall here assemble some ideas that are scattered over this work, and

shall show the reader the consequences, that necessarily result from them, and which he may already have inferred for himself.

Of the Difference between the Fundamental Powers and their General Attributes.

The term, *fundamental quality or faculty*, expresses what is proper or peculiar to the powers, — that which constitutes their essence, their nature. The term, *general attribute*, on the contrary, expresses what these fundamental qualities and faculties have in common.

I have proved, that all the qualities and faculties of which I have treated, and whose organs, I have discovered, are primitive fundamental powers. But none of my predecessors were acquainted with these powers, which are exclusively the functions of the particular cerebral organs. No one ever sought for an organ of the instinct of propagation and of the love of offspring, of the carnivorous instinct, of benevolence, of music, of calculation, &c., consequently, none whatever were discovered. They confined themselves to those phenomena that are common to the fundamental powers, viz., their general attributes. They sought for the organs of attention, perception, memory, judgment, imagination, appetite; of instinct, affections, and passions. Reason and will were with them, the pure powers of the mind, independent of every organic condition. I shall now proceed to prove that attention, memory, judgment, and imagination, are only attributes common to the fundamental qualities and faculties, not the fundamental qualities and faculties themselves.

The better to connect the philosophy of man with natural history generally, let us glance at the world of nature, and examine the methods that naturalists have always adopted, for studying its details. They

have begun by trying to ascertain the general attributes of all bodies, and have discovered that extent, impenetrability, attraction, and repulsion, belong to all material things, — to light, as well as to metals, to the integrant parts of a plant, as well as those of a man. But if natural philosophers had contented themselves with the knowledge of these general properties, what should we now know of their science? Could we distinguish, by any specific character, the most dissimilar substances, such as earth, water, air, metals, light, plants, animals? for, they are all endowed with extent, impenetrability, attraction, and repulsion. It was necessary to look for particular characters, and to distinguish bodies into classes, and, it is by means of these characters, we distinguish earth from water, water from metals, and plants from animals, and thus a great step is made. But, if they had confined themselves to the properties common to all metals, to all plants, &c., the natural sciences would not now be in existence. The object is, to distinguish one metal from another, one plant from another, &c., that is, to find the properties that distinguish a certain class of metals, plants, and animals. They have talked of terrestrial animals, and aquatic animals, of insects, fishes, reptiles, amphibia, and mammifera; and the more they have abandoned those general expressions, the more they have concerned their minds with particular properties. They have established subdivisions; divided mammifera into frugivorous and carnivorous; the carnivorous, they have subdivided into cheiroptera, galeoptheci, insectivora, carnivora, &c., and the more they have succeeded in establishing characters, that are applicable only to particular genera and varieties, the more precise, clear, individual, and consequently useful, does the knowledge of the naturalist become.

Why is it, that it is precisely those who are so proud of the metaphysical spirit of their inquiries, who publish the results of their speculations with as

much assurance, as if they were demonstrated truths, that reject this method, and think their notions the more precise, the more general they are; or in other words, the less applicable they are, to particular cases and individual facts, and consequently, the less practicable? It is probably because the methods of these philosophers has required no observation, that it leaves the field entirely open to sophisms, as well as to sound reasoning, and that in this way, each metaphysician can easily erect a system of his own, and become the chief of a sect. But it necessarily results, that these doctrines have nothing in common with the real world; that they all are stamped with the peculiar turn of mind and capacity of their inventors; that they differ, as much as the minds of those that conceived them. In entering upon this subject, I shall begin to show the faults of the existing philosophy, relative to the higher functions of animal life, or the moral and intellectual powers.

The most general property, that which is common to all the nerves, is sensibility, or power of perceiving irritations, stimuli, &c., or to use another term, sensations. Are there not philosophers, even in our days, that admit only this single, solitary power in the animal kingdom? that derive from it, the voluntary movements, the functions of the five senses, and all the moral qualities, as well as intellectual faculties? To think, say the ideologists, is to feel; to remember, judge, and all that, is only to feel. All the faculties of the understanding are included in the faculty of feeling, and the difference of motion alone, according to M. Destut-Tracy, explains all the different modes of feeling.

There can be no doubt that sensibility bears a part in all these phenomena, in the same way that all bodies are endued with impenetrability and extent. But what does physiology gain by knowing that the nerves are sensible? Does this throw any light on the true cause, on the material conditions of specific

functions, on voluntary motion, on the functions of the five senses, on the different moral qualities and intellectual faculties? Would we listen to a naturalist who should tell us that all beings are only bodies differently modified? that insects, fishes, amphibia, and mammifera, are only animals differently modified? According to this system, the study of natural history, would be an easy work. But how do the modifications of these sensations arise? How are these different motions effected? How does the general faculty of feeling become the faculty of voluntary motion, of seeing, hearing, and feeling? How does it become this or that intellectual faculty, or moral quality? Could not the Author of all that exists, create a particular family of nerves for voluntary motion, another for the functions of the five senses, and another still, for each function of the qualities and faculties? Was it not necessary that the nerves of each sense should have their peculiar origin, structure, and function? True indeed, there is sensation in all these phenomena, but it is something more than sensation modified in different ways. It is sensation essentially different, in each different case — as essentially different, as the plant is from the animal, the mammifera from the bird. The end of physiological researches, is, to ascertain the difference between sensations, and to discover the different organs which nature has created in the system, for producing so many essentially different sensations, from the most simple perception of a stimulus, even to the most elevated conceptions. It is clear, therefore, that this mode of generalization, cannot reach objects as they exist in nature. We shall see that it is the same with the other faculties, which the ideologists have recognised as the only intellectual faculties, and that they equally, are only common attributes of all the fundamental faculties.

Of Perception, Recollection, Memory, Judgment, Imagination, and Attention.

To prove that the faculties of the mind, hitherto admitted by philosophers as realities, are only the attributes of each fundamental faculty, I shall content myself with some examples which, it will be easy for the reader to apply himself.

I class among the number of fundamental faculties, the sense of locality, the sense of tones, the sense of numbers, and the sense of arts. Now, he that is endowed with the sense of locality, the sense of tones, &c., necessarily has the faculty of perceiving the relations of space, and of tones, and the same may be said of the sense of numbers. A person endowed with the sense of locality, remembers the relations of space, and the places he has seen, when he meets them again. He even enjoys the faculty of presenting to his mind, by its own inward power, the relations of places which he has seen, without its being necessary for the outward impression to be repeated; that is, he is endowed with the memory of places. He too who remembers having heard certain music, has a musical memory; and he who can reproduce, by an inward power alone, certain music which he has heard, and without needing a renewal of the outward impression, has also a musical memory. In the same way, the arithmetician and mechanician have a memory of the relations of numbers, and of the arrangement of a machine.

To these four fundamental faculties, therefore, belong four faculties of perception and four of memory. The faculty of perception and that of memory are common to these four, and to all the fundamental faculties in general. None of these common attributes constitutes a fundamental power. An animal may have the faculties of perception and memory, relative to the sense of tones and the sense of localities, for

example, without having the faculty of perception, or memory, in regard to the sense of numbers or that of mechanics, because he wants these two fundamental faculties. When the fundamental faculty is wanting, the attributes must be also. The dog, endowed to such an astonishing degree, with the sense of locality, has neither the faculty of perception, nor that of memory, for the relations of tones, for the structure of a machine, or for moral and religious thoughts. The beaver which is an admirable architect, has neither perception nor memory of the relations of tones and colors, and for the reason, again, that he is destitute of two fundamental faculties, the sense of tones and that of colors.

From what has been said, it is very evident, that perception and memory are only attributes common to the fundamental faculties, but not the fundamental faculties themselves; and consequently, that they can have no proper organs. They therefore, that seek for such organs, will never succeed in finding them. In fact, if the perceptive faculty were a fundamental power, and had its peculiar organ, the man or brute endowed with it for one thing, would be so for all things. But natural history proves the contrary in the different species of brutes, and in partially imbecile men; and it is precisely the same with memory. Neither man nor brute can remember objects, which they have no capacity to receive.

If perception and memory were fundamental forces, there would be no reason why they should be manifested so very differently, according as they are exercised on different objects. There would be no reason why the same, and, in fact, every individual, should not learn geography, music, mechanics, and arithmetic, with equal facility, since their memory would be equally faithful for all these things. But where is the man, who, after the greatest possible application, should succeed with equal ease, in these different branches of knowledge, and not evince,

however astonishing his capacious memory, in certain respects, might be, an extremely small endowment of the same faculties, in all other respects?

All that has been said, relative to the common attributes of all the fundamental faculties, is also applicable to judgment and imagination. Whoever is eminently endowed with the sense of locality, easily recognises the relations of places, and has a good judgment of the relations of space. Whoever is endowed with a very active sense of tones, perceives concords, readily judges of the correctness, or incorrectness of the relations of tones, and finally, has a good judgment of the relations of tones. In the same manner, whoever has the sense of numbers, has a good judgment of the relations of numbers; the sense of arts, a good judgment of works of art. When, however, the fundamental faculty fails, the judgment relative to the objects of this fundamental faculty, must necessarily fail also.

I apply the term, imagination, to the action of whatever faculty it may be, that takes place independently of the external world; it is the creative power of each fundamental faculty. The imagination of the sense of locality creates landscapes; that of the sense of tones, music; that of the sense of numbers, problems; and that of the mechanician, machines. This explains why a man's judgment may be prompt and correct, relative to certain subjects, while he is almost imbecile in regard to others; why he may manifest the most rich and brilliant imagination, relative to a certain class of subjects, while he is cold and barren, upon every other. It is impossible for an animal to possess judgment and imagination respecting subjects, for which nature has refused the fundamental faculty. What judgment of music or the relations of numbers, could be pronounced by the fox, which, nevertheless, is an admirable judge of the means of escaping from snares and surprising his prey; or by the beaver, which judges of the rise and fall of the

stream, and accommodates his structure to these circumstances? The dog, by virtue of his imagination, dreams, that he is engaged in the chase, or, that he has lost his way, and wanders through the whole city in search of his master's house. But will you believe, that he dreams of mechanics, pictures, calculations, architecture, and combinations of philosophical ideas? Judgment and imagination, therefore, are not fundamental powers, but only attributes common to all the fundamental faculties. Is it a matter of astonishment, then, that they have sought in vain for their organs?

I cannot conceive, how it ever entered the heads of certain philosophers to maintain, that attention is the source of all our faculties and propensities. I admit, for a moment, that attention is exerted in every thing done by man or brute; but it must proceed from a fundamental power, — it never can be the source of any fundamental power whatever. A partially imbecile person may give the most untiring attention to every thing relative to mimicry, to order, and to the sexual functions, but none whatever to sentiments and thoughts of a different order. The educated and thinking man is very soon fatigued, when fixing his attention on subjects that are out of his sphere, while it is mere sport for him, to give unwearied attention to subjects that belong to his province. He, who is highly endowed with a sense of locality, devotes his attention, without an effort, to the relations of space; while, if his sense of tones be feeble, he will hardly be aware of the performance of the most enchanting music. Vaucanson, while a child, gave his attention to the wheels of a time-piece, on which a musician, or gray-haired poet would have scorned to give a single look. The coquette, whose whole attention is engrossed by the milliner's shop, would pass by the most valuable collection of natural history, or the richest library, with perfect indifference. Attention, therefore, is only an attribute of each fundamental faculty, and when this is wanting, attention to the

objects of this faculty, is impossible. Try to fix on numbers, colors, or a poem, the attention of a falcon, which keeps his eye on the lark; of the horse, whose ear is trained to obey the orders of his keeper; of my starling, which forgets to eat its favorite meal of worms, when I am whistling it a tune.

The reader, I think, from what has been said, must be convinced that the intellectual power, with all its subdivisions, such as perception, memory, judgment, and imagination, are not fundamental faculties, but only their general attributes. As the fundamental faculties are not known; as the organs of their attributes alone, have been sought for, I have good reason for saying, that a false philosophy has impeded the progress of the discovery of the functions of the brain, and its integrant parts.

In recapitulation then, we observe, that wherever there exists a fundamental faculty, a particular and definite intellectual power, there also necessarily exists a power of perception relative to this faculty. Whenever this faculty is actively exercised upon its appropriate objects, there is attention. Whenever the ideas or traces, which the impressions of these objects have left on the brain, are renewed, either in the presence, or absence of these same objects, there is passive memory, reminiscence. If this same renewal of impressions is done by a deliberate, voluntary act of the organs, there is active memory. Whenever an organ or fundamental faculty, compasses and judges the relations of analogous and different things, there is judgment. A series of comparisons and judgments, constitute reasoning. Whenever an organ, or fundamental power creates, by its own inherent energy, without the concurrence of the external world, objects relative to its function; when the organ, by its own activity, discovers the laws of objects placed in relation with it in the external world, there is imagination, invention, genius. Admitting, for a moment, that perception, attention, memory, reminiscence, comparison, judg-

ment, reasoning, imagination, invention, and genius, considered either as gradations of the different degrees of the same faculty, or, as particular states of this same faculty, it still remains certain, that all the fundamental faculties, that have been demonstrated as such in Vols. III, IV, and V, are, or may be, endowed with perception, attention, memory, judgment, imagination, and consequently must be recognised as intellectual and fundamental faculties; while the pretended mental faculties of my predecessors, are only common attributes. Here, then, is an entirely new philosophy of the intellectual powers, founded on the natural history of the different modes of human intelligence. Let us apply the same operation, to the appetites, faculties, or qualities.

Of the Moral Qualities, the Appetitive Faculty, the Appetites, Propensities, and Passions.

The appetitive faculty, and its subdivisions, have been considered as proper faculties, in the same manner as the intellectual faculty and its subdivisions, and their organs have also been sought for. But, as they have never succeeded in finding them, they have concluded, from all these fruitless researches, that the operations of the mind are much too secret, for it to be possible to follow their traces. The discovery of these organs was in fact impossible; for, desires, propensities, passions, are, in fact, only different degrees of the activity of some fundamental power, whether intellectual or appetitive. A desire, propensity, or passion, supposes, therefore, a fundamental quality or faculty, and we can have no desire, propensity, or passion, but in regard to objects, for which we are endowed with a primitive or fundamental power. Let me explain. When a person is endowed with a sense of poetry, of construction, of locality, in a feeble degree only, there will not be a well-marked fondness for these objects,

When, on the contrary, the organs of these fundamental powers act with more energy, the person finds a pleasure in the exercise of the functions that relate to it; he has a propensity for these objects. When the action of these organs is still more energetic, the person feels a necessity for occupying his mind with these objects, — he has a *desire* for such occupation. Finally, if the action of these organs preponderates over the rest, he is drawn towards these objects; he feels his happiness in them; he feels opposed and unhappy, when he cannot follow the bent of his propensity; he has a *passion* for these objects. In the same manner, certain persons have a passion for music, poetry, architecture, travelling, &c.

As the fundamental powers are developed in different proportions in each individual, a person may have a violent passion for certain things, music, for instance, and be very indifferent to others, mathematics for example. If there were an organ of the passions, those endowed with it, should have an equal passion for every object. The same must be the case with the desires and propensities, if they are proper faculties or appetites, and also with the most exalted intellectual faculties. They, whose organ of comparative sagacity is very active, have a taste, a passion for comparisons and apologues. A great activity of the organ of metaphysics, immerses the thinker in the world of ideas. He sees no truth, and feels no pleasure, but in things that do not come under the cognizance of the senses — in speculation and abstraction. By the force of thought alone, he would divine, or rather construct, the laws of the universe. Who, too, at some time or other, has not been the victim of some epigrammatic friend? Who knows how much it costs a Boileau, or a Piron, to restrain the expression of his caustic humor? Prevent a Bacon, or a Leibnitz, from reflecting on the connexion of cause and effect, of drawing conclusions, and establishing principles, and you oppose their inclination — you do violence to their passion.

The gradation that takes place in the intellectual talents and faculties, is still more sensible in reference to those fundamental powers, that are only sentiments and appetites. While the cerebral organ of love remains undeveloped, there is no difference between the sexes, to the child. But, according as this organ is developed, the boy and girl begin to fix their attention on whatever relates to the sexual functions, whether in themselves or others; and, in the same proportion, there arises a sentiment, a propensity, which at last is raised to a passion. The same is true of the love of offspring, of self-defence, of the carnivorous instinct, of the sentiment of property, of pride, vanity, circumspection, &c. There are women passionately fond of children; there are persons, passionately benevolent, devout, or ambitious.

Let us now descend to beings, that want one or another of the fundamental powers, and we shall see, that it is impossible they should have a desire, a propensity, or passion for things, with the fundamental power of which, they are not endowed. But give to brutes the fundamental powers, and you have the dog passionately engaging in the chase; the weasel strangling the hens; the nightingale singing by the side of his female with such warmth of passion, as sometimes to sink under his long continued efforts; and the monkey affectionately loving his female and young; but in none of these creatures, can you give rise to the desire, propensity, or passion for devotion, mathematics, or metaphysical speculations. It is clear, therefore, that the desires, propensities, and passions, are not proper fundamental powers, but the result of the different degrees of the activity of the organs, or primitive qualities and faculties.

I have shown then, even in respect to the fundamental faculties, such as the sense of tones, of numbers, &c., which belong to the intellectual faculties, there is a desire, propensity, or passion, according to the degree of their activity. Not only so, but it must be.

admitted that perception, memory, imagination, are also the attributes of the fundamental powers, that constitute the sentiment. The instincts of propagation, of love of offspring, of pride, and of vanity, possess indisputably their own perception, memory, imagination, and judgment. In this respect, the sensations and sentiments are affected, like the thoughts produced by the intellectual faculties. The history of insanity and idiotism proves to us, that when one of the fundamental qualities has been lost or enfeebled, its perception, memory, judgment, imagination, attention, all its attributes in short, are equally lost or enfeebled.

I have mentioned cases, where, in consequence of some accidental lesion of the cerebellum, the sexual parts were completely atrophied, and the generative faculty entirely lost. Now, in these cases, the memory of past enjoyment is as feeble as the desire. These individuals talk on the subject with indifference, and it is more from what they have said, than from any impressions they retain, that they know they were once like other men, and, it is to be presumed, that if the cerebellum had entirely lost his action, the memory of the sensations formerly experienced, would be completely gone. I have also related cases, where the total loss of an external sense, and of its internal nervous apparatus, has not only prevented new impressions from taking place, but has effaced the old ones relative to this sense; and why should not the same thing happen, where there is a total loss of the activity of an organ of a moral quality, or intellectual faculty? However this may be, it remains certain, that desire, propensity, and passion are only degrees of the action of fundamental powers, and that it is wrong to consider these degrees, as so many real powers. Consequently, I have substantiated my charge against the philosophy of my predecessors. May the refutation of these errors, consecrated by time, show how useless is all reasoning, unsupported by facts.

Of Instinct and Understanding, Intellect, or Intelligence. Have they particular Organs?

The brute acts from instinct, man from understanding, — such is the language of philosophers. In the former, say they, instinct supplies the place of intelligence, which is peculiar to man. But do they act solely from instinct? are they destitute of intelligence? Is man exempt from all instinctive impulses, and beyond the influence of instinct?

We have only to obtain a precise idea of instinct, and of understanding or intellect, and the truth will spontaneously present itself to our minds. Instinct is a sentiment, an inward movement, independent of reflection and volition, — an impulse that impels a living being to certain actions, without its having a distinct idea of the means or end. I now ask, if instinct is a universal power, that explains all the actions of brutes, or whether it varies as much as the fundamental qualities and faculties, and produces only the manifestation of these qualities and faculties? If instinct be a universal power that explains all the actions of brutes, how is it connected with organization? Has it a proper organ? If instinct were a universal power, every animal would do precisely like the rest, and no one would be unprovided with it; the species that makes a web, or constructs hexagonal cells for the reception of its honey, would also sing, or manifest attachment to its master. The spider by means of its web, preys upon flies; the working-bee constructs cells, but kills no flies for food; it tends the young, but has no connexion with the males. Many male animals perform their sexual duties, but take no care of the offspring. The male and female cuckoo, both, abandon the care of rearing their young to other birds, though impelled to intercourse by a very ardent instinct. The beaver constructs its cabin, but neither sings nor hunts; the dog hunts, but does

not build; the speckled magpie sings, builds, and hunts; the quail prefers concubinage to marriage, but tends its young, and migrates; the partridge marries, and takes care of its young, but does not migrate; the wolf, fox, roe-buck, and rabbit, live in the marriage state, and both male and female concur in tending the young; the dog, stag, and hare, use the first female that comes along, and know nothing of their young. The ferocious wolf, and the cunning, timid hare, make no burrows, like the courageous rabbit and crafty fox. The rabbits live in a kind of republic, and place sentinels, but not so do the fox and hare. How can these instincts exist in one species of animals, and not in another? How can they be so differently combined?

If instinct were a single, general power, not only ought the instincts to be manifested all at once, but also in the same degree. The truth is, however, that while certain instincts act with great force in the young animal, they are completely inactive in others; certain instincts act at one season, others, at another season. There is one season for propagation, and another, for emigration; one, for living alone, and another, for assembling in flocks, or collecting provisions. And how are we, on the supposition of a general instinct, to explain why the different instincts, not only exist separately, in different species, but are, many of them, even contradictory? It is wrong to consider instinct a general power, and explain by it, all the actions of animals, however opposite they may be; and consequently, it is absolutely impossible to find a single, general organ of instinct, and accordingly the efforts made to find it, have been fruitless. Such expressions serve only to convey the appearance of knowledge, to get rid of all difficulties by means of an *occult faculty*, and to dispense with all laborious research.

Are there as many instincts as there are fundamental powers, and does the term *instinct* merely desig-

nate the activity of these same fundamental powers? Propagation, love of offspring, friendship, and attachment, marriage or celibacy, the social or solitary state, self-defence or love of fighting, preference of animal or vegetable food, providence for the future, circumspection and the precaution of placing sentinels, the choice of a fixed place of abode, emigration, singing, construction, &c., are derived from as many fundamental qualities, or primitive dispositions, and all become instincts from the moment, when, in consequence of their activity, they produce in the animal a desire, a want, an internal impulse, under the influence of which, it is impelled to act. The term *instinct*, therefore, applies to all the fundamental powers, and the instinct must have as many organs as there are fundamental powers. This explains very naturally, how an animal may be endowed with one instinct, and be destitute of another. In this sense, it may be said, that all animals act from instinct, though their acts are very different, and even opposite.

Let us now examine whether, in the manifestation of their fundamental powers, animals always obey a blind impulse? whether they act exclusively from impulse, or, are conscious of their propensities and faculties? whether they modify their instinct by a clear idea of the means or end to be used? in other words, must they be considered to possess *intelligence, understanding?* If animals acted only from a blind instinct, their manner of acting would be always uniform. Experience and external influences would never be able to make them deviate, one hair's breadth, from their ordinary routine; their actions and the order of their occurrence, might be submitted to calculation, like the course of a machine, (which, in fact, is the common doctrine;) but experience teaches a very different lesson. At the very moment the wolf scents the flock enclosed in the fold, the thought of the shepherd and the dog comes to his recollection, and counterbalances the present impression which he

receives from the sheep. He measures the height of the fold, compares it with his strength, judges of the difficulty of leaping over it with his prey, and concludes the attempt would be useless, or dangerous.

Yet, from the midst of the flock, when scattered over the field, he will seize a sheep, before the eyes of the shepherd, particularly if the nearness of the woods affords a chance of concealment. He undermines the park or sheep-fold, when he can find no other means of penetrating it. He needs but little experience, to learn that man is his enemy, and that he must fear his snares. Thus, he is always on his guard. The older he is, and the more dangers he has encountered, the more distrustful he becomes. Wolves will hunt in packs, and the mutual aid they afford, renders the chase easier and surer. If a flock is to be attacked, a female goes and shows herself to the dog, which she leads away in pursuit of her, while the male leaps over the fold and carries off a sheep which the dog is unable to protect. In pursuing a deer, the duty is divided according to the strength. The male watches and attacks the animal, chases and puts it out of breath, when the female, which is placed somewhere ahead, renews the chase with fresh strength, and in a little time renders the contest very unequal. It is easy to entrap a young inexperienced fox, but if he has learned the ways of man, the same means will be useless. No bait can then induce reynard to brave the danger, which he discovers or suspects. He scents the iron in the trap, and this sensation, already terrible to him, predominates over every other impression. If he perceives that snares are multiplying around him, he quits the country for a safer one. Sometimes even, emboldened by gradual and repeated approaches, and guided by his smell, he will find means, safely to himself, of stealing the bait from the trap. Man, with all his intelligence, needs a great deal of experience, not to be baffled by the prudence and cunning of the fox.

When the stag has been often disturbed in his retreat, he conceals himself by an artifice, which can only be the fruit of nice view and deep reflection. He frequently will change his thicket so as to accommodate his location to the wind, in order that he may be aware of whatever may menace him from without. Frequently, instead of confidently returning and going straight to his lair, he will do so only in appearance; and enters the wood, comes out, goes away, and returns upon his track, repeatedly. Without any cause of present disturbance, he uses the same artifices, that he would use to escape from the pursuit of dogs, if he perceived himself chased. I have elsewhere mentioned the means, made use of by stags and hares, to elude the pursuit of the hunters and dogs. Every hunter also knows, how easy it is to surprise these creatures, in countries where they are not ordinarily disturbed; but the moment they have learned from experience, the dangers that threaten them, the hunter finds it necessary to multiply and vary his means.

We have daily opportunities of seeing the difference between a trained and an untrained horse, and the changes, which education effects in the manners of dogs. Whoever has, in the slightest degree, observed animals, must concede to them a certain degree of perfectibility, of which I have mentioned a great number of examples in this work. It cannot be denied, that they remember past facts, and that their conduct is regulated in reference to them; that they compare, reflect, and judge; and that in emergencies they take measures well adapted to the circumstances. All this cannot be the impulse of a blind instinct,—it must be admitted, that, to a certain extent, they are endowed with understanding. But as this understanding is only the faculty of modifying the manifestation of their natural instincts, according to accidental circumstances, it follows, that there is a portion of understanding peculiar to each species, and in virtue of this law,

each species remains confined to the circle in which nature originally enclosed it. Still, it is established that animals exercise their faculties with more or less intelligence, or understanding. Now let us inquire whether man also, acts from instinctive impulses, or exclusively obeys the dictates of reason? Is he the author of his propensities, or are they as involuntary in him, as in the brute?

I do not speak of those automatic movements, that some authors confound with instinct, and which both man and brute do unconsciously, and without any possible premeditation. For instance, we recoil suddenly from the sight of a danger, and in falling, we stretch out our arms, either to come on our hands, or to preserve our equilibrium. I here speak of instinctive propensities,—true instincts. I have proved in the section on innate dispositions, and when treating of the fundamental qualities and faculties, that man neither invents nor creates his propensities and faculties. I know not to what degree of ignorance, are to be attributed the dogmas of that arrogant philosophy which pretends that man is beyond the reach of those laws, which govern the animal kingdom. When man burns with physical love and seeks a companion; when he loves his children and takes care of them; when he defends himself and family against his enemies; when he is proud, vain, benevolent, cruel, avaricious, cunning, and circumspect, who does not know that this takes place without his participation, or resolutions? Who does not perceive, that all these sentiments are movements, dispositions independent of reflection?

They are not the result of attention, of deliberate thought, of premeditation, of volitions. They are genuine instincts. The intellectual faculties also are, in most cases, exercised instinctively. Whenever the organs of these faculties have acquired considerable development, or have been excited by some kind of stimulus, they act involuntarily, without reflection, or

judgment. The child cuts out figures and builds, makes music, or poetry, seeks, in cats and mice, for the causes of the vital phenomena, &c., and all this too, from a blind internal impulse. So far are such individuals from being conscious of their faculties, that when their attention is called to them subsequently, they are astonished to find such extraordinary qualities or faculties. This instinctive action continues, in most men, more or less exclusively, for their whole life; but few persons ever obtain a clear knowledge of their propensities and faculties. The more violent the action of the organ is, the more imperious is the passion; the more brilliant the genius, the more instinctive the activity of the organ, at least in the early periods of its manifestation. My admiration was deeply excited by the following lines of Voltaire, who has achieved so much himself, by the force of instinct, addressed to Diderot, under date of 20th April, 1773.

"All the philosophers together could not have written the *Armide* of Quinault, nor *les Animaux malades de la peste* of la Fontaine, who was unconscious of what he had done. It must be granted that, in the performances of genius, all is the work of instinct. Corneille conceived and wrote the scene between Horace and Cornelius as a bird builds its nest, with this exception, that a bird always does its work well, which is not the case with us."

It is only, when man turns his attention to his innate internal powers, compares them with the powers of others, learns their use and how to employ them under change of circumstances, and reflects upon himself, that his instincts gradually acquire the character of intellect or understanding. To be endowed with intellect, or possess intelligence, is, in other words, to have a clear knowledge of one's propensities and faculties, — to feel and exercise them with attention. There are, therefore, as many different kinds of intellect, as there are distinct qualities and faculties.

One individual may have considerable intellect, relative to one fundamental power, but a very narrow one in reference to every other. Man, by reason of more and nobler organs, is much more capable than the brute, of acquiring a clear knowledge of his propensities and faculties; and, in consequence of this prerogative, he is endowed with intellect, not exclusively, but in a higher degree than any other animal. To concede to the brutes, what God has given them, is surely not to degrade our own species.

From what has been said, we draw the conclusion, that an organ of intellect or understanding, is as entirely inadmissible, as an organ of instinct.

Of Reason, Will, and Free-Will. Have they particular Organs?

Reason is to the intellect or understanding, what the will is to the propensities. Let me explain. In the section on innate dispositions, I have explained the difference between propensities, will, and liberty.* Desire, propensity, and passion are different degrees of the activity of each fundamental power. Oftentimes man is incapable of controlling the violent action of some one of his organs; in which case, the desire, propensity, and passion that results, are involuntary; and thus arise temptations, which are the first conditions of vice and virtue, because, while we only *desire*, we deserve neither punishment, nor reward. Most often, the brutes have only desires without will, and the same is the case with man, in a state of idiocy or insanity, or when the organs are unusually active. It is only when the will is exercised, that our actions become morally free, and subject to merit or blame.

It is not the impulse that results from the activity of a single organ, or, as authors term it, the feeling of

* Vol. II, on Moral Liberty.

a desire, that constitutes the will. That man might not be confined to desiring merely, but might will also, the concurrent action of many of the higher intellectual faculties, is required; motives must be weighed, compared, and judged. The decision resulting from this operation is called the *will*. There are as many kinds of desires, propensities and passions, as there are fundamental powers. There is but one will. The desires, propensities, and passions are the result of the action of isolated fundamental powers. The will is the result of the simultaneous action of the higher intellectual powers, and supposes attention, reflection, comparison, and judgment. The will is often in direct opposition to the desires, propensities and passions. Cæteris paribus, the desires and passions will prevail in a rough, uncultivated man; the will will triumph in the refined and educated man. The brute, the violently excited man, the idiot, and the maniac, have ardent desires and passions, but hardly any will. The actions of those who are solely guided by the desires and passions, are easy to foresee, and calculate, however little we may know of their organization. The decisions of the will, however, cannot be foreseen with much certainty, but by means of a profound examination of the nature of all the motives, which are furnished in part by the organization, and in part by the external world; by circumstances of convenience, morality, religion, legislation, social order, and the good of society. These remarks are sufficient to establish the difference between the desires, propensities, passions, and the will, or liberty; and to convince the reader, that there can exist no particular organ of the will, or free-will.

As little ground is there for the existence of a particular organ of the will, or of free-will. Every fundamental faculty accompanied by a clear notion of its existence, and by reflection, is intellect, or intelligence. Each individual intelligence, therefore, has its proper organ; but reason supposes the concerted

action of the higher faculties. It is the judgment pronounced by the higher intellectual faculties. A single one of these, however, could not constitute reason, which is the complement, the result of the simultaneous action of all the intellectual faculties. It is *reason* that distinguishes man from the brute; intellect, they have often in common, to a certain degree. There are many intelligent men, but few reasoning ones. Nature produces an intelligent man; a happy organization cultivated by experience and reflection, forms the reasoning man. As will and reason suppose the existence of fundamental powers, and as the latter are founded in organization, it is obvious, as I have already proved by other arguments, in the section on innate dispositions, that will and reason themselves are not indefinite powers, independent of organization, and consequently, that there cannot be such a thing as unlimited, and absolute liberty. It is clear too, that, by reason of his nobler organization, man is susceptible of moral motives, which he can weigh, compare, and judge; that the comparison made, and the judgment given, he is permitted to determine in consequence, or, in other words, that he is endowed with moral liberty; that consequently, his actions are meritorious or blameable —moral or immoral.

Can we find Organs for the Affections?

Most authors confound the affections with the passions. By passion, I mean the highest degree of voluntary or involuntary activity, of which any fundamental power is susceptible. Each passion supposes a particular organ, which produces passion, as its function, only when in its maximum of activity. It is altogether different with the affections. In the passions, the organs are active, exalted in their fundamental function. In the affections, on the contrary,

the organs are passive, they are modified, — struck, in a particular manner, agreeably or disagreeably. Modesty, terror, anguish, sadness, despair, jealousy, anger, joy, ecstacy, &c., are involuntary sensations, passive emotions, either of a single organ, or of the whole brain.

There cannot be a particular organ for joy, or sadness, or despair, or discouragement, or hope, or any affection whatever. To admit one, would be equivalent to admitting a particular nerve for pain, and a particular nerve for agreeable sensations. Every nerve may be the seat of pain and of pleasure. If we admit a single organ for all the affections, it would follow, that every animal susceptible of one affection, would be susceptible of all, and that this organ, once set in action, all the affections, however unlike or opposite they may be, would simultaneously affect both man and brute.

Conclusion.

These views of the qualities and faculties of man are not the fruit of subtile reasonings. They bear not the impress of the age in which they originate, and will not wear out with it. They are the result of numberless observations; and will be immutable and eternal, like the facts that have been observed, and the fundamental powers, which these facts force us to admit. They are not only founded on principles deduced from individual facts, but are confirmed by each individual fact in particular, and will for ever come off triumphant, from every test to which they may be submitted, whether of analysis or synthesis. If the reasonings of metaphysicians are ever discarded, this philosophy of the human qualities and faculties, will be the foundation of all philosophy in time to come.

Division of the Moral Qualities and Intellectual Faculties.

The moral qualities and intellectual faculties may be differently divided, if considered in a different point of view. We may divide them into sentiments, propensities, talents, and intellectual faculties. Pride and vanity, for instance, would be sentiments; the instinct of propagation and the love of offspring, propensities; music and mechanics, talents; and comparative sagacity, an intellectual faculty. It is often perplexing, however, to fix the precise limits of each division. The intellectual faculties and talents, when their organs are very active, are manifested in company with desires, propensities and passions; and the sentiments and propensities have also their judgment, taste, imagination, and memory.

The division into qualities and faculties which are common to man and brutes, and qualities and faculties exclusively possessed by man, is very valuable, I acknowledge, in a philosophical point of view. But since there are naturalists who think they perceive in some brutes, certain monkeys for example, an idea of justice and injustice, and even a sentiment of the existence of God, and since the more cautious observer would not venture to decide where the faculties of the brute end, and those of man begin, it must be acknowledged, that this division would not be generally satisfactory.

The best division appears to me to be that of fundamental qualities and faculties, and that of the general attributes of these same qualities and faculties. We thus preserve, and profit by the fruits of my predecessors' labors, while we establish the true theory of the primitive and fundamental instincts, qualities, and faculties of man and brutes. These two divisions have just been discussed. In order to complete my work, I now proceed to present to my

readers some propositions of the highest importance, whose solution directly depends on the physiology of the brain.

What are the Motives of our Actions?

So long as the philosopher, the moralist, the judge, and the legislator have not a minute acquaintance with the springs of our actions, their interpretations, their imputations, their decisions, and their laws, will always be wrong. Hitherto nearly all writers have considered self-love or interest, as being the sole motive of our desires, and the will, as the sole agent in determining our actions. It is evident, however, that there must be as many motives to action, as there are primitive qualities and faculties. Here too the comparison of man with the brutes, will be of great utility. The actions of the brutes are simple, free, and exempt from all doubtful interpretation; while those of men, on the contrary, are almost always more or less complicated, and the individual himself is, very often, unable to render a reason for them. Their motives are doubtful, and never entirely free from capricious subterfuges. The most powerful springs of the actions of brutes, are the instincts of propagation, of love of offspring, of attachment, of self-defence, of the sentiment of property, &c. Their actions are very often determined by envy, jealousy, hatred, anger, cruelty, and benevolence. Surely no philosopher can pretend to have indicated the motives of animals, by attributing them to interest, self-love, or, the sole desire of self-preservation. Man being endowed and governed by the same desires, the same propensities, the same passions, and the same affections, his actions must be determined by the same motives. Our social, civil, and religious institutions are due, in a great measure, to the instincts of propagation, of love of offspring, of self-defence, of the sentiment of

property, of vanity, ambition, the desire of independence and domination.

We have only to call to mind my observations on each organ, and its sphere of activity, to have a general view of the natural history of the moral man. I have given the reasons, why one person applies himself to the arts and sciences, while another finds his happiness in sloth and ignorance; why every one, from the Brahmin to the cannibal, from the slave to the despot, from the most superstitious devotee to the most arrogant infidel, believes himself possessed of excellent motives for his belief and conduct. Excite the fundamental qualities and faculties till they act with energy, and you will then see the motives of all the extravagances of passion, of all the wonders of genius, and of all the efforts of virtue and wickedness. Vary the age, sex, temperament, health, or nourishment, and you vary the action of the cerebral organs, and frequently, the desires, propensities, passions, and ultimately, the motives and determinations.

Thus far, the actions of men are scarcely less instinctive, than those of brutes. Knowing the qualities and faculties, and the degree of their activity, we can infer the motives; and the actions themselves, it is as easy to predict. The modest artist, under a thousand humiliations from the rich, will continue to cultivate the arts; the benevolent, after a long experience of ingratitude, will be always impelled to acts of beneficence; and the rash, crippled by wounds, will always rush into battle. Thus in most cases, man has less to do, in originating his actions, than nature. But give to him all his prerogatives, let him act with reason and will, from that moment he becomes a free moral agent. Whoever would wish to foresee or judge his actions, must not only know his natural disposition, but also all the external elements that concur in producing his determinations; for the acts of reason and will are often diametrically opposed to the instigations of the desires, wants, and passions.

It follows, as I have elsewhere remarked, that if you would always have actions to be the result of deliberate reason, you must cultivate the inward qualities and faculties; multiply, ennoble, and enforce the outward motives. It follows, too, that the virtues and crimes of men may as justly be imputed to those, who are charged with their education and government, as to those, who are themselves patterns of virtue or crime.

It is still objected, that all the qualities and faculties together constitute the *moi* of the individual; that every gratification of a desire, propensity, or passion, is connected with his interest and self-love; and consequently, that the motives of his actions are all resolved into interest, or self-love? I reply, that the philosopher's rage for abstracting and generalizing, has also generated this false theory, which considers all the moral qualities and intellectual faculties, as simple shades of the single, solitary principle, sensibility. As sensibility alone will not explain the phenomena of voluntary motion, the different functions of the five senses, the moral qualities and intellectual faculties, so neither are interest and self-love, considered as the sole motives of our actions, sufficient to account for instinctive acts, nor for the deliberate convictions of human reason.

Of the origin of the Arts and Sciences, and of different Communities.

The origin of the arts and sciences, and of different communities, is almost universally attributed to chance, necessity, or reflection. Even the earliest and most indispensable of human occupations, are derived from the same source. Hunting and fishing, it is said, were invented, because the spontaneous fruits of the earth were insufficient for the nourishment of families; and when families have become so numerous, as to form tribes and nations, they have been obliged to resort to

agriculture; the women and children not finding sufficient food, man is obliged to attach himself to one woman only, and to share with her in the domestic cares. Here is the origin of marriage, and of society, which goes on increasing in numbers, and giving rise to all the wants. The inclemency of the weather is to be guarded against, and thence spring the arts of making clothes, and building houses and palaces. Thence also, arise the factitious wants, all the desires and passions, which are the result of inequalities of condition, vanity, love of distinction, and glory, ambition, avarice, war, luxury, with the excesses it cherishes, laws, police, religion, the thirst for strong emotions, music, eloquence, poetry, and shows.

If outward accidental causes are the source of all these inventions, why have they not produced the same effects in the brutes? Why does not the dog build a house to protect him from the inclemencies of the weather? Why do the partridge and raven perish of cold, rather than migrate like the swallow? Why is it that each animal satisfies its wants in a manner peculiar to itself? that each man has different wants, though outward circumstances are very nearly the same in all? In treating of the fundamental powers of man and brute, I have satisfactorily answered these questions. The true source of the arts and sciences, is our innate instincts, propensities, and faculties — our inward wants.

Who invented the spider's web, the beaver's cabin, the hang-bird's nest, the bee's cells, the nightingale's song? Who suggested the idea of a republic to the ants, of tricks to the monkeys, of sentinels to the chamois, of migration to the storks, of hunting to the wolves, of provisions to the hamsters, of marriage to nearly all the birds, and a large part of the mammifera? All these things are universally attributed to instinct, to an inward impulse, never to external circumstances. The cause of these inventions, therefore, lies in the organs, or, in other words, animals

have received from nature, by means of organs, certain definite powers, propensities, talents, and faculties, which produce their habits, that have so often the appearance of spontaneous and deliberate actions. It is precisely the same with man. All that he does, or knows, all that he can do, or can learn, he owes to the author of his organization. God is its source; the cerebral organs, his intermediate instrument. The same organ, which in the nightingale produces singing; in the beaver, the faculty to build; in the hamster, the propensity to lay up provisions; produces in man, music, architecture, love of property. The poet, the orator, the legislator, the minister of religion, are the work of God. Chance may furnish a faculty, the occasion of displaying activity, but when the faculty does not exist, it accomplishes nothing. Pythagoras, passing by a blacksmith's shop, was struck with the gradations of the different sounds of the hammers. He examined them carefully, and made one of the most brilliant discoveries in acoustics, and one which has most contributed to the perfection of music. To Newton, the fall of an apple from the tree, was the occasion of dicovering the laws of gravitation. How often has the sound of hammers been heard, and apples seen falling to the ground, without giving rise to the slightest presentiment, that these phenomena take place by virtue of certain laws of nature? I showed, while treating of each particular fundamental power, that oftentimes, the first *instinctive* efforts of genius are master-pieces. It is not until after he has constructed machines, and built houses, for ages together; spoken language, whether of words, or signs; cultivated painting, sculpture, music, poetry, eloquence, that man thinks of seeking for the rules of these arts, and of fixing their laws. During the same time, too, he has reasoned correctly, without inquiring for the rules of logic; he has compared, and judged, without suspecting that the flow of his ideas was confined to any necessary catenation.

He was a logician, long before he had learned any logic; and in the same way, he decided what was just, and what unjust, long before having any acquaintance with jurisprudence.

No valid objection to my reasoning can be drawn from those inventions or discoveries, which, like organology, or any branch of natural history, are, in fact, the fruit of accidental circumstances, and of the simultaneous action of several intellectual faculties — of combination, analysis, abstraction. These discoveries have not been made by any particular organ; they are the result of observation, of the faculty of ascertaining what individual phenomena have in common, of learning the laws of phenomena, and applying this knowledge to a specific object. The progressive improvement of inventions and discoveries, is not to be attributed to any particular power, but is the result of application and experience; the first invention is the work of genius. Neither let it be objected that, upon my principles, any man, supposing him to have lived under favorable circumstances, might have invented all the arts and sciences. A man of moderate powers —and of such is the majority of mankind — invents nothing, and creates nothing, of himself. His faculties only are competent to appropriate, what is already invented. It is only remarkably developed organs, whose activity is exercised on things without, that leave their impressions on the external world — that, in a word, create.

Banish music, poetry, painting, sculpture, architecture, all the arts and sciences, and let your Homers, Raphaels, Michael Angelos, Glucks, and Canovas, be forgotten; yet let men of genius of every description spring up, and poetry, music, painting, architecture, sculpture, and all the arts and sciences will again shine out in all their glory. Twice within the records of history, has the human race traversed the great circle of its entire destiny, and twice has the rudeness of barbarism been followed by a higher degree of refine-

ment. It is a great mistake, to suppose one people to have proceeded from another, on account of their conformity of manners, customs, and arts. The swallow of Paris builds its nest like the swallow of Vienna, but does it thence follow, that the former sprang from the latter? With the same causes, we have the same effects; with the same organization, we have the manifestation of the same powers.

Ferguson has very justly remarked, that, "if we may rely on the general observations contained in the last section, the literary, as well as mechanical arts, being a natural produce of the human mind, will rise spontaneously, wherever men are happily placed; and in certain nations, it is not more necessary to look abroad for the origin of literature, than it is for the suggestion of any of the pleasures or exercises, in which mankind, under a state of prosperity and freedom, are sufficiently inclined to indulge themselves.

"Ages are generally supposed to have borrowed from those, which went before them, and nations to have received their portion of learning, or of art, from abroad. The Romans are thought to have learned from the Greeks, and the moderns of Europe, from both. From a few examples of this sort, we learn to consider every science, or art, as derived, and admit of nothing original in the practice, or manners of any people. The Greek was a copy of the Egyptian, and even the Egyptian was an imitator, though we have lost sight of the model on which he was formed.

—"Painting, sculpture, and the other imitative arts, are as ancient as the human race; they are found to exist, whenever men are formed into societies; no individual, therefore, can claim the honor of being their inventor."

Thus God is every where the artist, and man only the instrument.

Is the Human Species capable of Indefinite Perfectibility?

This proposition includes two entirely different points of view. It may be asked, whether the species can ever lose or acquire any quality or faculty whatever? and whether the faculties and qualities inherent in our organization, are capable of a constantly and indefinitely progressive course of improvement? The reader must beware of confounding these two questions, both of which organology can answer.

Can the Human Species ever lose or acquire any Quality or Faculty whatever?

Man can manifest no other qualities or faculties than those, whose manifestation is provided for by material instruments, the number of which is definite. While the present creation lasts, the number of these material instruments will neither be increased nor diminished; so that the species can never lose nor acquire any faculty, whether good or bad. If some philosophers boast of the indefinite perfectibility of the human race, and, on the other hand, if some moralists deplore its constantly increasing depravity, their reveries must be attributed to the erroneous hypothesis, that the moral man is only the result of chance and outward circumstances; that, in short, he is a being capable of infinite modification, and is subject to no law of nature. The forms of crystals and of plants, have never varied since the creation, and never will vary. Just so invariable is the organization of the human race; consequently, his moral and intellectual character can experience no essential change.

In several parts of this work, I have refuted all the prevalent notions concerning the pretended influence

of the social life on the origin of the factitious qualities and faculties. Man can possess no artificial quality or faculty. He is designed, by his organization, like many species of animals, to live in society, and consequently, he must be provided with all the qualities and faculties, necessary to the maintenance of the social state. Communities are the result, not the cause of their moral qualities and intellectual faculties. Will it be said, that the republics, in which bees, ants, and beavers live, have produced the instincts of these beings? Is it not far more reasonable to believe, that their innate instincts have collected them into republics? If you hesitate to admit this opinion, form the foxes, tigers, and vultures into flocks, and show us a single artificial quality or faculty, which will result from their association. Where is the vice or crime, that sullied the memory of our forefathers, which no longer disgraces our own history? Where is the virtue, that adorned the early ages of the world, which is not also the boast of our own time? Read the ancient moralists and historians; the men of Horace, Homer, Lucan, Livy, and Socrates, are the men of Montaigne, La Bruyere, Voltaire, Bossuet, and La Rochefoucault. To maintain, that any virtue whatever has disappeared from the surface of the earth; that our times present fewer examples of generous forgiveness, of sacrifices to friendship, of heroic courage, of conjugal fidelity, of maternal love, of love of country, than the time of the Trojan war, would be as absurd, as to maintain that the sun has ceased to warm the earth, and the dew to refresh the fields; to maintain that cruel revenge, base perfidy, calumny, envy, perjury, servile adulation, false witness, espionage, ingratitude, thefts, murders, luxury, war, despotism, visit society with their desolations, less than in the time of Joshua and Nero, would be no less an error, than to believe that earthquakes, inundations, storms, and tempests, will no longer devastate our land.

Finally, what qualities would they derive from the civilized state? Is it property? I have proved, that the sentiment of property is innate, not only in the human species, but also in brutes. And in the same place, I have shown that the savages and barbarians of all times, have had their respective properties. Is it pride, ambition, vanity, love of gain? or is it certain talents? But the savage and the barbarian are vain and proud, and their principal concern is for dress and pleasure. They share all our vices, in the very bosom of the forests, and dispute with the inhabitants of cities for the palm of extravagance. Games, even those of hazard, also belong to the remotest times. The savage brings his furs, his tools, and his necklaces to the gaming table, and there he finds the excitement and agitation, which monotonous labor cannot furnish. While his fate is yet undecided, he tears out his hair, and strikes his breast with the fury of the most accomplished player, and often quits the game naked and stripped of every thing he possessed. In countries where slavery is the custom, he stakes his liberty for the single chance of regaining what he has lost. Is not this a faithful picture of the frequenters of our own gambling houses? In talents, savages and barbarians often surpass us. They frequently manifest a penetration, a force of imagination, and even of elocution, a warmth of soul, a courage, a constancy of affection, to which the arts, education, and politeness of the most cultivated nations, have nothing to add. If the object be to penetrate the thoughts and intentions of those, with whom they have to deal, their glance is piercing and sure. If they design to cheat or deceive, they veil their design with so much skill, that it is difficult for the most subtile person to escape their toils. In the public councils, their eloquence is figurative, nervous, and glowing with warmth, and in the negotiation of treaties, they show the most perfect discernment of their national interests. In times of peace their intercourse is friendly,

even in the rudest state, and they are affectionate to one another. An individual enjoys the greatest security, both in respect to his property and person. The principles of honor, generosity, and justice, are practised with an enthusiasm, equal to the violence with which at other moments, they practise revenge and cruelty.

Thus all the pretended factitious qualities and faculties, are an original possession of the human species, and not the subsequent effects of invention and discovery. It is in the dispositions of uncultivated men, of barbarians and savages, that we must study the natural dispositions of civilized nations. Thucydides, notwithstanding the prejudices of his country against every thing that bore the name of barbarian, was conscious, that the manners of ancient Greece were to be studied in the customs of these people. The inverse of the proposition is equally true. Study the propensities and faculties of civilized man, and you will know the propensities and faculties of savages and barbarians. The germs of all that man has ever done or ever will do, even of his political institutions, are enclosed in his organization, for time and circumstance to develope and ripen. All this is merely modification; the essence is and will be, always and every where, the same.

How far is the Human Species Perfectible?

The question then, is no longer, whether the human species may lose or acquire any quality or faculty whatever; but whether the qualities and faculties, inherent in this organization, are susceptible of a continually progressive improvement, or, whether nature has placed limits to their perfectibility.

The hope of a constantly increasing improvement of our species, is a pleasing and animating sentiment. But, alas! the laws of organization and the records of

history, destroy the illusions of the metaphysicians. The elephant and the whale, though infinitely larger than the mite: the cedar and the oak, infinitely taller as they are, than the moss, have still their prescribed dimensions. And will you pretend, in your presumptuous arrogance, that the organs of your brain will meet with no limits in their development and activity! It is idle, to object to me the distance between brutal ignorance and refined learning, — between the savage and the civilized man. We have seen that this distance is marked by no essential difference. Cast a careful look at the various conditions of the human family, even in the civilized, and you will see depicted with equal fidelity, both its littleness and its grandeur.

Surrounded as we are by refined and cultivated men, we readily attribute to mankind in general that progress and perfection, for which we are indebted to a few individuals. As long as we have had any knowledge of our race, the generality of men have been the slaves of ignorance, error, prejudice, and superstition. Slavery, brutality, and sensual gratifications of the grossest description have ever been the main features of his history. Even the hunters, fishermen, and tillers of the earth, have hardly possessed the knowledge necessary to their employments. Every thing is done mechanically; to deviate from the old routine, to alter, and improve, is to them, absurd, ridiculous, and criminal. Mechanics too are scarcely any better. The majority resemble automata, more than intelligent beings. Laborers, and, in short, all who are obliged to spend the most of their time in obtaining the necessaries of life, either do not think at all, or have but a few ideas relative to the satisfaction of their wants. Though encompassed by the wonders of nature, they are hardly touched by the melodies of birds, or the beautiful tints of flowers; the changing seasons, the meteors with all their diversified and striking appearances, even the majestic spectacle of the

stars, never excite their curiosity, and scarcely ever arouse their minds from indifference and supineness.

Let us pass to the higher classes. The influence of the heads of government on the prosperity or decline of the arts and sciences, we know, is incalculable. They are aware, that, in encouraging talents, they are embalming their own names; that though conquests astonish the world, the protection of industry draws upon themselves the blessings of ages. The immense range of their duties, and the tyranny of etiquette, scarcely allow them to devote a few moments to lighter and more pleasing cares. Too often, the jealousy and ignorance of favorites inspire them with mistrust of the men, who attack with superior power the abuses and weaknesses of their time; and the most generous and beneficent efforts of genius, instead of being welcomed, if not completely crushed, are at least hampered and checked.

They who vegetate in lazy opulence, are content with suing for office and distinction, with decorating themselves with medals and ribbons, and dissipating their whole life in sensual pleasures. Their fortune and influence dispense with the necessity of reflection and form the propensity to idleness, so natural to the majority of mankind. Hence it is that pomp and ignorance are as inseparable, as dissipation and misery; hence the sad truth, that the class, which from their imaginary elevation, looks down on the people with disdain, is moreover, in point of intelligence, on the same level with them. There is the same indifference, the same prejudice, and the same aversion towards new truths; the same tenacious adherence to old errors, the same credulity and the same superstition. The fatidical flight of birds, the fatidical oaks of the forest of Dodona, the sorceress of Thessaly, the magic of Egypt, the oracles of Delphos are replaced by fortune-tellers, prophets, interpreters of dreams, presentiments and inspiration, hobgoblins, ghosts, and unlucky days and numbers. We still live with Romans

and Spartans, who seek to know the future, in the motions of the bills of birds, and in the entrails of beasts; we have yet our Mithridates and Alexander, who employ conjurers to interpret their dreams. Penetration and prudence and great military and political talents, and the height of civilization, are as incompetent now, as they ever were, to guard ignorance from the most puerile, absurd, and superstitious practices. Can those even, who are led by the energy of their faculties to reflection and the search for truth, fortify their minds against error? Can they save themselves form the wildest extravagances? The fatalism of Zeno, and the absolute, indefinite liberty of Ancillon; the Iroquois notion of the immortality of brutes, and that of Descartes of their automatic nature; the doctrine of Parmenides, that God includes all ideas, and that of Malebranche who saw all things in God; the belief of Empedocles in the transmigration of souls; the numbers of Pythagoras, which the Supreme Intelligence used for direction in the creation of the world; the blank table of Helvetius; the doctrine of Lucretius, which attributes the creation of the universe to the concourse of atoms; Berkeley's disbelief in the existence of matter; the molecules of Buffon; the monads of Leibnitz; the atoms and the voids of Leucippus and Democritus; the approval of suicide and contempt of all property, of Antisthenes and Diogenes; the voluntary sufferings and abstinence of Epictetus; the merry philosophy of Aristippus and Epicurus, &c. &c., are but specimens of the efforts of philosophers, most of whom were the admiration of their age.

We need not speak of the interminable, and often bloody, controversies of theology, the eternal vacillation of the forms of government, of the present infancy of criminal legislation, of the fluctuation of the principles of civil law; the disputes relative to national law, supported, as they always are, by force and violence; let us look where we might have some grounds to expect indefinite perfection. Compare with modern

works of art, the temple of Dendera in Egypt, the Pantheon at Rome, the temple of Nîmes in France, the vast temple at Heliopolis in Syria, now Balbec, the immense circus at Rome, the arenas in the city of Nîmes, the theatre of Marcellus at Rome, Trajan's column, the Antonine column, a vast temple at Pœstum, the temples of Pole in Istria, the ruins of Thebes, of Sienna, of Persepolis, and, most astonishing of all, those of Palmyra, the Baths of Titus and Caracalla, and the excavations of Herculaneum and Pompeii. Compare the poets, painters, and orators of our days, with Homer, Virgil, Horace, Ovid, Tasso, Cicero, Michael Angelo, and Raphael, and then maintain, if we can, that the productions of the mind are always progressing in improvement.

All that man can immediately attain by the force of his powers; all that is the result of great genius, he has and will attain, whenever favored by nature with a large development of his organs. But, where the progress of the arts and sciences, requires a particular concourse of fortunate circumstances and combinations, it is impossible to fix a limit to our knowledge. The positive arts and sciences, geometry, astronomy, experimental physics, navigation, chemistry, anatomy, surgery, medicine, agriculture, natural history, bear no resemblance to their former condition. Still, since our capacities are always limited, we necessarily lose as many old ideas as we obtain new ones, and when the mass of society shall be enriched by innumerable discoveries, individuals will no longer be astonished. Every one is obliged to confine himself to a particular sphere, to make ever so little of his privileges, and scarcely has he begun to flutter on the height of his domain, when he is precipitated into the abyss of nothing. We see nations remaining for thousands of years stationary in mediocrity, and none have gradually risen for any length of time, towards moral and intellectual perfection. Athens and Rome have sunk into barbarism, and the flux and reflux of the ocean every where represent the history of human affairs.

Philosophers have always drawn an argument in favor of the indefinite perfectibility of our species, from the uniformity of the actions of brutes. But the sum of men's dispositions, and consequently their principal actions, are every where alike. People the most remote in time and place, are united together in their interests and institutions. We deceive ourselves when we consider the maxims of the present day, as the results of modern reflection and experience. The morality of Pythagoras, of Socrates, and of Christ, are all equally founded on the sentiment of benevolence, and the good of society. Even savage nations, have presented perfect models of our civil and political institutions. At the time of the first settlement of Europeans in America, the six nations of North America were leagued together, and had their States-general. The stability of their union, and the wisdom of their conduct gave them an ascendancy over the whole population between the mouths of the St. Lawrence and the Mississippi. They showed themselves as well acquainted with the interests of the confederation, as with those of separate nations, and studied to maintain the balance between them. The representative of each nation watched the designs and movements of the rest, and neglected no opportunity of increasing the influence of his tribe. They made alliances, and treaties, like European nations, which they respected or violated from reasons of state. A sense of necessity, or considerations of utility, kept them in peace; while jealousy, or any other cause of rupture, made them resume their arms.

Thus, without any fixed form of government, and in a way, with which instinct had more to do than reason, they were guided by the same maxims, as modern government. The conclusion is — and it is supported by all the observers of our race — that the history of all nations, from their savage state to their highest pitch of civilization, is perfectly alike.

Finally, when I see the greater number of people

despising the arts and sciences, and with all the arrogance of ostentation and power, consuming all their powers in commercial pursuits, or sensual enjoyments; when I see the proneness of men to sloth, and the commonest ideas, and their invincible aversion to every mental effort, and innovation; when in travelling among people styling themselves the most cultivated in the world, I find at every step, entire provinces still plunged in barbarism, and see that the same men not only bear with indifference the vilest condition, but shrink from whatever would point them to a lot worthy of humanity; when history teaches us that sometimes, nations which have risen to the summit of distinction, relax their efforts, and that after a few ages of light and knowledge, either in consequence of their own sloth, or the jealousy of their neighbours, they again find themselves in the depths of ignorance and barbarism, — who, after such reflections, can help maintaining, that the moral perfectibility of the human species is confined within the limits of his organization.

What is the World of Man, and of the different Species of Animals.

The natural history of instincts, of industrious habits, propensities, and faculties, and the demonstration of their organs, necessarily leads to the conclusion, that the moral and intellectual world of man and the brutes, begins where the brain begins, and ends, where the brain ends. The following considerations raise this assertion to the rank of an incontestable truth.

Inanimate bodies are unconscious of their existence. They have no MOI; nothing tells them that they are individuals independent of other beings, and alone, though infinitely multiplied, they would constitute a perfectly dead nature. Life, *moi*, consciousness of

the existence of the world, begins with sensation, with the nervous apparatus. When the individual perceives, that it is distinct from surrounding things, it has a *moi* whose capacity will be in proportion to the variety and intensity of its sensations; and consequently, to the number and energy of the organs of internal sensibility, and external relations. The more numerous the organs in contact with external objects, the more extensive will be the world of the animal. To the general, vague, indefinite sensation, add sensations that are determinate and essentially distinct from one another, and you gradually modify and enlarge its world. Each sense, each organ, becomes a new revelation. Taste, smell, hearing, vision, touch, each make known to him existences, and different relations of the world, and whether wholly or partially combined, the aspect of this world must essentially vary. Applying these remarks to the organs of the moral qualities and intellectual faculties, we may consider them to be also so many points of contact with the external world; so many sources of new kinds of sensations, sentiments, instincts, propensities, and faculties; but we have seen, that they are unequally shared by the different species of brutes. Their internal and external world must therefore vary to infinity; diminishing or increasing in the same proportion, as the number of these organs diminishes or increases.

What a difference between two beings, one of which, scarcely higher than the plants, and nearly unconscious of its existence, is generated from their decay; and the other which is led to the propagation of its species, by the warmest desires, and the most exquisite enjoyment! Give to these beings the love of offspring, and this organ becomes an inexhaustible source of the tenderest feelings, the dearest cares, and the most anxious solicitude. From this moment, the whole existence of the man and woman, of the male and female, seems to be in reference to these two

powerful instincts. Destroy these two organs, and, though all the rest remain, the interest and charm of life are destroyed. The delights of the marriage state, and the sweets of friendship and social intercourse, we owe to a cerebral part. By means of a cerebral organ too, the Creator has inspired us with the right and the duty of defending ourselves, our children, friends, property, and country, against the assaults of enemies. Without this and the organ of the carnivorous instinct, the economy of man and animals, would be totally changed. Now, what an effort is here to seize the prey; there, to escape from the murderous tooth! War especially gives a form and object to communities. The necessity of public defence assembles together the most different men, and opens an immense range to the moral and intellectual powers. What scenes in the life of individuals, as well as in the history of nations, have these organs produced, and are, every moment, producing!

Cunning, craft, finesse, tact, prudence, sometimes the safe-guard of the weak, at others, the instrument of the strong, owe their manœuvres and intrigues to the same organ, as that to which the fox owes the fortunate issue of his nocturnal expeditions.

Remove another cerebral part, and you deliver men from the propensity to theft, but at the same time, destroy a great part of our social institutions. By rendering us indifferent to property, you take away one of the most powerful motives for our actions; the arts and talents would soon be sacrificed to idleness and indifference.

Were there no organ to assign to each animal a suitable place of abode, what confusion would result! This organ preserves the balance in the distribution of the animal kingdom, and peoples the plains and the mountains, the fields and the forests, the air and the water.

If man is deeply impressed with a sense of his own value; if he rises above his fellows; if he breaks

the chains of slavery; if he arrogates supreme authority, and thus gives rise to governments, think not this to be the work of man. It is the author of all things, who, by means of a particular organ, has subjected the human species to this arrangement.

The pleasure you find in pretended distinctions, the delicious reveries of those, who are seeking for honors, — this spring of such indefatigable activity, also comes from a cerebral part. What an amount of enjoyment and care, what an abundant source of follies and noble deeds, would be taken away, the moment the functions of this organ should cease!

Without circumspection, neither man nor brutes would be guarded against the dangers of inconsiderate and precipitate conduct; they would never carry their thoughts to the future, nor would they perceive the obstacles or perils of an enterprise.

What power renders man and brutes attentive to the events, that are passing around them, and teaches them to turn their propensities and faculties to account, under the circumstances in which they are placed? Take away the organ of educability, and brutes would cease to be useful to man; agriculture and civilization would be impossible; all our faculties and propensities would be confined to a narrow, determinate sphere of action, and man, like the brute, would be the slave of his propensities.

The organ of the sense of locality, every year, preserves, by means of migration, half of the animal kingdom from inevitable death. Man, under the impulse of this organ, traverses lands, and seas, and worlds. Without this organ, how much less knowledge, resources, and objects of admiration, should we possess!

Take away for a moment, the organs of painting, music, architecture, design, and sculpture, and we should no longer have the chefs-d'œuvre of Raphael, of Mozart, of Michael Angelo, of Canova, and of Homer.

The superficial observer never suspects, that he also

owes the faculty of communicating his thoughts, and transmitting them by articulate language, to a particular cerebral organ.

You congratulate yourself on being the friend of justice; your moral sense inspires you with high conceptions of your own nature; and your benevolence charms you. Yet, without a particular organ, all your glory, and all those fine emotions would be absolutely impossible.

Would you know why the brute never rises above earthly things; why he never sees the relation of cause and effect; why he does not know and adore the supreme intelligence? Learn how God has formed man. Follow step by step the eternal laws of the gradation of nature. There is no power without its organ, and new organs, give new powers. Now place man before you, and contemplate his high and prominent forehead; compare that majestic forehead with the depressed forehead of other creatures, and you will learn why man *is* man. Against this forehead are placed those organs, that bestow on him the human character, and by means of which, he penetrates the relations of causes and effects, and is made capable of will and reason. Place your hand on the front and top of his head, and you will there find the sign of the alliance, which his Creator has concluded with him. There is the organ, which has been commissioned to reveal to all nations the Supreme Intelligence, — the organ, which, enthroned in the noblest organization on earth, has always exercised, and will always exercise, supremacy over all human interests.

The world of each species of animals, is therefore the sum total of their cerebral organs — the sum of the relations, or points of contact between external things and internal organs. Where there is no organ, there is no relation, nor revelation. The turtle can never rise to the instincts of the elephant, nor the elephant conceive of the intelligence of man; and man having received no organ for conceiving of the infinity

of worlds, of the eternal duration, or beginning of things, or understanding the essence of God, is condemned to absolute ignorance of these mysteries. Let those who presume to compare themselves, so to speak, with the Divinity, to understand and explain the laws that govern the universe; and those, who, with vain-glorious boasting, believe they may dispense with the necessity of a supreme and independent Intelligence, remember, that all the material conditions of their thoughts and conceptions, are compressed within the compass of twenty-two inches. On the other hand, let us call to mind the industrious habits, instincts, propensities, sentiments, and faculties, which from the insect to man, characterize and diversify the immense multitude of animal beings, and, overwhelmed with feelings of adoration, prostrate ourselves before the Creator, who has transformed such slight materials into the instruments of such sublime and numerous powers! Are we to cast a stone at the physiologist, who, in the height of his astonishment, exclaims; *God and the brain! nothing but God and the brain!*

Moral Precepts resulting from the Physiology of the Brain.

The world, so far as knowledge is acquired by the external senses, must necessarily be modified in as many ways, as the senses themselves are modified. The wolf scents differently from the sheep; the eyes of the owl are affected by the light differently from those of the eagle. When the wolf, sheep, owl, and eagle, decide on the nature of effluvia and light, their judgments, though different, will be equally true, since they are all in accordance with the sensations produced on each, by light and effluvia. But the senses and their functions, are not only differently modified in different species, but also in the different individu-

als of the same species. The dish that is a dainty to you, may be loathed by me. Your hotch-potch may be an abomination to me. Still, no one thinks himself authorized to blame others for this difference in their tastes. There are many more reasons, why we should pardon the difference, and often opposition, of our propensities, sentiments, and faculties. What an immense variety in the development, excitability, and relative proportions, of our cerebral organs! Each individual, in himself considered, that is, independently of external influences, is marked by his own peculiar moral and intellectual character, and, placed in contact with the external world, receives his own impressions, and sensations. Consequently, the propensities, sentiments, and judgments of each individual, and the actions, that result from them, must differ from the propensities, sentiments, judgments, and actions of other individuals. This is why every body has reason to consider the criticism of others unjust, and it is doing violence to a natural law, to require the propensities, faculties, judgments, and actions of others, to accord with our views of things. Each has his personal rights, and unlimited toleration for every thing, that does not disturb the order of society, is the first, most sacred, and most philosophical duty. Here again is a proof, that he who discovers and publishes new physical truths, ought not to be afraid of contradicting moral truths.

Conclusion, and Summary Review.

Here, then, terminates this work, which, for fifteen years, the learned have been impatiently expecting. I should have wished to defer it still longer, to bring the fruits of my researches to greater maturity; but the final hour draws near, and I must be content with leaving this first effort in the physiology of the brain, far less perfect than it will be fifty years hence. I have

several times mentioned, how many means I have as yet failed to obtain, for positively demonstrating the results of my labors. It needs infinitely more materials to convince others, who, for the most part, are but little accustomed to observation, than, to convince one's self.

In order to put my successors on the proper track for improving my system, I have made a long list of questions, that remain to be answered, and I intend to devote a particular chapter to points, of which we are yet ignorant, but which it is indispensable for us to know. But, I am afraid of daunting young naturalists, who would shrink from too formidable an array of difficulties, when, otherwise, they would begin with courage, and remove one obstacle after another.

I regret, and always have regretted, that I dare not flatter myself, that my undertaking will ever be continued in all its details, or, that my exertions will be appreciated. Whoever is not impelled by an innate instinct of observation; whoever finds it hard to sacrifice his opinions, and the views he has derived from his earlier studies; whoever thinks more of making his fortune, than of exploring the treasures of nature; whoever is not fortified by inexhaustible patience, against the interpretations of envy, jealousy, hypocrisy, ignorance, apathy, and indifference; whoever thinks too highly of the force and correctness of his reasoning, to submit it to the test of experience, a thousand times repeated, will never do much towards perfecting the physiology of the brain. Yet, these are the only means, by which my discoveries can be verified, corrected, or refuted. The reader will pardon me, if, independently of the proofs of organology, which I have furnished, in treating of the fundamental powers, I also rely on experiments made in the presence of a great many persons, who accompanied us in our visits to prisons, &c.; for, I would neglect nothing, that might encourage the learned to study the functions of the different cerebral parts. The following is a translation

of an authentic account of my visits to the prisons of Berlin, and Spandau, inserted in Nos. 97 and 98 of the *Freymüthige*, May, 1805. Demangeon has given it in his *Physiologie Intellectuelle*, Paris, 1806.

"Dr. Gall having expressed a desire to inspect the prisons of Berlin, with the view of making himself acquainted with their arrangements and construction, as well as of observing the heads of the prisoners, it was proposed to him, that he should visit not only the prisons of that city, but the house of correction, and the fortress of Spandau.

"Accordingly, on the 17th of April, 1805, Dr. Gall began with those of Berlin, in presence of the directing commissaries, the superior officers of the establishment, the inquisitors of the criminal deputation, the counsellor Thürnagel, and Schmidt, the assessors Muhlberg, and Wunder, the superior counsellor of the medical inspection, Welper, Dr. Flemming, Professor Wildenow, and several other gentlemen.

"As soon as Dr. Gall had satisfied himself in regard to the regulations and general management of the establishment, the party went to the criminal prisons, and to the *salles de travail*, where they found about 200 prisoners, whom Dr. Gall was allowed to examine, without a word being said to him, either of their crimes, or of their characters.

"It may here be remarked, that the great proportion of those detained in the criminal prisons, are robbers or thieves; and, therefore, it was to be expected, that if Dr. Gall's doctrine were true, the organ of Acquisitiveness should, as a general rule, be found to predominate in these individuals. This accordingly soon appeared to be the case. The heads of all the thieves resembled each other more or less in shape. All of them presented a width and prominence at that part of the temple, where the organ is situated, with a depression above the eyebrows, a retreating forehead, and the skull flattened towards the top. These peculiarities were perceptible at a single glance; but the

touch rendered still more striking, the difference between the form of the skulls of robbers, and that of the skulls of those, who were detained for other causes. The peculiar shape of the head, generally characteristic of thieves, astonished the party still more, when several prisoners were ranged in a line; but it was never so strikingly borne out and illustrated as when, at the request of Dr. Gall, all the youths from 12 to 15 years of age, who were confined for theft, were collected together; their heads presented so very nearly the same configuration, that they might easily have passed for the offspring of the same stock.

"It was with great ease, that Dr. Gall distinguished confirmed thieves, from those who were less dangerous; and, in every instance, his opinion was found to agree with the result of the legal interrogatories. The heads in which Acquisitiveness was most predominant, were that of Columbus, and, among the children, that of the little H., whom Gall recommended to keep in confinement for life, as utterly incorrigible. Judging from the judicial proceedings, both had manifested an extraordinary disposition for thieving.

"In entering one of the prisons, where all the women presented a predominance of the same organ, except one, (then busy at the same employment, and in precisely the same dress as the offenders,) Dr. Gall asked, as soon as he perceived her, why that person was there, seeing that her head presented no appearance indicative of any propensity to steal. He was then told, that she was not a criminal, but the inspectress of works. In the same way, he distinguished other individuals confined for different causes besides theft.

"Several opportunities of seeing Acquisitiveness, combined with other largely-developed organs, presented themselves. In one prisoner, it was joined with Benevolence, and the organ of Theosophy, the latter particularly large. This individual was put to the proof, and, in all his discourses, showed great

horror at robberies accompanied with violence, and manifested much respect for religion. He was asked, which he thought the worse action, to ruin a poor laborer by taking his all, or to steal from a church without harming any one? He replied, that it was too revolting to rob a church, and that he could never summon resolution enough to do it.

"Dr. Gall was requested to examine particularly the heads of the prisoners implicated in the murder of a Jewess, which had taken place the preceding year. In the principal murderer, Marcus Hirsch, he found a head, which, besides indicating very depraved dispositions, presented nothing remarkable, except a very great development of the organ of Perseverance. His accomplice, Jeanette Marcus, had an extremely vicious conformation of brain, the organ which leads to theft being greatly developed, as well as that of Destructiveness. He found in the female servants, Benkendorf and Babette, great want of circumspection; and, in the wife of Marcus Hirsch, a form of head altogether insignificant. All this was found to be in strict accordance with the respective characters of the prisoners, as ascertained by the legal proceedings.

"The prisoner Fritze, suspected of having killed his wife, and apparently guilty of that crime, although he still stoutly denied it, was next shown to Dr. Gall. The latter found the organs of Cunning, and Firmness, highly developed, — qualities, which his interrogator had found him manifest in the very highest degree.

"In the tailor Maschke, arrested for counterfeiting the legal coin, and whose genius for the mechanical arts was apparent in the execution of his crime, Gall found, without knowing for what he was confined, the organ of Constructiveness much developed, and a head so well organized, that he lamented several times the fate of that man. The truth is, that this Maschke was well known to possess great mechanical skill, and at the same time much kindness of heart.

"Scarcely had Dr. Gall advanced a few steps into

another prison, when he perceived the organ of Constructiveness equally developed in a man named Troppe, a shoemaker, who, without any teaching, applied himself to the making of watches, and other objects, by which he now lives. In examining him more nearly, Gall found also the organ of Imitation, generally remarkable in comedians, considerably developed; — a just observation, since the crime of Troppe was that of having extorted a considerable sum of money, under the feigned character of an officer of police. Gall observed to him, that he must assuredly have been fond of playing tricks in his youth, which he acknowledged. When Gall said to those about him, '*If that man had fallen in the way of comedians, he would have become an actor,*' Troppe, astonished at the exactness and precision with which Gall unveiled his disposition, told them that he had in fact been some time (six months) a member of a strolling company, — a circumstance which had not till then been discovered.

"In the head of the unhappy Heisig, who, in a state of intoxication, had stabbed his friend, Gall found a generally good conformation, with the exception of a very deficient Cautiousness, or great rashness. He remarked in several other prisoners the organs of Language, Color, and Mathematics, in perfect accordance with the manifestations; some of the first spoke several languages; those with large Color were fond of showy clothes, flowers, paintings, &c.; and those with Mathematics large, calculated easily from memory.

On Saturday, 20th April, the party went to Spandau. Among those who accompanied Dr. Gall, were the privy counsellor Hufeland; the counsellor of the chamber of justice, Albrecht; the privy counsellor Kols; the professor Reich, Dr. Meyer, and some others. At the house of correction, observations were made upon 270 heads, and, at the fortress, upon 200. Most of them were thieves and robbers, who presented more or less exactly the same form of head,

of which the prisons of Berlin had exhibited a model. Including the whole, the prisons of Berlin and of Spandau, had thus subjected to the examination of Dr. Gall, a total of about five hundred thieves, most of them guilty of repeated offences; and in all, it was easy to verify the form of brain, indicated by Gall as denoting this unhappy tendency, and to obtain the conviction, from the discourse of most of them, that they felt no remorse for their crimes, but, on the contrary, spoke of them with a sort of internal satisfaction.

"The morning was spent in examining the house of correction, and its inmates; the most remarkable of whom were submitted, in the hall of conference, to the particular observation of Dr. Gall, sometimes one by one, and sometimes several at once. The combination of other organs, with that of Acquisitiveness, was also noticed.

"In Kunisch, an infamous thief and robber, who had established himself as a master-carpenter at Berlin, and who, in concert with several accomplices, had committed a great number of thefts with '*effraction*' (burglary,) for which he had been shut up till he should be pardoned, Gall found, at the first glance, the organs of Mathematics, and of Constructiveness, with a good form of head in other respects, except that the organ of Acquisitiveness was exceedingly developed. Gall said on seeing him, '*Here is an artist, a mathematician, and a good head; it is a pity he should be here,*' —an observation remarkable for its accuracy, as Kunisch had shown so much talent for mechanics, that he was appointed inspector of the spinning machinery, the repairing of which was confided to him. Gall asked him if he knew arithmetic, to which he answered with a smile, '*How could I invent or construct a piece of work, without having previously calculated all the details?*'

"The head of an old woman, who was in prison for the second time for theft, presented a great develop-

ment of the organs of Acquisitiveness, Theosophy, and the Love of Offspring, especially the last. Upon being asked the cause of her detention, she answered, that she had stolen, but that she fell upon her knees every day, to thank her Creator for the favor she had received, in being brought to this house; that she saw in this dispensation, one of the clearest proofs of the wonderful ways of Providence, for she had nothing so much at heart as her children, whom it was impossible for her to educate properly; that since her imprisonment, they had been taken into the Orphan Hospital, where they were now receiving that education, which she had not had the means of giving them.

"Deficiency of Cautiousness was often joined to a great endowment of Acquisitiveness. This was particularly the case, in the woman Muller, whose head presented also a very remarkable development of the organ of ambition, (organ of Vanity,) which, according to Gall, degenerates into vanity in narrow-minded and ignorant persons. She was unwilling to acknowledge, that she was fond of dress, thinking that this was not in harmony with her present situation; but her companions insisted, that she had much vanity, and was careful about nothing but her dress.

"In the prisoner Albert, the organ of Pride was joined with that of Acquisitiveness. '*Is it not the case*,' said Gall to him, '*that you were always desirous of being the first, and of distinguishing yourself, as you used to do, when still a little boy? I am sure that, in all your sports, you then put yourself at the head.*' Albert confessed that it was so; and it is true, that he still distinguishes himself by the command, which he assumes over the other prisoners, and by his insubordination, to the degree that, when a soldier, he could not be constrained but by the severest punishments; and even now he generally escapes one punishment only to incur another.

"Here, as at Berlin, Gall distinguished at a glance, such prisoners as were not thieves. Among others brought before him, was Régine Dœring, an infanticide, imprisoned for life. This woman, different from the other infanticides, showed no repentance and no remorse for her crime, so that she entered the room with a tranquil and serene air. Gall immediately drew the attention of Dr. Spurzheim to this woman, by asking him, if she had not exactly the same form of head, and the same disposition to violence, as his gardener at Vienna, Mariandel, whose chief pleasure consisted in killing animals, and whose skull now serves at his lectures, as an example of the organ of Murder. This organ was found to be very largely developed in Régine Dœring, and the posterior part of the head, in the situation of the organ of Love of Offspring, was absolutely flattened. This was in exact accordance with the character of the culprit, in so far as her examination bore upon it; for, not only has she had several children, of whom she has always secretly got rid, but she lately exposed and murdered one of them, already four years old, which would have led her to the scaffold, if the proofs had not been in some respects vague and incomplete, and her judges on that account had not preferred sentencing her to imprisonment for life.

"One of the gentlemen present was a distinguished musician, upon whom Gall had incidentally pointed out one of the forms of development of the organ of Tune, which consists in a projection above the external angle of the eye. As soon as the prisoner, Kunow, appeared before him, '*Hold,*' said Gall; '*here is the other form in which the organ of Music shows itself; it is here, as in the head of Mozart, of a pyramidal shape, pointed upwards.*' Kunow immediately acknowledged, that he was passionately fond of music, that he had acquired it with facility; and the production of the jail register showed that he was as an amateur, that he had spent his fortune, and that latterly he

had had in view, to give lessons in music at Berlin. Gall asked what was his crime. It appeared, that he had spent his youth in debauchery, and had been condemned to imprisonment for an unnatural crime. Gall having examined his head, and found the organ of Propagation in enormous development, immediately exclaimed, '*C'est sa nuque qui l' a perdu*;' —'*It is the nape of his neck, which has been his ruin.*' Then, carrying his hand upwards towards Cautiousness, which was exceedingly deficient, he added, '*Maudite légèretè*' —'*Unhappy instability.*'

"After dinner the party went to the fortress. Major de Beckendorf, the commandant, had the politeness to cause all the prisoners to be drawn up in line, to be presented to Dr. Gall. Here the organs of Cunning, and Acquisitiveness predominated, as in the other prisons. They were sometimes so strikingly apparent, that at a glance the thief might be distinguished from the other criminals. Raps, in whom the organ of Acquisitiveness was very conspicuous, attracted among others the notice of Gall, who discovered at the same time large organs of Murder and Benevolence. What makes the justness of these observations very remarkable is, that Raps strangled a woman whom he had robbed, and that on going away he untied the cord from compassion, and thus saved the poor woman's life after robbing her of her property. He then examined the young Brunnert, in whom he found the organs of Acquisitiveness, Locality, Constructiveness, and Pride, which were curiously verified in his history; for Brunnert had committed several robberies; had been confined in various prisons, from which he had escaped; fixed himself nowhere; deserted as a soldier; underwent several castigations for insubordination; and, having again rebelled against his superiors, was once more waiting his sentence. He was, besides, skilful in the mechanical arts, and showed some exquisitely finished works in pasteboard, which he had executed in a prison, a place very unfavorable to such talents.

"The organ of Mathematics was largely developed in some; and in each case, the power of calculation was found to correspond.

"Two peasants, father and son, mixed with the thieves, attracted notice from having quite different forms of head. Gall having examined them, found an enormous development of the organ of Pride, and said, '*These two have not wished to be ruled, but to rule themselves, and to withdraw from any thing like subordination.*' It was discovered, that the cause of their confinement was insolence to superiors.

"An old soldier, who was among the prisoners, had a very large organ of Acquisitiveness. It was, however, for insubordination, and not for theft, that he was confined in the fortress; but, on farther research, it appeared, that he had been punished several times in the regiment for having stolen."

These facts will not astonish the reader, who knows the means by which they were obtained.

Permit me to advert to a singular disposition manifested by many, Reil, for example, to attribute our discoveries to others. Spurzheim has, in several places, reclaimed our property, and I have done as much in respect to Sir E. Home, &c. The following passages, also quoted in Demangeon's work, will be serviceable to those, who have been unable to follow the chronological order of the successive discoveries in the structure of the brain.

"The worthy Reil" says Professor Bischoff, "who as a profound anatomist and judicious physiologist, has no need of my praise, rising above all narrow and selfish prejudices, has declared, 'that he has found more in Gall's dissections of the brain, than he could have believed it possible, for any one man to discover in his whole life.' Loder, who indisputably yields to no living anatomist, thus estimates the discoveries of Gall, in a friendly letter to my respectable friend, Professor Hufeland. 'Now that Gall has been at Halle, and I have had an opportunity, not only of

listening to his lectures, but also of dissecting with him, either alone or in the company of Reil and several others of my acquaintance, nine human brains and fourteen of brutes, I think I am both able and entitled to pronounce my opinion of his doctrines.

"'I say then, that I agree with you in a great measure concerning organology, without, however, believing it to be at all contradictory to anatomy, being convinced that, in respect to its grounds and principles, it is true. There are still some particulars to be corrected, and the whole system is too much in its infancy to be explained as many take upon themselves to explain it. It is evident, notwithstanding, that very well marked faculties may be discovered by indications on the skull. The crania of Schinderhannes and six of his comrades, which Ackermann of Heidelburg lent me, presented a striking correspondence with the craniological indications of Gall. In the presence of S., with whom the little H., of Jena lived, who drowned herself in the Saale, after stealing several times, Gall gave such an exact description of the character of this girl, from an inspection of her skull (which I had secretly procured, and which no one knew I had), that S. was really amazed when I revealed the secret. There was no chance about this, and I may say the same of several other cases.

"'The discoveries in the brain, made by Gall, are of the highest importance, and several of them are so obvious, that I cannot conceive, how, with good eyes, it is possible to overlook them. I speak particularly of the great ganglion of the brain (corpora striata), the passage of the pyramidal bodies into the crura of the brain and hemispheres, the bundles of the spinal marrow, the decussation of the fibres in the pyramidal and olivary bodies, the recurrent fibres of the cerebellum, the commissures of the nerves, the origin of the motor nerves of the eye, the trigemini, and the sixth pair. I pass over other things, which, though very reasonable, do not yet appear to be sufficiently proved

these discoveries alone, would be sufficient to render Gall's name immortal; they are the most important that have been made in anatomy, since that of the absorbent system. The unfolding the convolutions is a capital thing. What have we not a right to expect, from farther progress in a route thus opened! I am dissatisfied and ashamed of myself for having, like others, for thirty years, cut up some hundreds of brains, as we slice up cheese, and not perceived the forest by reason of the great number of trees. But what is the use of blushing and fretting? The best thing we can do is, to listen to the truth, and learn what we are ignorant of. I say, with Reil, that I have found more, than I deemed it possible for any one man to do in his whole life.

"'I am unwilling as yet to publish any thing on the subject, because I am anxious to obtain the utmost weight of evidence, to indicate the steps that are proper to pursue, and perhaps even, add plates to illustrate the facts. With this object in view, I have already examined ten human brains, and shall examine as many more as I can get. I am desirous, too of comparing the brains of wild and tame animals, and of birds and fishes; of injecting the minute vessels of the brain, preparing them with alcohol, acids, solution of corrosive sublimate, maceration, &c., and of committing my observations to writing. I hope soon therefore to publish such a work as you might expect of me.' Thus thought and wrote the estimable Loder. Thus judged a man who, for nearly thirty years, had devoted himself to anatomy. His conduct proves, that true greatness consists in recognising the merit of others, and acknowledging one's own errors for the sake of truth."

On page 143 of the same work, Hufeland, before commencing his criticisms, thus expresses himself. "It is with great pleasure, and much interest in the subject, that I have heard this estimable man (Gall) expound his new doctrine. I am fully convinced, that

it ought to be considered as one of the most remarkable phenomena of the eighteenth century, and one of the most important and boldest advances that have been made in the study of nature.

"One must see and hear, in order to learn that the man is entirely exempt from prejudice, charlatanism, deceit, and metaphysical reveries. Endowed with a rare spirit of observation, considerable penetration and powers of acute reasoning, identified, so to speak, with nature, and deriving confidence from his constant intercourse with her, he has collected a multitude of indications and phenomena, in organized beings, never before observed, or observed superficially. He has compared them ingeniously, found the relations that establish an analogy between them, has learned their signification, deduced consequences and established truths, so much the more precious for being invariably founded on experience, and flowing from nature herself. To this labor he is indebted for his views of the nature, relations and functions of the nervous system. He himself attributes his discoveries to the circumstance, that he has ingenuously and unreservedly yielded himself to nature, always following her through all her gradations, from the simplest to the most perfect results of her formative power. It is wrong therefore to give this doctrine, the name of a system, and judge it as such. True naturalists are not addicted to making systems. Their *coup d'œil* would not be so nice, if they started from a theoretical system, and facts would not always quadrate in so narrow a circle. Hence it is that Gall's doctrine neither is, nor can be, from the opinion he has expressed of it himself, any thing more than a collation of instructive natural phenomena, as yet partly consisting of fragments, the direct consequences of which he makes known."

Such is the judgment which some most respectable men have passed on the anatomy and physiology of the brain, as I explained them directly after my depart-

fire from Vienna, in 1805. As they have since been improved and expounded in the six volumes of this work, it will be sufficient to give the reader a summary review of my labors.

SUMMARY REVIEW.

In all my researches, my object has been to find out the laws of organization, and the functions of the nervous system in general, and of the brain in particular. The exposition of the nervous systems of the chest and abdomen, and of the spinal column, or of voluntary motion, has shown us the same laws, both as to their organization and purposes. The nervous fibres invariably originate from the gray substance, as their matrix, and finally expand on the surface. Whenever an essentially different function appears, there is invariably a particular nervous organization, or system, independent of the rest. I have demonstrated the same laws of organization in the brain. The cerebral nervous fibres all originate in the gray substance, and are successively reinforced by new masses of the gray substance. Many bundles of nervous fibres exist independently of one another, and all finally expand in a nervous membrane, either spread out, or rolled up in the form of convolutions. This uniformity of the laws of organization of all the nervous systems, leaves no doubt as to the correctness of the anatomical discoveries of the nervous systems in general, and of the brain in particular.

Having determined the functions of the nervous systems of the chest, abdomen, vertebral column, and the five senses, there still remains the great difficulty of determining the functions of the brain and its different parts. Before entering upon this essential part of my system, it was indisdispensably necessary to correct the common notions respecting the origin of the in-

stincts, industrious habits, propensities, and faculties. Hence, an entire section is devoted to prove, that all our moral and intellectual dispositions are innate, and that every manifestation of a moral quality or intellectual faculty, depends on organization. Now I would ask, what is this organization, this instrument of all the moral and intellectual functions? Is it the entire body? Is it temperament? Is it a single part of the body, and what part is it? I have established the fact by a great many proofs, negative and positive, and by refuting the most important objections, that the brain alone has the great prerogative of being the organ of the mind. From farther researches, on the degree of intelligence possessed by both man and brutes, we draw the conclusion, that the complexity of the brain of brutes is in proportion to that of their propensities and faculties; that the different regions of the brain are devoted to different classes of functions; and that finally, the brain of each species of animals, man included, is formed by the union of as many particular organs, as there are essentially distinct moral qualities and intellectual faculties.

The moral and intellectual dispositions are innate; their manifestation depends on organization; the brain is exclusively the organ of the mind; the brain is composed of as many particular and independent organs, as there are fundamental powers of the mind; these four incontestable principles form the basis of the whole physiology of the brain.

These principles having been thoroughly established, it was necessary to inquire, how far the inspection of the form of the head, or cranium, presents a means of ascertaining the existence or absence, and the degree of development, of certain cerebral parts; and consequently the presence or absence, the weakness or energy of certain functions. It was necessary to indicate the means for ascertaining the functions of particular cerebral parts, or the seat of the organs, and finally, it was indispensable, to distinguish the primi-

tive fundamental qualities and faculties, from their general attributes.

After that I was enabled to introduce my readers into the sanctuary of the soul and the brain, and give the history of the discovery of each primitive moral and intellectual power, its natural history in a state of health and of disease, and numerous observations in support of the seat of its organ.

An examination of the forms of heads of different nations, a demonstration of the futility of physiognomy, a theory of natural language, or pathognomy, added new weight to preceeding truths.

The thorough development of the physiology of the brain, has unveiled the defects of the theories of philosophers, on the moral and intellectual powers of man, and has given rise to a philosophy of man founded on his organization, and consequently, the only one in harmony with nature.

Finally, I have discussed four propositions equally interesting to history and philosophy, concerning the motives of our actions, the origin of the arts and sciences, the perfectibility of the human species, and the capacity of the world of each living being, and I have shown, that the solution of all these questions, hitherto problematical, springs directly from the physiology of the brain.

Many, and even well educated people, but knowing nothing of organology, except from common report, have asked me, with the most astonishing naïveté, if I really believe my own notions. It seems as if they supposed that I would be the first to be convinced of their error, but that I was desirous, either of enjoying the reputation of being the founder of an ingenious system, or of maintaining, from pride, opinions that had been hastily published.

If I were a man to be gratified with a little temporary eclat, I should have yielded, more than twenty years ago, to the desire of publishing the first views of a physiology of the brain, but I am prouder of the

discovery of the slightest truth, than the invention of the most brilliant system.

The physiology of the brain is entirely founded on observations, experiments, and researches for the thousandth time repeated, on man and brute animals. Here, reasoning has had nothing more to do with it, than to seize the results, and deduce the principles that flow from the facts; and therefore it is, that the numerous propositions, though often subversive of commonly received notions, are never opposed to or inconsistent with one another. All is connected and harmonious; every thing is mutually illustrated and confirmed. The explanation of the most abstruse phenomena of the moral and intellectual life of man and brutes, is no longer the sport of baseless theories; the most secret causes of the difference in the character of species, nations, sexes, and ages, from birth to decrepitude, are unfolded; mental derangement is no longer connected with a spiritualism that nothing can reach; man, finally, that inextricable being, is made known; organology composes and decomposes, piece by piece, his propensities and talents; it has fixed our ideas of his destiny, and the sphere of his activity; and it has become a fruitful source of the most important applications to medicine, philosophy, jurisprudence, education, history, &c. Surely, these are so many guarantees of the truth of the physiology of the brain — so many titles of gratitude to HIM, who has made them known to me!

END OF THE SIXTH VOLUME.