ELECTRO-BIOLOGY;

OR THE

DOCTRINE OF IMPRESSIONS,

CONSIDERED

UPON THE TRUE PRINCIPLES

OF -

REASON, NATURE AND PHILOSOPHY,

BY

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AND

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MAN ACTS BY ELECTRICITY .- Smce.

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PREFACE.

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Like all other mighty truths that have from time to time been brought to light, the Science of Electro-Biology has had to battle its way through the prejudices, the illiberality and the combined opposition of the ignorant, the selfish, and all whose interests would be affected by any change, from the "ancient order of things." At this day of its existence, however, it is beginning to engage the serious attention of the literary and scientific, wherever its principles have been properly set forth by its advocates, and we are not now called upon to give new facts to illustrate its important truths. History, both sacred and profane, is replete with them. Every periodical having any pretensions to scientific repute, is filled with them. They crowd around the social circle and the family fireside. They are met with in the every day business of lifein church and in state—in religion and in politics—in law and in physic - everywhere.

But it is a privilege we claim of having examined

PREFACE.

more minutely than heretofore, the mysterious links of the invisible chain, that binds them all together in one harmonious group, and shows the beauty, simplicity and wisdom of its construction. It is a discovery we claim, to have reconciled under the DOC-TRINE OF IMPRESSIONS by *Electrical agency*, as found in animated, spiritualized being, the discordant opinions of those who profess to teach Electro-Biology; some of whom account for its phenomena in one way, and some in another, whilst others, a *numerous* class, entirely ignorant of its principles, go through the routine of the *practice*, merely for pecuniary advantage.

To many valuable authorities, we are much indebted in the preparation of this treatise; but as most, if not all of them, are named in the text, and as their names stand high in the lists of fame, and carry with them conviction wherever they are known, it is not required that further acknowledgements should be made here.

The sole object, by which we are induced to submit our views to the test of public scrutiny, is the advancement of truth; the proper and scientific application of agencies, that have existed from all time, to the relief of human misery; the eradication of error and the exposure of humbuggery in a science so important in its bearings to the welfare of man. Instead, therefore, of clothing it in all the superstition of ancient priests and sorcerers; instead of concealing it under the charms, chants and incantations of magicians, jugglers and mountebanks; instead of associating it with all the mysterious manipulations and the subtle trickery of pawing the air of modern *pretenders*, it has been our constant aim to render the subject as intelligible as the nature of the case would permit, so that "he that runs can read," and the humblest capacity understand.

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LECTURE I.

Introduction. — Ancients knew little of Electricity. — Their mode of healing by charms, &c., all the result of Impression. — Atomic motion produced by the passions. — Sensations communicated by Electrical agency through the nerves. — Cumulation of nervous energy and negative condition of mind. — The system ever producing Electrical currents, &c.

In opening the volume of history, what changes and mighty revolutions do we trace on its ample pages. Here we see the rise and fall of nations, and mark the dread conflict between light and darkness. But this is not the time nor the occasion, for us to turn its mystic leaves and follow man back through a long line of centuries, and point you to the different era that have marked his progress. Age after age has been stamped with the impress of his genius and power, and tells the resistless force of the inquiring mind. But the subjects we are about to present for consideration, are only seen on history's mirrored page, in the dim outlines of twilight and shadow. The science of Electro-Biology is the legitimate offspring of modern discovery, though evidences of its unknown power, have existed in every age and every nation. But mantled in the mists and vapors of superstition, an ignorant people ascribed many phenomena arising from this source to the workings of the dread powers of the invisible world.

Innumerable are the instances recorded by both the sacred and profane historian of its manifestations. The divining cup, spoken of in Genesis, whose manner of use is wholly unknown to us; the powers of the Magi; the ancient mode of healing ; the blessings and cursings of the Fathers, are but so many exhibitions of its powers. But Electricity, apart from its vital connexions, as presented in the motions of life and the phenomena of impressions was even unknown to them. The sages of spiritual Greece looked upon the thunder as the voice of Jupiter and the lightning as his resistless bolt. If perchance, during a thunder storm, Patrician Rome saw the electric spark play upon the soldier's spear, it was at once viewed as a manifestation of divine aid in their behalf. If such were the crude notions entertained by the ancients of the more manifest operations of this subtle fluid, what could have been their knowledge of its silent and mysterious agency in the mutations of nature, as seen in the formation of the primitive rock, or displayed in the structure of man?

So little was known of the laws that govern man in his relations to the earth, and the causes of health and disease, that all things were more or less mingled with superstition and credulity. Hence the wonderful importance, so frequently attached to the most trifling circumstance — the circumstance seeming to be the apparent cause, became the ascendant, and formed the basis of their reasoning, while the real cause was occult. Thus a system of false reasoning was established and has continued even to the present day.

Naaman went to Elisha evidently under the im-

pression that he was to be healed after the manner or mode, as practiced in his own country, for we are told that when his chariot stopped at the door of the prophet, Elisha sent out a messenger to him, saying "Go wash in the river Jordan seven times and thy flesh shall come again to thee, and thou shalt be healed." Mark Naaman's reply - I do not allude to that part of his objection, as to the rivers of Pharpar, Abana, &c., but he was evidently disappointed and looked upon Elisha as a quack for having departed from the established practice-for says he, "I thought surely he would come out to me, and stand and call upon the name of the Lord his God, and strike his hand over the place, and the leper be healed." Bear in mind that Naaman was a distinguished man, a captain of Syria's host, and that practice, which he patronised, was the fashionable, the accredited practice of the day, and that practice was the laying on of hands.

The heathen magi, uniting the offices of priest and physician, and practicing successfully, this mode of healing acquired so great a reputation that they were deified after death, having idol statues, shaped in their likeness, to which divine honors were paid. It may readily be conjectured, under such circumstances, how they managed to maintain their ascendancy, and thus gain unbounded sway over the minds of the multitude.

It is difficult to fix the period when remedies were first applied. The personal feelings of the sufferer must have suggested the different modifications of heat and cold, moisture and dryness in the earliest periods of the human race. Yet these were never applied without the mystery of a charm. Hence with the ancients charms, chants and incantations were always more or less connected with the healing art. The number of known remedies being very few; they were compelled to rely principally on this mode of healing, and it was thus fostered and transmitted from age to age. Its traces are even to this day to be found in our profession, and indeed may be said to be the basis of some systems of modern practice.

Homer tells us that the bleeding of Ulysses was stopped by a charm. Josephus in his Antiquities says that Solomon discovered a plant for the cure of epilepsy, which he concealed in a ring and applied to the nose of the demoniac. This he aided with a song. Josephus says that he himself saw a Jewish priest operate successfully in the presence of Vespasian, his sons and the tribunes of the Roman army. Democritus says many diseases may be cured by the sound of the flute. Marianus Capellus observes that fevers may be cured by appropriate songs, and Asclepiades employed trumpets for the relief of sciatica.

Boerhaave arrested epilepsy in a school which had become epidemic by threatening to run a red hot poker through the leg of the next boy that should be taken with it. Ancient physicians speak very learnedly of live toads suspended round the neck for certain diseases. Again the soup of puppies is highly recommended. The hand of the dead man laid on the scrofulous ulcer or tumor has been known to cure in some cases, so has the king's touch.

Epilepsy has been treated in some parts of Europe

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by causing the patient to drink the hot blood, as it gushes from the neck of the decapitated criminal.

"The physicians of India and Egypt are to this day charmers. The north-men compose Rhunic rhymes to charm away disease; with the Norwegians and Icelanders verse or song was looked upon as all powerful; with the Jews the simple enunciation of their mystic word Abracalan was sufficient to inspire a confidence that baffled disease : the Indian sorcerer by charms and chants effects changes in the bodies of his patients truly wonderful. The physicians in Chili, says Zimmerman, blow around the beds of their patients to drive away disease. The practice of some North American medicine man, who performs certain fantastic tricks and takes the medicine himself, produces changes in the bodies of his patients every way analogous to the most skilful administration of medicine. The Arabs have their talismans, the Indians their amulets and the western nations praise the cures effected by their holy wells and holy relics - a stone or ring, with a history real or supposed, a verse of the Koran or the Bible sewed in silk and worn next to the body, has induced a coporeal steadiness that defied the influence of epidemic and contagion."

The sympathetic powder of Digby, which raged for a time in Florence and England, speedily healed the wounds, when the weapons that had inflicted them, were carefully anointed and dressed; the healing of the wound in this case, being attributed to the dressing of the instrument. Perkins' Metallic Tractors, which at one time were held in such high repute for the cure of a host of diseases, were found by

experiment with pieces of painted wood, to possess no inherent power of their own, but owed their reputation to the credulity of the patients. Upon the same principle does the success of the less reputable finger doctor of Texas depend. And as he possesses no historic fame, permit me to give some idea of his mode of practice. The doctor fixes his eye upon the patient to be operated on, first making him bare the parts affected, then making certain gyrations with his arm, he draws the fore finger rapidly over the parts, and as it passes off, he gives a decided stamp on the floor with his foot. These evolutions he continues for some time, says it is hard work, but it must be done to remove disease. He believes that a sanative power resides in his finger, and his success in some cases, confirms him in the belief, and no doubt brings him new patients. With how much propriety the infinitesimal dose, as prescribed by the homepathic physician, may be classed with some of the before mentioned modes of healing is left to the unprejudiced reader to judge.

It does not require any extraordinary acumen to discover a type that pervades and a bond that associates these multifarious results of experience. Certainly there can be no legitimate connexion between the effect and the apparent cause. We then must look for some other than that of the apparent. When we look a little deeper than the surface of things we find an unity of action resulting from the electric state of the individual brain. Whatever can powerfully excite the mental condition, produces a physical impression through an electrical agency. Hence our impressibility varies with our electric susceptibility, and frequently has no relation to the virtue or potency of the ascribed agent.

It is upon this principle that faith, fear, joy, rage, terror, disgust act with so much power, when, in reality, the subjects that gave rise to these several emotions possessed intrinsically no power whatever.

"The simple act of inspiring confidence may be seen in the siege of Breda, in 1625. That city for a long siege suffered all the miseries that fatigue, bad provisions and distress of mind could bring upon its inhabitants. Among other misfortunes, the scurvy made its appearance and carried off great numbers. This added to other calamities induced the garrison to incline towards a surrender of the place, when the Prince of Orange anxious to prevent its loss, and unable to relieve the garrison, continued, however, to introduce letters to the men, promising them the most speedy assistance. These were accompanied with medicines against the scurvy, said to be of great price, but of still greater effacacy. The effect was wonderful, two or three vials were given to each physician, and a few drops imparted a healing virtue to a gallon of water: many were quickly restored, and many who had not moved their limbs for months before, were seen walking the streets with their limbs sound and whole ; and behold this potent medicine was simply colored water."

'From this you may learn the importance of strengthening man in his own mind.'

'Faith, fear, joy, rage, are never exercised without corporeal changes.' Any mental impression, as faith, acts on the principle of awakening motion. "Disease has been termed an error of action, a greater or less movement of the identical forces that continue life in health." And "There has been no disease," says the same eminent author, "that has not been caused or cured by the different passions."

Now, therefore, if a mental impression has the power to awaken motion in matter, that motion may be of such a character as to reverse the existing motion upon which the disease depends.

Witness the wounds of the conquered and those of the victors. Those of the victors, quickly get well; while in the conquered, they are lingering and often prove fatal.

At sea a beat to arms often empties an hospital, and the doctor not unfrequently silently contemplates and contrasts the drugging system with the booming cannon.

The hand of the dead man laid on the scrofulous ulcer or tumor, as we have said, has been known to cure that disease in some females. The cure following the application. The dead man's hand was looked upon as possessing some inherent virtue when it was wholly the result of the impression or mental emotion produced by the circumstances. There could have been no virtue resident in the dead man's hand apart from the impression Only think of a timid lady approaching the bier, there lays the ghastly corpse, the very touch sends a shudder through her frame. She approaches with feelings not easily to be described. She takes hold of the icy hand of death and places it on her neck. Her mind being thus wrought upon, must of necessity produce motion in the physical system, and that motion of so intense a character as to awaken and reverse the existing state of things. The second

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Baron Alibert mentions a severe case of goitre in a lady that had resisted all the prescriptions of the most celebrated French physicians, that was effectually cured during the reign of terror.

An old gentleman suffering from a paroxysm of gout and his attending physician failing to relieve him, he was effectually restored by fright. His wife, at the suggestion of a friend, dressed a lamb in slips and cap, and taking it in her arms, dreadfully lamenting, went into the chamber of her husband, communicating the sad intelligence of the awful change that had come over their youngest child. It produced so violent a mental agitation as completely to reverse the atomic motions of that portion of the body upon which his disease depended.

An impression may be of such a character as even to produce death, and the individual may be said to die of an electro-nervous stroke. He dies from a disturbance of the inherent electric action of his own system, as effectually as if the lightning had leaped from the clouds and destroyed him. How many have died of sudden joy. The aged door-keeper of Congress, upon hearing the news of the surrender of Yorktown, is an illustrious and familiar example. Of sudden fright many have been the victims; especially those of nervous and delicate habits. How was it with the malefactor condemned to the guillotine. His neck was placed on the block, his eyes bandaged, he was pardoned, yet the fact was kept secret from him, the ceremony of execution was to be gone through and then he was to be released. The executioner was told to let the knife drop. The prisoner heard the

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rattling wheel, at the instant he received a stroke upon the neck with a wet towel. He was raised from the block a corpse, his spirit had fled. The wet towel, here, could not have killed him. Where then are we to look for the force that destroyed him but that resident in his own body.

How are sensations communicated but through the medium of nervous perception. In other words, through the medium of the nerves, for a destruction of the nerve at once cuts off all communication with the external world. Then it is the medium through which the mind acts. Now if we ascertain the character of that system we have the connecting link between mind and matter. Its character appears evidently electric, and from the known properties of electricity, it seems alone worthy to subserve the mandates of the will. Its transit knows no time, and with it distance is a blank. Now, then, if physical impressions are communicated only through and by the nervous system, and that too by its electric action, every other agent emanating from without -- come in what shape it may - a look, a sigh, a word must travel the same highways to the dome of thought --- the palace of the soul, and be conducted thither by the same winged messengers of nature.

The words of Byron are as true in philosophy as they are chaste in poetry — " It may be a sound, a tone of music, summer's eve or spring, the wind, the ocean, which may wound, striking the electric chain, with which we are darkly bound."

So indissolubly bound is both mind and matter, that physical action of external objects is conveyed inward to the internal mind, and produces moral action, and moral action proceeds from the internal mind through the nervous and muscular medium to the external world, by which we perceive that mind and matter act and re-act upon each other. From this organization man becomes the recipient of impressions and impressions are the result of action or motion, and motion belongs to both physical and moral action.

Motion can be communicated through the medium of one sense as well as another and one sense, according to its intensity of action, may influence the whole corporeal motion, for with the senses are linked memory, imagination, &c. A sight may bring a blush or pallor to the cheek — may press like an incubus or give lightness to the palpitating heart — may chill the blood, or send it like liquid fire through the veins — may be animation and vigor to the frame, or produce the swoon of death. Tasting, feeling, hearing, have produced alike results.

So long as the passions or mental emotions act in concert with of the atomic motion of the system, harmony may be said to exist. But a passion by some exciting cause may become of so intense a character as to produce a derangement of the atomic motion of the body and even death in the same manner as a tuned violin or piano may have its strings snapped by intense vibration.

If death has been produced by impressions, an impression has also the power to raise the sick from impending dissolution. The extremes being admitted, every phenomena that can be presented in the human system between the harmony of forces constituting life and those of death, when the passions are involved, may be explained on the principles of electrical impressions. Hence, when an agent possessing intrinsically no virtue in itself is applied, and indeed with songs, chants, manipulations or appeals to faith, hope, &c., if success attends, we may strongly suspect the w orking of impressions.

That impressions act electrically, and on the common principle of attraction and repulsion we shall show in our subsequent lectures. If electrically, then subject to some principle of action. If connected with the mind, then measurably controlled by it. And if, as will hereafter be demonstrated, it is generated in the system and controlled by the immortal mind in its distribution and use, we may safely come to the conclusion that it is also cumulative. That is, that it is gathered up like wheat into the garner, from the silent and vital changes that are going on in the physical system, and stored away for future use in the recesses of the brain and nervous system. If, therefore, it is cumulative, it is subject to surrounding circumstances, and can re-act with greater energy upon atomic motion under mental excitement. This cumulation is also, sometimes, called the negative condition of mind, which is but the result of a passiveness of the brain or submission to external forces. Man thus becomes easily impressed. But the mechanical doctor or charlatan, with his manipulations never dreams that an impression, dependent on a cerebral atomic condition, is electrically influencing for good or evil, a particular organ or structure. This condition is also a fruitful source of the fanatic and deluded zealot's success

And all false religions owe their influence over the minds of the multitudes to it, and numerous have been the sects, born of this parent of mystery. But we shall only mention that of the Mormon faith. They seem to attach wonderful importance to the laying on of hands in healing the sick, and even take this as an evidence on their part of Apostolic power, when in reality it can be done by any one assuming an air of mystery, first gaining the confidence of the subject; any other agent would act in the same manner under similar circumstances.

We have said that an impression acts electrically, and in accordance with the common principle of attraction and repulsion. But the causes that give rise to impressions are frequently only of a mechanical character and sustain about the same relation to the complicated and wonderful machinery of the human system as the mechanical mover of the valves in the steam engine.

That the human system is the most perfect isolated self-acting electro-magnetic machine of the most delicate workmanship will be seen in a subsequent lecture, and not only as Dr. Dodd observes, does it derive its electric action from the atmospheric electricity in the lungs, thus rendering the iron in the blood magnetic, but its sources are as abundant as that of the globe itself; of which man is but an epitome. In the earth philosophy has proved that the mysterious process of crystalization — the formation of metallic ores — the numberless and inscrutable changes from the solid to the gaseous state — the respiration of plants and the germination of seeds, evolve powerful electric currents;

so also, in the several changes of the body, the motion of its particles, whether undergoing the process of organization in the living tissues or passing out in the form of excretion evolve electrical currents. That the chemical and other changes constantly going on in the human system contribute powerfully to this result we must naturally infer from the very elements which are found in the animal economy -- such as carbon, hydrogen, potassium and sodium - which exhibit a strong affinity for those of the negative - as oxygen, sulphur, nitrogen and chlorine, and other affinities of necessity evolve electrical currents. Acids and alkalies are found separated by a membrane, constituting myriads of little galvanic circles, which as such, must produce electrical effects. But more clearly will this subject be illustrated in our subsequent lectures, after we have somewhat briefly examined the subjects of Galvanism, Magnetism and the Electro-Magnetic forces of the human body.

LECTURE II.

Electricity and Galvanism. — Electricity known to the ancients. — Thales, the discoverer. — Its modifications. — Galvanism discovered by Galvani. — The Voltaic theory and pile. — Simple Galvanic circuit. — Compound circuit. — The poles. — Galvanic trough and battery. — Nature of the fluid little known. — Resemblance and difference between Electricity and Galvanism. — Decomposing power of Sir H. Davy's battery. — Various experiments.

The eye of philosophy fails to discover among the legends and uncertain traditions of the ancients any distinct traces of a knowledge of the first principles by which the life of man is governed; and electricity, now recognized as the ruling power of the universe, was totally unknown, till about six hundred years before the christian era. Electricity was discovered, about this period, in a substance called in our language. amber, but in Greek it was called electron, from which electricity derives its name. Thales, a celebrated philosopher of Greece, is said to be the discoverer. He found that by rubbing a piece of amber, it had the power of attracting to its surface certain light bodies, and then repelling them, or letting them fall off. And if he, when he had made the discovery, stood aback in wonder and amazement, believing that it was endowed with a living soul, what would be his feelings now, could he arise from the silent slumbers of the

tomb, and behold the Iron horse speeding away on the wings of steam, and intelligence communicated from post to post, a thousand miles distant, on the electric or lightning telegraph in advance of old time himself, swift and certain as he is in his flight. We see by this, that the subject of electricity claimed the attention of the ancients at an early period of authentic history, and certain other substances were soon discovered to possess the same electric power as amber, of attracting light bodies when rubbed, and then repelling them. For want of amber, this interesting experiment may be tried with a piece of glass or a stick of sealing wax. Thus, though the sages of antiquity advanced from step to step, yet so slow was the progress made in the investigation of this, nature's all pervading and most powerful agent, that it was left to the discoveries of the present century to dignify it with the title, and rank it first among the sciences. The deeper the researches into the arcana of nature have been, the greater importance has this science assumed in the eyes of modern philosophers, and the greater its utility in the economy of creation, is it now known to be. So important, indeed, is electricity in the operations of nature, that in all the motions of matter, and in every chemical process, there are manifestations of its development in a greater or less degree ; and there are many of the present day, eminent in natural science, who believe, and not without reason, that all change is the result and not the cause of electrical action. They believe, that composition and decomposition, the growth and decay of all vegetation, which is nothing more than the alternate attraction and repulsion of the particles of matter, are effected by its means. The invisible agency, which causes a stone, when cast into the air, to descend again to the earth ; described and called by the great Sir Isaac Newton, the attraction of gravitation ; and the unerring certainty with which the magnetic needle points to the north, and guides the mariner across the pathless ocean, in the darkness of the night, amid the thunder and the storm to the destined port, are but manifestations of the same power, differently modified. There is now but little doubt that the daily motion of our earth upon its axis, and its yearly revolutions round the sun, together with the motions of all that host of suns, moons and stars that spangle the heavens, and there for ever shine, attesting the greatness, glory and wisdom of God owe the regularity and precision of their movements to the self-same cause. 'The life of man himself, the result of the most perfect organization of matter, is but a higher link in the electrical chain that binds material to immateriality, and connects time with eternity. Indeed an eminent English author has already classified these various modifications, when he observes that "The attraction of the magnet is an electrical step in advance of gravitation, chemical change one step more, the alternate attraction and repulsion of amber is a still higher link in the electrical chain. Galvanism and electricity strictly so called, embrace all the subordinate links, while life or vital electricity comprehends the whole."

We cannot, in the design of the present work, give more than these general remarks, on what is called common electricity; for the minutize of this wonder

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working agent, we would refer the reader to the numerous elaborate works now extant. We shall now proceed to the examination of one of its modifications, as coming within our province, and in this, we propose to particularize.

Galvanism was discovered about the year 1790, and takes its name from Dr. Galvani, a Professor of Anatomy at Bologna in Italy, its reputed discoverer. One day in the above mentioned year, some skinned frogs, prepared for soup, were lying on a table, in the professor's laboratory, near an electric machine.

During his absence, one of his students, more for mischief perhaps than anything else, touched with his scalpel the crural nerves of one of the frogs, and the muscles were immediately set in violent convulsive motion. Galvani being informed of this, attributed it to the electrical machine, and commenced a series of experiments to test the truth of his theory. He soon however, had occasion to relinquish it and adopt a new one, when he found he could produce these contractions of the muscles at pleasure, without the aid of . electricity, by using two wires of different metals. This new theory was, that there existed in the animal two kinds of electricity, one in the muscles, the other in the nerves, and that it only wanted a metalic communication to set them in motion. He published a work on animal electricity about fifty years ago, containing his theories and the result of his experiments. The discovery is generally called accidental, but we ought to give credit, where credit is due, for the same trifling circumstance, that led Galvani on to reason, reflect and experiment, would have been observed by thousands

of others, with only a passing notice. And although his opinions were erroneous and his experiments failed to reveal to him the true source of the subtle agent he was trying to explore, yet they laid the foundation of a science, that has already benefited millions, and in connection with magnetism, is probably destined to supersede the use of steam and become the great motive power of machinery.

It was left to Volta, of Padua, to ascertain the true source of this wonderful agent. He found that the electricity or galvanism, as it should now be called, did not exist in the muscles and nerves of the animal, but that it was the effect of two metals on each other. And the most simple experiment I can give you to illustrate this principle in galvanism, is by placing a piece of copper under the tongue, and a piece of silver above it, then let their edges come in contact, a a peculiar not unpleasant sensation is produced, totally different from that of either metal, or both of them when not touching each other. Some persons are even enabled, by closing the eyes, to perceive a flash of light, at the moment of contact of the two metals; I, however, have never been so fortunate myself. 'This peculiar sensation we have spoken of, is caused by the latent electricity in the metals, being set free and put in motion by the action of the saliva on them. The tongue serves as a conductor, the Galvanism passes from the copper through the tongue to the silver, thence along the silver to the point of contact, and so on in a continued circuit, as long as the metals touch each other. This fact was known long before Galvani's time, but could not then be explained or accounted for, on anything like rational grounds. It is owing to this Galvanic action, that water has a different taste when drank from a tin cup and a glass or any other non-metalic vessel; and also shows the predilection of the English for tankards in drinking their ale instead of glasses.

Take a slip of copper and a slip of zinc, place them in a tumbler of water so that their upper ends shall project and be in contact, a very slight galvanic action is developed. Put in some salt and the action will be increased a little, a little sulphuric or nitric acid, and it becomes still more intense. The zinc being most easily acted on by the acid evolves the greatest amount of Galvanism, and is therefore called *positive*. This passes through the water or acid to the copper, from the copper to the zinc at the point of junction, and so on, will the current continue to flow as long as they remain in situ.

This constitutes a simple Galvanic circuit. Now separate the two upper ends of the metals, and put a finger of one hand on one, and a finger of the other hand on the other; the Galvanism will now pass from the copper through the arms and body as a conductor to the zinc, and so on in a continued circuit as before. Take a finger off one of the metals, the Galvanism instantly ceases to flow and the circuit is said to be broken; put the finger on again, and the circuit is again closed. A wire may be substituted for the arms, and the current passes with equal facility, whether it be only a few feet, or many miles in length, as in the telegraph. This simple circuit is capable of developing this mysterious and powerful agent only in a limited degree.

Volta, reasoning a priori, that if one set of plates would develope a small quantity; two sets would develope more, and so on, in proportion to the number used. This he found upon experiment to be the fact, until carried to a certain extent, beyond which no additional intensity could be gained. His method of combination received from him the name of the voltaic pile, and was constructed as follows: upon some substance that was a non-conductor, such as dry wood, glass, rosin, &c., he first placed a copper coin, then a silver one, then a piece of cloth moistened with acidulated, or salt water, then another copper and silver coin, moist cloth as before, and this he carried to any desirable extent, and was enabled to produce considerable galvanic effects. This is called a compound circuit, since it is composed of several simple ones. The Galvanic influence will be most sensibly perceived at the top and bottom of the pile, and therefore called the poles. One is styled the positive, the other the negative pole. It is requisite for the success of the experiment, that the two metals used, should be unequally acted on by the acid ; that is, that one should be more easily corroded, or rusted as it is commonly called, than the other, otherwise no effect will be produced. Any other metals will do as well as copper and silver, or zinc and copper, but the two latter are most commonly used, both on account of their cheapness and the easy corrosion of the zinc. The pole having the metal most easily acted on by the acid will be positive and that least so negative. It is necessary, therefore,

that the pile should begin with one metal and end with the other. The poles must have a connexion by means of a wire or some conducting substance, in order to make the battery complete. All the phenomena of the compound circuit or battery are the same as observed in the simple one, only in a much higher degree.

The voltaic pile was found to be too inconvenient in practice, and this led to the invention of the Galvanic trough by Cruikshank, a means of producing more powerful effects and much more easily managed. It may be made of any size, but for most purposes, in which it is used, it is made three or four feet long by six or eight inches in depth and breadth. The inner sides and bottom are cut in grooves, an inch or two apart. A plate of zinc and a plate of copper are then taken, of sufficient thickness when soldered together to exactly fill the grooves. They are then fitted in water tight. These plates divide the trough into numerous cells, the copper side of the plates must all face one way, and the zinc the other, so that there will be a copper plate at one end of the trough, and a zinc plate at the other, to which the wires are to be atattached as in the voltaic pile. In order to put this battery in operation, these cells must be filled with acidulated water and you will at once perceive the resemblance between the pile and the trough. The acid answers the purpose of the moistened cloth, as a corroder of the metals, and a conveyer or conductor of the galvanic fluid from one set of plates to the other. These are by no means the only forms of a Galvanic Battery. They are as various as the purposes to which

they are applied or as the fancy of the operator chooses to have them constructed. They are, however all made upon the same principle, there must be two metals of unequal corrodibility, an acid and a conductor.

This, then is a brief description of the galvanic battery, the generator of that subtle fluid called galvan-ism; and by its means we are enabled to excite that powerful agent in any determinate quantity we wish, and apply it to various purposes at pleasure. But of the nature of the fluid itself, its own essence or substance we know nothing. Yet we do know that it differs according to the means used for its development. We know that a trough or battery, having but few plates, but very large, produces galvanism of great heating power, whereas if the surface of the plates is small and they are many in number, the electrical character of the fluid will be more intense and the heat less. These phenomena are always in proportion to the size and number of the plates used, so that we derive the following general rule. "If we wish to produce great heat only, the plates must be large but few in number. If great intensity is desired, the plates must be small but their number great. If both heat and intensity are wanted, then the plates must be large and many in number."

In many respects the electricity of the heavens, or that excited by the electric machine, and galvanism resemble each other. The metals and such substances as conduct the one, are common conductors of both. They both exhibit a spark, are both capable of producing a shock upon the animal system when applied to it. They both are *positive* and *negative*; that is according to Dr. Franklin's theory, any body may have more or less than its natural quantity; or according to older theories, they consist of two different kinds, termed *vitreous* and *resinous*, either separate or in combination. The vitreous corresponds to the positive and the resinous to the negative. They both effect the decomposition of water and other substances. These with other similarities have induced many eminent philosophers to consider them identical, differing only in this, that the one is excited by friction as in the electrical machine; the other by the action of acids on the metals, as in the galvanic battery.

In many respects, however, they are widely and totally different. The galvanic fluid easily renders iron temporarily and steel permanently magnetic, as will hereafter be shown, while common electricity can be made to subserve no such purposes practically. Galvanism is more dense so to speak, and can be conveyed to any distance by means of conductors, as in the telegraph ; while electricity is soon lost or dissipated in the atmosphere. This would lead us to the conclusion, though it is not mentioned by authors, that the former holds its natural abode in the denser particles of matter, or the recesses of the earth; while the latter, more etherial in its nature is a tenant of the thinner regions of uninhabited space. Galvanism can be produced in a continued supply and must have a continuous conductor, while electricity can only be had at irregular intervals, and is transmitted by sparks from one substance to another, as in the lightning during a storm. In all respects galvanism can be made an obedient and useful agent, subservient to the

will and pleasure of the philosopher, while electricity is at all times a refractory subject, and often escapes with a crack and a spark to its native atmosphere, when the operator least expects or desires it.

Sir Humphery Davy had a battery of two thousand plates and of twenty-two inch surface, by which he could kindle a fire seven times hotter than the fiery furnace in which the three young Israelites were cast, which we are told was seven times heated. And by having wires pointed with charcoal, one of the most infusible of substances, he was able to burn up instantaneously small pieces of gold, silver, iron and most of the metals that were submitted to its action; and substances that had resisted, for centuries, all the efforts of the chemists at decomposition, and pronounced by them simple substances readily yielded their elements to this powerful decomposer and demonstrated their compound nature. Thus lime, potassa and soda were found to be the metals calcium, potassium and sodium in combination with oxygen, or oxides of those metals. The same may also be said of thousands of other bodies.

Water is a compound and consists of oxygen and hydrogen gasses in the proportion of one volume of oxygen to two of hydrogen. By passing the galvanic current through the water, it is decomposed; the oxygen, being *negative*, is carried to the *positive* pole, and may there be collected in its purity by a suitable apparatus; the hydrogen being *positive* is carried to the negative pole, and may also be there collected. If a wire be heated to redness and dipped in some of the oxygen, it will burn with beautiful scintillations. The oxygen unites with the iron and forms an oxide. But if the heated wire be put into the hydrogen, that gas will be set on fire, and will burn with a beautiful blue flame. If the two gasses are mixed together in proper proportion, in a suitable vessel, and a current of the galvanic fluid passed through the mixture, they will instantly explode with a loud report, and form precisely the same quantity of water as before it was decomposed. By this beautiful and truly astonishing experiment, water can be decomposed, its constituents made to burn, and converted into water again.

Gilding and silver plating may be performed by means of the galvanic battery. Copper plates and other engravings are accurately copied, and if a man were put into a vessel holding copper in solution, he might be encased in a solid covering of copper. Dissolve some soda in a glass of water, and put some dilute sulphuric acid in another, then connect the two by a piece of moistened cotton, and put the wire proceeding from the positive pole of the battery in the soda and that from the negative in the acid; the acid will then pass over to the cup that held the soda, and the soda to the cup that held the acid. Again disolve some sulphate of soda or other salt, in a vessel of water, put some pure water in another, connect as before, and apply the battery; the acid may be made to leave the soda, or the soda the acid, and pass over to the vessel of water, according as the positive or negative pole is put in the solution. A still more interesting experiment may be made by dissolving some of the same salt in a glass vessel, connect this with another vessel on either side containing water, then by applying the wires to the

outside vessels, the salt in the middle one will be decomposed; the acid passing over to the positive pole, and the soda to the negative pole, leaving pure water in the vessel they have left. Upon the same principle a person might take a dose of salts, and by applying the battery to his sides, the soda or magnesia might be collected on one side and the acid on the other ; they then might be mixed and form salts again. Millions of little insects have been created by means of the galvanic shock, out of powdered silex, or our common flint stone. We might here enumerate many more of its wonders, but for the present forbear, as we design to take the subject up again in a subsequent lecture so far as it affects the vital organization. In conclusion let us remark, that these things may appear stranger than fiction, but they are stamped as truths by an Almighty hand, and man has but to take them as he finds them.

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LECTURE III.

MAGNETISM.

Anecdote. — Natural Magnets. — Artificial Magnets. — Poles. — Magnetic and Geographic Poles of the Earth. — Compound Magnets. — Magnetism a Fluid. — Theory of Atomic Magnetism. — Electro-Magnetism. — New Theory of Gravitation. — Orders of Electricity. — Their influence in producing the motions of the Earth, Planets, &c.

There is an anecdote related of a shepherd, who, as he was walking along one day, over some rocks, found it almost impossible to raise his feet from the ground. After several ineffectual efforts, on his part, to proceed, he at length became terrified; and untying his shoes, left them in possession of the rocks, while he took to his heels, at the top of his speed; under the impression, no doubt, that he had fallen upon a den of witches. How different the ideas of a philosopher the rocks were Magnetic — the shoes had iron nails in them.

The Magnet is an ore of iron, and is found in a state of *nature*, in various parts of the earth from this circumstance it is called the *natural* magnet. It is generally of a dark, or black color; but is sometimes found, though rarely, in a crystaline state. The
most remarkable peculiarity of the natural Magnet, is, that it has, without any previous preparation, the power of attracting iron and steel. This peculiar property has been ascertained by careful and very accurate experiments, always to be in proportion to the distance, and not to the size of the Magnet. Some very small specimens, are capable of attracting and sustaining much heavier weights, than others, in proportion to their size. Sir Isaac Newton had one, which he wore as a set in a ring, and weighing only three grains, which would sustain 748 grains or nearly 250 times its own weight ; while others, of a like magnitude, would not support a twentieth part of it. The power of Magnets, therefore, is estimated, by the weight they are capable of sustaining.

The properties of the natural Magnet may be communicated to iron and steel; and these after having acquired such properties are called *artificial* magnets. The powers of artificial Magnets may also be transmitted, ad libitum, and they are most commonly used in experiments, for the simple reason, that they can be made of any form and power, desirable.

Two Magnets mutually attract each other, at determinate distances, and the attraction between two Magnets is greater than the attraction between iron or steel and a Magnet. This mutual attraction may be illustrated by a very simple, yet interesting experiment — place a small Magnet on a light substance, as dry wood or the figure of a duck, goose or boat, and a piece of iron or steel, or another Magnet on another piece — let them be put in a vessel of water, so as to swim them, at some distance from each other — they will then

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be found to approach each other at the same rate. The interposition of any substance that does not contain iron, in nowise, interferes with this attractive quality; for when placed under water, or in a vessel, from which the air has been exhausted, or into which it has been condensed, the same properties are still exhibited in the same degree, as when in the open air. This proves that the Magnetic influence passes with equal facility through water, glass, wood and all other substances containing no iron or steel. The knowledge of these facts, has been taken advantage of in jugglery and slight of hand ; and by means of concealed Magnets, the expert operator can perform wonderful and astonishing feats, that would appear impossible without the aid of a supernatural power, and which are totally incomprehensible to the uninitiated.

A Magnet, either natural or artificial, when suspended by a fine thread, or balanced on a pivot, so as to move freely in any direction, invariably points one end towards the North and the other to the South. This is doubtless, its most useful property, since it gave rise to the invention of the Mariner's Compass — the Seamen's guiding star, when far away, upon the boundless ocean, his beacon of hope, when the storm-king rages fiercest — the discoverer of America and the ant-artic continent — the indisputable lever, that controls the commerce of the world.

There are always two points in every Magnet, where the attractive force is greatest. They are at or near the ends of the Magnet, and are called the poles — one, the North pole — the other, the South pole. Though it has heretofore been stated, that two Magnets mutual-

ly attract each other; yet it only holds good, when the North pole of one, is presented to the South pole of another : for if two North poles or two South poles be presented to each other, instead of mutually attracting, they mutually repel: poles, therefore, of opposite names attract; while those of the same, repel each other. Rust weakens the power of a Magnet, and a white heat entirely destroys it. The poles may be reversed, or destroyed by an electric shock, and the explosion of a small quantity of gun-powder upon one of them will sometimes have the same effect. When both poles of a Magnet can be brought to bear upon the same piece of iron or steel, at the same time, the power is proportionately increased. It is on this principle that the horse-shoe Magnet is made. Though we have said that the magnet when suspended by a thread, or the Magnetic needle when fixed upon a pivot, points to the North, yet this is not always the case. There are two Magnetic as well as two geographical poles to the earth, and they do not always correspond. The North Magnetic Pole is in North America - the South Magnetic Pole is in Australia. A line passing round the earth through these two poles is the Magnetic Meridian. The situation of the Magnetic poles is by no means constant, they are ever varying towards the East or West of the geographic poles, and as the Magnetic needle always points to the Magnetic poles, its variation from due North and South is sometimes as high as twenty or thirty degrees. The fallacy of surveying by old courses and distances is thus clearly demonstrated; for a line that was run twenty years ago, North 10° East, might now be as many degrees West, thus throwing a line twenty degrees, or one-eighteenth part of a circle out of its true course. Ignorance of these facts, no doubt, often gives rise to tedious and expensive law suits, and makes enemies of those who were once the best of friends.

Several Magnets may be joined together, with all their North poles one way, and all their South poles the other, and form a compound Magnet of increased power and efficacy, according to the number, size and power of them so arranged. Thus placed, the fluids all coalesce and act as one Magnet, whereas, if they were reversed there would be a confusion among the currents - the one counterbalancing the other. Magnets become of greater power by being placed in the Magnetic Meridian, and they lose a portion of their power when not so placed, and if the North pole of a Magnet, be constantly held towards the North Magnetic pole, it will in time entirely lose its virtue. Magnetic needles sometimes lose their power, but may be remagnetized by holding a powerful Magnet to it --the needle, whilst receiving the Magnetism will be violently agitated, but when it becomes thoroughly charged, it remains perfectly at rest.

It is generally considered by the best philosophers, that Electricity and Galvanism are subtle fluids, uni versally diffused throughout the material world, and we can see no good reason, why Magnetism may not with equal propriety, be deemed a fluid also, passing round and round the Magnet, from pole to pole. Here, therefore, very naturally arises the important and interesting inquiry, why is a Magnet, Magnetic? This we can only answer from the present state of our

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knowledge, that they have the particles of matter of which they are composed, so arranged as to become good conductors - on the theory we shall here advance, that the ultimate particles of matter are little globules - are original Magnets, and have each their own circles of Magnetism, revolving or rather passing round and round them. Now, we have already shown the properties of the compound Magnet, in which all the poles of single Magnets of the same name, are brought to act as one, increasing the power in proportion to the number. Furthermore, we know that a single Magnet with two poles, may be divided and sub-divided and each portion will have new poles established in them and become so many separate and independent Magnets. Carry this division as far as you please and the principle still holds good. Reduce it to the finest powder and each ultimate particle, will still be a minute Magnet, as perfect in itself yet of such feeble power as to be quite imperceptible to our senses. It may be said that this is mere hypothesis - not so, it is only carrying out a plain and acknowledged analogy, for each division of the original Magnet decreases its power in proportion to its size, and it is perfectly fair to conclude that the same rule holds good, even to the ultimatum

Now let all these minute particles be brought to gether so as to form one mass, they will not act as the one Magnet of which they were made, for the reason that their poles being some one way and some another, there is a confusion among the currents, one counterbalancing the effects of the other as would be the case in a compound Magnet, were half the North poles of

the single Magnets, placed to the South poles of the other half, under such circumstances, there would be no power at all manifested, yet should we come to the sage conclusion, that they were no longer Magnets-not by any means; separate the compound and each piece will be a Magnet still, perfect in itself-so arrange them, that the like poles may correspond, and they all act as one. So with the minute particles of the pulverized Magnet we have supposed, arrange them in such order that their poles shall correspond, and you restore at once the power of the former Magnet. We therefore hold, that every piece of iron or steel is composed of innumerable little Magnets, without any regularity in the distribution of their poles,-and when it becomes magnetized, there is motion communicated to the ultimate particles, and according to the universal law of their nature, they so arrange themselves, that all their north poles and all their south poles, correspond with each other. We consider as proofs of this theory, first, that bars of iron, old shovels and tongs, &c., when left for a length of time in the magnetic meridian, exhibit Magnetic phenomena-the terrestrial magnetism, constantly passing round and round the earth from pole to pole, changes the relation of their particles, and dispose the little Magnets to harmonize. The second proof, we offer, is the fact we have mentioned, that when a Magnet has its poles placed the reverse of the poles of the earth, it soon looses its virtue, because the currents of the one interfere with the currents of the other-as when two streams of water, flowing in opposite directions meet and produce a confused eddy. It is also a well known fact, that steel can be permanently magnetized and soft iron cannot; the steel being hard, does not permit its particles to return to their original situation, when the due motion has been communicated to them by the magnetizing power, and the force that bent them in their new relation has been removed. We know too, that when the attractive power is communicated from a magnetized bar of steel to an unmagnetized one, the former loses none of its power, which it certainly would do, were it on the same principle of positive and negative, as in common electricity. Artificial motion, also, produced in the receiving body by striking it with a hammer, aids very much in the induction of the magnetic phenomena. The compass needle, we have also said, (and it may as easily be proved by experiment as to say it,) is strongly agitated, while receiving its magnetism, clearly establishing the fact that there is a change in the relation, that is motion, of the particles or ultimate and original Magnets of which it is composed. Lastly, we will state, that all the researches of philosophy have as yet discovered nothing contradictory to these views,-and we shall take the ground, that Magnets, either natural or artificial, are only so, because the particles of matter which compose them, are so arranged as to develop their otherwise latent power. That other metals and other substances are not magnetic,-that is, visibly magnetic, is because the magnetism of their ultimate particles is so feeble that visible attraction cannot be induced in them as in iron and steel, by any artificial or natural means.

We might here very appropriately extend our remarks to the attraction of cohesion, chemical affinity, &c., as dependent on the same principle; but the de-

sign of the present work precludes more than a glance at the wonderful operations of this truly mystic power of nature. Yet, we cannot pass them by, without the expression of the conviction, that cohesion is nothing more nor less than miniature Magnetism. Thus, if you take two Magnets and present their opposite poles, they adhere strongly together-this is Magnetic attraction. Again, take two minute or ultimate particles, having no visible Magnetic properties; put them together so that they adhere -this is cohesive attraction. Are they not identical? Now, by any means in your power, change the position of the Magnets so that poles of the same name may come together, and they repel-this is Magnetic repulsion. Next, take any substance and produce motion among its particles so that they repel each other-this is decomposition, so called; but what is the difference between it and Magnetic repulsion? Chemical affinity may as easily be illustrated by two Magnets and a piece of iron. Take some oil and soda-they unite and form a substance entirely different from either, called soap. In a solution of soap, pour some sulphuric acid, and the soda will instantly leave the oil, and seek companionship, and form a union with a more congenial pattner; and all this is effected by what is termed chemical and elective affinity. But, is it essentially different from magnetism? For if you take a horse shoe Magnet and put an armature of soft iron on or near the poles-there is a strong adhesion,-but apply to the poles another Magnet of equal or superior power, and the armature will either drop off, like the oil from the soda, or pass over to its more powerful neighbor, like the soda; what

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more, therefore, is chemical affinity than the attraction between a Magnet and soft iron? What more is elective affinity, than the stronger attraction, heretofore noticed, between two Magnets, than between a Magnet and a piece of iron.

We come now to treat of the connexion between Galvanism and Magnetism, and to examine the relation they sustain towards, and their effects on each other. This is called Electro-Magnetism.

The first effect we observe in passing the Galvanic current along a metallic conductor, such as a copper or iron wire, is, that there is a secondary current induced, which revolves around the primary one in the wire. This secondary current passes round and round through the air in a plane at right angles to the wire, in the same direction as the hands of a watch, when the primary current is passed from above, downwards. It is upon this secondary current, and the temporary induction of Magnetism in soft iron, that the science of Electro-Magnetism is based. It is the great principle upon which all Electro-Magnetic machines are made, and accounts for all the wonderful phenomena of this truly astonishing and interesting science.

The most obvious effect of this secondary current is, that when the primary conductor is held parallel to a magnetic needle suspended so as move freely, it causes the needle to deviate from its north and south direction, and to assume a position at right angles to the conducting wire. Also, when the conducting wire is insulated and wound into a coil or helix, having a current of galvanism passing through it, and a piece of soft iron is put into the helix, it exhibits north and south polarity—the same as a permanent Magnet, but as soon as the current ceases to flow, the iron looses its power. With steel it is otherwise, for it not only exhibits polarity under the same circumstances, but if allowed to remain within the helix for a while, it becomes permanently magnetic. It is by taking advantage of this property of soft iron, in becoming Magnetic while the current is passing round it, that most Electro-Magnetic machines are made; some upon the mere principle of attraction, others upon that of attraction and repulsion.

The most useful and one of the most remarkable inventions of the age, is Morse's Electro Magnetic Telegraph. This acts upon the principle of attraction alone. The operator at one end of the line, alternately closes and breaks the circuit, which magnetizes a piece of iron placed in a helix at the other station. This alternately attracts an armature, fixed to the end of a lever, having a spring to raise the armature as soon as the circuit is broken and the iron demagnetized. At the other end of the lever are fixed steel points which fit into groves in a steel roller, over which passes, by means of clock work, a strip of paper. When the operator closes the circuit, the iron is magnetized, the armature is attracted, the opposite end of the lever is raised, the steel points press upon the paper and the desired impression is made.

Professor Page, of Washington, has invented a printing press, worked by Electro-Magnetism, and giving 1200 impressions per hour. Other machines have been constructed—more curious than useful among which we may mention the revolving Magnet, which, by means of a perpetual screw and clock work, has been found to have attained the incredible speed of 48,000 revolutions per minute. For a more particular account, we will refer the reader to Davis' Manual of Magnetism.

The secondary current we have spoken of, may be separated from the primary one, as follows : let the current from a battery of moderate power be passed through a helix of coarse insulated wire, having a piston of soft wire within it-around the first helix let a second one be placed so as to be completely insulated -now let the current be alternately broken and closed by a vibrating armature, as in the medical machines, strong and powerful shocks will be felt by a person holding the two poles of the second helix in either hand. These shocks will be powerful or weak according as the piston is pushed in, or withdrawn from the primary helix. The magnetism of the iron is therefore supposed to generate the secondary current, or at least the shocks, and hence it has taken the name of Magneto-Electricity, and is that used for medical purposes.

Again, if a third helix surrounds the second, a tertiary current may be obtained. And so on, up to seven or eight; each one, the higher it ascends in the scale, becoming less distinct and more etherial in its nature, and resembles that generated in the human brain, to serve as the connecting medium between mind and matter, as will be more fully considered in a subsequent lecture.

From this brief review, we are naturally led to the conclusion that electricity, variously modified, is the

great and all pervading agent, that carries the laws of nature into execution. Indeed, when God created the heavens and brought forth this world out of chaos ; when he said, " let there be light and there was light ;" when he created man after his own likeness, and gave him power over every living creature; he also established certain immutable laws by which all things should be governed. But wherefore the laws without the executive power to put them in operation. But His wisdom and foresight were not at fault. He at the same time created that subtle agent we have named to pervade all matter, time and space, under whose controlling influence, every animal, and plant and tree, and all things that live, and move, and have a being, might work out their destiny in obedience to those laws, without any further especial providential care. For we are not to suppose there is an especial act of providence to direct every crook and turn of the devious path of the life of man; that he personally watches over the budding and the bloom of every little flower, from the germination of the seed to the full maturity of the reproduction of its kind; that he superintends the ebb and flowing of the tide-the heavings of the mighty ocean, or takes cognizance of every organic and inorganic change that is taking place every second of time, in every spot upon the wide face of creation. We are not even to suppose that God sits upon his great white throne and directly notes down all the actions of men; or that there is a mighty angel in heaven, recording his good and evil deeds in the Book of Life. No, for every departure from the simple dictates of nature, every violation of her laws-is as surely and as accurately recorded upon the moral being, as if an angel scribe in heaven had done it. For who can yield to appetite and not feel every power of his being prostrated? Who can act the sluggard and not feel his energies blunted? Who can walk in the paths of iniquity and not pay the forfeit of morality and virtue ? The *hcart*, therefore, at that great accounting day, will be laid open, as it were, a mighty mirror, in which are reflected the good and evil of a lifetime.

This militates not against the doctrines of christianity, and savors not of materialism; though it would make religion itself a science; not, indeed, of materiality, but of morality and the workings of the spirit in connexion with the organization of matter, as found in human life. Need reference be made to the aborigines of America, who acknowledged, in the untutored simplicity of their hearts, a superior being, and worshipped with more than the zeal of a christian his Kishe Manitou; or to the Hindoo who falls down and adores his Pagoda, and in his blind zeal suffers himself to be crushed to death, beneath the ponderous wheels of the Juggernaut. Is there any nation, savage, barbarous or civilized, wherever found and for whom the light of christianity has never shown, yet who do not feel in their own hearts a sense of right and wrong, and it must be admitted that religion and morality are not of natural origin.

But though, they be a science, how unlike those of material things. How much more sublime, how holy, how divine! The genius of man has been sufficient for the development of nature. Thus we owe the perfection of Mathematics, to Newton, Lavoisier, Laplace

and others ; Galvanism, to Galvani, Farady and Davy ; Botany, to Linnæus, and Hippocrates has been styled the father of Medicine. But religion, though it was planted in the garden of Paradise, with the tree of the knowledge of good and evil, though it was revealed to Moses, on Mount Sinai, in thunderings and lightnings, and spoken by Isaiah's hallowed lips, of old ; though it was sung in the Psalms of David and taught in the Proverbs of Solomon, yet for its perfection, a Godmade man, was required. Neither do these views come in conflict with the doctrine of repentance and the forgiveness of sin; for even as the body is restored to health when in sickness, and the wrong action of the functions of life reversed by external agents, called medicines,' so do repentance and prayer, reverse the the wrong action of the corrupted heart, and restore it again to innocence and the Grace of God.

So far, therefore from the revelations of science, leading the mind astray from the teachings of the Gospel, they do but harmonize with them. The more is known of the material world, the stronger must be the conviction, that in the state of knowledge, at the time the scriptures were written, and the humble capacities of many of the writers, that nothing less than the inspiration of the Almighty could have dictated them. And whoever will go to the investigation with the book of science in one hand, and the Bible in the other, unless he be wilfully blind, must meet at every step, new beauties in each that correspond with the other, and he must necessarily progress onward, even to the perfection of his nature.

Gravitation was incidentally mentioned as being the

lowest order or modification of Electricity, and Sin Isaac Newton has described its action, as accurately perhaps as human genius or knowledge can ever do it. But of the nature of the agent itself, we can never probably arrive at any satisfactory result, since it finds in nature no one substance, that is a better conductor of it than another, and since no natural or artificial conductor of it has yet been discovered, we are unable to carry the investigation any farther than to determine its effects on external objects. But reasoning from analogy we are led to the belief that it is also a subtle fluid like Galvanism and Magnetism, and is not the fact of its finding no conductor in nature, a proof that it is the lowest order of Electricity - a wonderful example of the goodness of the great Creator. Doubtless did it find one, that substance if a perfect conductor, would not be brought down to the earth subservient to its power, but would remain suspended without any visible supporter, in middle air. And if all things were conductors, or if there were no such thing as the gravitating fluid, (which it is assumed to be) one revolution of the earth on its axis, or one single motion in its orbit would be sufficient to scatter every particle of earth, rocks, trees, animals, and everything, to the interminable bounds of space. Mark then that the sphere of action of gravitation is perpendicular to the surface of the earth, and extends from the centre to the farthest limits of the atmosphere that surrounds it, and probably fills all space. And in the unity of action with the other modifications of Electricity binds together the motions of all the planets in one grand totality, while its pecu-

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liar action is to keep the earth in its globular form, and all things on its surface in their proper place.

Man has been called a Microcosm or little world in himself, and so may every thing be considered, so far as terrestrial gravitation is concerned. For the drops of rain, as they descend from the clouds, and the molten lead in falling from the shot tower, exhibit in themselves, a miniature specimen of a perfect little world, for call it the attraction of cohesion, or whatever else you please, that causes the particles of matter, when left free to move among themselves, to assume the globular form, if rightly examined, will be found to present the same phenomena as gravitation upon a large scale, as displayed in the earth, the larger planets, or the sun himself, the light and centre of the solar system.

Though the genius of philosophy has not been able to discover, in the remotest degree, the essential properties of gravity, yet the ingenuity and skill of man have applied it to many useful and important purposes. The clock is a most familiar example, for the weights descend and the pendulum keeps in motion by one and the same mysterious agency.

Magnetism we infer to be the next order in the ascending scale; for we have seen that it finds in nature three conductors—one perfect,—which is iron—two imperfect, viz : nickel and cobalt. From this circumstance, its properties have been more accurately estimated. Its motion we have seen, is with the meridians, or in a northerly and southerly direction. Of its specific action on the earth, we know but little; yet, since it is so universally diffused, and powerful an agent, there can be no doubt, that it acts a most important

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part on our globe; and, while it passes round and round the earth, it probably extends to other spheres, like gravitation, and faithfully executes its appointed duties in the motions of the heavenly bodies. At the same time that it acts on such a magnificent scale, each drop of water suspended in the air, and every globule of matter, has its magnetism in miniature passing round it, as each has its peculiar gravitation; the earth being no more, when suspended in the boundless space, to the whole creation, than a drop of water is to it. And although, through the vast bounds of creation, it probably extends from sphere to sphere, and like the bands around the wheels of a machine, it serves to give motion to the whole; it has also, by ingenuity and skill, been reduced to many practical purposes, as in the mariners' and surveyors' compasses, &c.

Galvanism is a still higher link in the Electrical chain, since it finds in nature, many conductors. Many more of its sensible properties have therefore been ascertained; and of its utility in the economy of creation, we have already seen many familiar examples. We shall presently show, that it exercises a wonderful influence in producing the motions of the earth, as a whole, as well as of its particles, in regard to itself. It has also, no doubt, its influence in the motions of the planets, suns, moons, and stars. Experiment has long since demonstrated, that its course through the atmosphere is neither perpendicular to the earths' surface, like gravitation, nor north and south, like Magnetism; but nearly at right angles to them, or east and west with the parallels. This fact may readily be proved by placing a rod of any metal in a north and south direction, some eight or ten feet above the ground. It will exhibit Electrical phenomena. The metal being a good conductor, catches the fluid as it passes along; and if the ends of the wire be bent and buried in the ground, its effects on vegetation, for some distance around, will be sensibly perceived. These facts will not be observed if the wire is placed in an east and westerly direction—clearly proving that the currents are east and west.

Neither Galvanism nor Magnetism, so far as we know, is capable of itself, of producing rotary motion in any body. A Magnet might forever be a Magnet; and a current of Galvanism might forever be passed through a piece of iron fixed on points, yet, no motion would be produced. But let a current of Galvanic fluid be passed through a Magnet so placed and it instantly begins to revolve with great rapidity. Now the acid we have seen used in the battery is not necessarily required to excite the Galvanic currents in two pieces of metal or other substances. If two pieces of metal be held at an angle, with their united ends in a lighted candle, a strong current from one to the other will be excited, like that produced by the acid. It is therefore recognized as a well established fact, that the rays of the sun, acting with fervid heat at the equator, upon the land and various minerals in its bosom, excite a strong Galvanic current from east to west-or Thermo-Electric current as it is usually called. The re-action of this current upon the whole earth, considered as a Magnet, produces its rotary motion, which is from west to east; and the secondary current round the primary one at the equator, gives rise to all the phenomena of

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terrestrial Magnetism. Further, we will add, that when a strong Galvanic current is passed through a helix, the secondary current has the power of drawing an iron rod into the helix, and there sustaining it without touching any thing or having any visible support. Thus have considerable weights been suspended; and if such has been done by man with this machine, and if such has been done by so insignificant a creature, who can doubt that the great "I am" "who spake and it was done," did at creation's dawn suspend Electrically and Magnetically, and still supports and moves unnumbered worlds, with such regularity and precision, that the motions of the one shall not disturb the harmony of the whole.

LECTURE IV.

A sketch of the human body.—The spiritual body.—The connecting link.—Experiment of Dubois.—A real living sclf-acting Galvanic Battery.—Two different surfaces collecting and giving out different forces.—An Electro Magnetic Machine.—Secondary Currents, &c.—Various Philosophical Experiments, showing that all the functions of life are carried on by Electricity.

When we take into consideration the physical nature of man, and investigate the structure of his body, independent of the invisible, etherial and spiritual principle, that gives it life and motion, we shall find it to be a piece of mechanism of the most perfect and delicate workmanship. First, we shall find the osseous or bony structure-the frame work and support of all the other parts-admirably proportioned, fitted and bound together by the various ligaments, into hinge and ball and socket joints, so as to admit of every variety of simple and compound motion. Next we find, suspended on the bones, the cellular membranes, so arranged in their disposition, as to serve as a mould, in which are cast the various organs and muscles of the body, that give beauty and symmetry of form. The muscles, we find of every form and size, to suit the locality and use for which they were intended, now swelling out in their centre, to give power of action, then contracting towards their ends into strong and ten-

dinous cords, affording compactness and strength to the joints. The digestive and nutritive apparatus, through which all the growth of the body must come, and all its wear and tear, from infancy to age, must be repaired, is still more complicated and wonderful in its construction. The hands first grasp the food and convey it to the mouth; the lips and tongue receive it; the incisor and molar teeth tear and grind it into a pultaceous mass; the fauces, with their contracting and constricting muscles, force it down the esophagus to that universal reservoir, possessing more than the powers of a chemist's alembic-the stomach. Here, from thousands of little glands, an acrid liquor, called the gastric juice, is poured out, chemically to decompose it, with the aid of the mechanical vermicular motions of the muscular coats. By this process, the food is converted into chyme, and in this condition, passes into the duodenum or second stomach, through the pyloric orifice. Then comes the process of chemical changes, and by a sort of precipitation, the separation of the nutritious from the excrementitious portions of the food. This is effected by the pancreatic juice and the bile. Next, as the food passes on, down the alimentary canal, millions of little mouths take in whatever is suited to the nourishment and repair of the system. These little mouths, or villi, have as many minute tubes proceeding from them, which unite into larger ones, in the mesenteric glands; these again form larger ducts, at proper intervals, until they all unite into one-the thoracic duct. The food, in the mean-time, has been converted into chyle-the wheat has been separated from the chaff-it is now in a fit condition to enter the

circulation of the blood, and answer the various purposes of life. This takes place at the junction of the thoracic duct with the subclavian vein, where are placed two valves, to prevent its regurgitation.

In the circulatory system we find the heart, the great central organ, constructed on the most perfect principle of the double suction and forcing pump. The blood collecting from all parts of the body, through the veins, is drawn into the right auricle, thence passes to the right ventricle, which, by its powerful contracting and forcing muscles, propels the blood into the lungs. through the pulmonary arteries, to undergo the process of decarbonization and oxygenation. It is then drawn through the pulmonary veins into the left auricle; the left ventricle next receives it. This having the greatest labor to perform, has still more powerful muscles to force the blood now fraught with living fire, through the aorta and its branches, to the farthest parts of the system.

Lastly, we shall notice the most delicate structure of all—the nervous system. And from the situation its principal portions occupy, we may readily conjecture its vast importance. We shall find the brain, the great regulator of the whole, encased in a thick and solid bony structure—the skull, which is of a spherical form, the best to resist external violence. The spinal chord proceeds from the brain, down its appropriate channel in the spinal column, which is composed of twentyseven different bones to afford freedom of motion and security to its contents. The nerves branch out from the brain and spinal chord, and spread out into a kind of net work in all parts of the body, in such minute ramifications, that you could not put down the point of the finest cambric needle without wounding some of their branches. This is but an outline of man's material part. There are other organs, such as the lungs, liver, spleen, the eye, ears, &c., which are equally requisite for the full development of the phenomena of life. Suffice it, however, here to say that, they are all admirably constructed to perform the duties and uses of their design in the organization of the human body.

But what of all this finely wrought material, this most perfect of all mechanism, not made by the hand of man, but of God. Of itself it is dead, inert matter, destitute of life and motion, of no more power of action, than the common clay of which it was formed, or the dust, to which it must return. And as every machine, of whatever kind or construction, must have a power to put it in motion; so must there be, of necessity, in man, a separable and distinct power to produce in his body the sum total of forces, we denominate life. When God created Adam, out of the dust of the earth; when he had fashioned his material body, as we have described it in all its various parts; there was still a something wanting-it was life. And he breathed into him the breath of life. Behold! the first pulsations of the beating heart; the blood now crimsoned in the expanding chest to animate the quickening clay; the opening eye, rolling in its orbit, the unstopped ear, strung to the music of nature; and perfect in every organ, its part to act, man stands erect, a living soul, and surveys, intelligibly surveys, the splendors of creation's dawn-that living soul, a fragment of Omnipotence, a

part and parcel of himself-a spirit after his own image and likeness.

We gather, therefore, from the history of the creation, as given by the sacred historians, as recorded in the Bible, that there are in man's body, two distinct principles, or organizations; the one, material, mechanical and of the earth-earthly; the other, immaterial, spiritual and of God-godly. We also find from the laws that govern man in his relation to the material world, that there must be a connecting link, a medium of communication between the material and the spiritual, through which all the phenomena of life are produced. Through which the various muscles of the face, display the impassioned thought, and mind her envire holds, and gives a tangible form to the creations of her fancy, and hope, fear, joy, rage, love, hate, ambition, find a physical embodiment, through which the brow, its angry frown displays, the mouth its smiles, the lip its scorn, the eye, the cosmoratna of the soul, flashes with rage, beams with intelligence, sparkles with wit, or grows pensive with grief and melancholy. In fine, through which all the impressions from external objects are conveyed by the various organs, to the internal or spiritual existence.

What that connection or medium is, and whether direct or indirect, we come now to consider. We hold it to be *indirect*, and maintain that spirit cannot come in contact with matter, so as to give it motion, nor matter come in direct contact with spirit or soul, so as to awaken thought in the mind, but that they reciprocally affect each other through electrical agency. We do not however pretend to say, that it is that grosser soit, as found in unorganized bodies, but a purer, more etherial, and as it were a vital galvanism, manufactured by the living organism, out of common electricity, so modified in its nature, as to suit the higher purposes of life. We come to this conclusion from a variety of circumstances. Every square inch of air we take in at each inspiration, is more or less charged with electricity. In the lungs, very important chemical changes take place. The air is decomposed; the oxygen unites with the blood, converting its superabundant carbon into carbonic acid, and giving it its florid red appearance, while the carbonic acid and the nitrogen are thrown out again at every expiration. The electricity thus set free by these changes, renders the iron, the coloring matter of the blood, magnetic, and is thus carried through the entire system. And thus, while the oxygen creates in the blood a kind of acidity, as it were, similar to the solution of sulphate of copper in the Galvanic Battery; the blood itself gives off by its friction, the Electro-Magnetic power, to the nervous system, for which it has a strong affinity, and as Dodd further observes, being secreted by the brain, it becomes the nervo-vital fluid, or animal Galvanism. This is universally admitted to be the highest order of Electricity, and is the highest and most etherial inert substance of which we can form any conception; and being the next step to spirit, is fit to come in contact with it, and therefore, must be the connecting link between mind and matter. Few will be found at the present day, to deny the existence of some medium, for the dead man's spirit, cannot move his body, when the connecting link has been broken that bound it to its clayey tenement, although every organ and

tissue are yet perfect. Nor can I, by my will alone, move that bench or chair directly, I might will, and will forever, and it would not move ; but I can move either by the intervention of other substances. The spirit wills, the will stirs the nervo-vital fluid in the voluntary nerves, the nervous fluid render the muscles Electro-Magnetic and they contract, the muscles contracting, raise the arm and the arm moves inert matter. Thus it can only be through a connecting medium that the mind can influence inert matter. It is equally obvious to every one that has investigated the subject, that it is by means of Galvanism that the muscle is made to contract, and therefore, must of necessity be the connecting medium. This has been clearly illustrated time after time, by actual experiment. It is common, when criminals are executed, that their bodies are delivered over to medical men for experiment and dissection. Now let a human body be conveyed from the gallows to the dissecting table. Let a strong, continuous shock from a powerful Galvanic Battery be given, and the muscles of the dead man will contract and exhibit many freightful contortions. Instances have occured in which the dead man would spring upon his knees, make violent motions with his hands, roll his eyes, move his head, chatter his teeth, and even make frightful groans, so that the experienced physician has started back in horror at the sight he himself had caused ; while the student has fainted away for fear, or left the room. Now what was it that contracted the muscles of the dead man? It could have been nothing else than the Galvanic current, sent through the nerves in the place of the nervous

fluid, which rendered the muscles Electro-Magnetic, and hence give rise to the motions we have described.

Yet more striking results occur in the living subject. In the dead man, the artificial current merely supplied the place of the natural one-but in the living, it will, when passed along the course of the nerves, if more powerful, entirely supersede the vital fluid and produce contraction, in spite of every effort of the will to prevent it. Hence we draw the irresistible conclusion, that the two are not only analagous in their nature, that the one can supply the place of the other, and that the more powerful, will supersede the other, but that as Galvanism is the only agent yet known, which can, when artificially applied, contract the muscles of the living, so it must be the medium of communication by which the will controls the motions of the body. But were any further proof required, the experiment of Dubois, as communicated to the Academy of Science, at Paris, would be sufficient to convince any one not ignorantly and willfully unbelieving. The description is as follows: "Fix to the two extremities of a sensitive Galvanometer, two strips of platinum; plunge these slips into tumblers of salt water, and then introduce into the water the corresponding fingers of each hand; let them remain until the fluctuations of the needle cease. Then contract the muscles of one arm by an effort of the will, and the deviation of the needle will instantly indicate a contrary current of electricity in that arm. The amount of deviation depends on the muscular development and the power of the contractions." Scientific American.

In tracing this subject still further, we shall find that MAN, himself, is a real, living, self-acting Galvanic Battery, of the most delicate and skilful workmanship. On viewing his body externally, we shall find it covered with a membranous, complex structure, called the The skin is composed of three distinct layers; skin. but besides these, there are also found in it, innumerable, minute, globular bodies, called papillary glands. These little bodies are found to be highly organized, having minute arteries terminating, and minute veins commencing in their structure. They are also seen by means of magnifying glasses of great power, to have minute ducts issuing from and terminating every where with open mouths on the surface of the skin. If we examine the various organs, as the brain, heart, lungs, liver, spleen, &c., we find them all, without a solitary exception, covered with a kind of skin called a serous membrane, in which are situated incalculable numbers of minute glands, as described, in the skin, with orifices terminating on the surface of these membranes. These little glands, of both structures, are found to secrete a watery fluid, by which these surfaces are constantly kept in a moist state, --- and the great quantity seen running off the skin, when a person is in a free perspiration, and its accumulation in dropsy, water on the brain, &c., show how well they are constructed to perform their specific duties, and how much they can overdo their office when excited to undue action. If we in like manner go on to examine the membrane which lines the internal parts of the body, we shall find it analagous in structure to the serous membranes. There is a slight modification, however, which consists

in its having what is called a villous, instead of a serous surface. The whole of the alimentary canal, including the mouth, œsophagus, stomach, &c., is lined with this membrane, as well as the internal part of every organ, including the ventricles of the brain. This is called the mucous membrane, and like the skin and serous membranes, it has also numerous little round or oval glands, or villi, as they are sometimes called. These villi, like the papillary glands of the skin, have their appropriate arteries and veins, and ducts terminating with open orifices on the surface. They are further characterized, says Sherwood, by numerous little cavities, crypts or follicles, which are found to be filled with a semi-fluid or mucous, which is constantly issuing from them, and spreads out upon and lubricates the membranous surfaces.

We have now traced two different kinds of surfaces, disposed in different ways, and covered with two different kinds of fluids, just as we find in the Galvanic Battery, two different kinds of plates,—zinc and copper—and as in Grove's Battery, the most perfect and powerful yet invented, two different kinds of fluids, the one acid, the other alkaline.

Now, upon an investigation of the nature of the two fluids secreted by these different kinds of membranes, that from the skin and serous membranes is more or less acid, and that from the mucous, more or less alkaline, and in disease they sometimes become remarkably so. The acid is the muriatic, and the alkali is soda and muriate of soda or common salt. The acids and alkalies possess directly opposite properties, yet have the strongest affinity for each other. They are universally diffused throughout the animal, vegetable and mineral king-

doms, and constitute two grand divisions of matter : one of which, the acid, is called negative matter, and the other, the alkalies, positive matter. It is also a well known fact, that the positive matter constantly gives out a negative force, and the negative matter a positive force. Thus the positive or alkaline mucous on the inside of the body and organs, is constantly giving out negative force, and the negative or acid fluid, on the outside of the body and organs, the positive force. Is this not perfectly in accordance with the principles of the Galvanic Battery? For we have not only found two different kinds of surfaces or plates, but we have also found each to collect a different kind of force, which is Galvanic, just as the copper plate in the battery, is negative, and collects and gives out the positive force, and the zinc plate, the negative force. From the brain and spinal chord, proceed the nerves, which spread out into a kind of net work on these surfaces so minutely, as we have already said, that the point of the finest needle would wound many of their filaments. These nervous branches serve the purpose of the conducting wire in the Galvanic Battery, and convey the fluid generated and collected on the positive and negative surfaces of the body, to the brain, and from the brain back again to any part of the system the will may direct. The analogy, therefore, between the human body and a properly constructed battery, is as perfect as can well be imagined could exist, between an organized and unorganized existence.

But this is not all. We can go still farther, and trace an equally perfect resemblance between man and an Electro-Magnetic machine. If, as we have shown

in a former lecture, a current of Galvanism be sent along an insulated wire, and that wire be wrapped into a coil or helix, and a piece of iron put into the helix, it instantly becomes magnetic and exhibits north and south polarity. Let, therefore, a number of little iron balls be so arranged in the helix, as to admit of freedom of motion, let the current be sent through the wire, and each little ball becomes a Magnet and presents an opposite polarity to the other, these opposite polarities attract and consequently the balls instantly rush together. Now the same thing precisely occurs when we wish to produce contractions of the muscles in any part of 'the body. Every muscle is composed of minute threads or filaments, forming a kind of sheath, in which are disposed, at a little distance from each other, a number of little globules of a spheroidal shape. The globules are colored by the iron they contain, and give redness to the muscles. Around the cellular sheath, are wound the attenuated extremities of the nerves as they proceed from their centres and branch out to every part of the system, forming as it were, innumerable helices, in which these minute globules are arranged by nature's most omnipotent architect to become Magnetic. Experiment has satisfactorily shown, that any body, should it contain but a three hundred thousandth part of iron, it is capable of becoming Magnetic. Now, therefore, when we wish to bend the arm, for instance, the will stirs up motion in the brain-the brain sends a current of the nervous or galvanic fluid down the nerves, and round and round the minute helices of the muscles-the globules they contain, since they are partially composed of iron, in-

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stantly become magnetic and attract each other, and this produces contraction in the muscles and motion in the arm.

We have already seen in the Electro-Magnetic machine, most commonly used for medical purposes, the second coil or helix of fine wire, receiving from the first, which it surrounds, the secondary, current, or Magneto-Electricity, as developed by the temporary Magnetism of the soft iron, and conveyed by its proper wires and applied to disease at the will of the operator. This secondary current is also thrown into the form of shocks, by the vibrating armature of the machine alternately breaking and closing the primary current. So also does it appear that the brain, being of a more delicate and highly organized structure, acts the part of the second helix, and manufactures out of the galvanism, generated by the positive and negative surfaces, a kind of Magnetic-Electricity. The will also, acting more perfectly the part of a vibrating armature, alternately sends along the different nerves the vital power to any or every part, at its pleasure, and thus controls the motions of the body. For instance, we wish to bend the arm-the will directs a current of Magneto-Electricity, down the nerves that are distributed to the flexor muscles, round the innumerable helices of which they are composed; the minute globules, partly iron, become Magnetic and attract each other, and consequently bend the arm, with a power in proportion to the volume and perfection of the muscle and the amount of the will or nervous power applied. The same thing precisely, that is found in the Magnetic machine. The piston is generally made of a bundle of

wires, resembling the muscles, and the more powerful the current from the Battery, the more power is given to the Magnet, the greater its attraction, and the heavier weight will it sustain. The extensor muscles in the mean time, having no current playing on them, are not Magnetic, their globules do not attract and consequently offer no resistance, except what may be needed mechanically, to extend them. Now suppose we wish to extend the arm. The will, of course, shuts off or breaks the circuit round the flexors-they are demagnetized, and their attraction ceases; the extensors are in the meantime magnetized, and the arm is extended, upon the same principle it was flexed. Is not the analogy, therefore, between man and an Electro-Magnetic machine, correct beyond a doubt. The one, however, was fashioned by an almighty hand, and is the most perfect work of God, with power to control its own working in a state of health; the other is but the handicraft of man, imperfect as he is imperfect, but an imitation of its prototype, as he is but the image of his maker. But how beautiful the idea; how wisely ordained, that we should receive our impressions from, and hold communion with the crude and unorganized material world around us, by common electricity, as we inhale it at every breath, as its vibrations enter the eye at every sight we see, or the ear at every sound we hear; and in the system, by the mysterious workings of the brain and the organs, converted into a more etherial element, fit to connect the material of organized existence with mind, thought, and soul,-and form a union with the spirit world and its great creator. God. Let man, therefore bow down in humble admiration to him who, in his wisdom hath made them all.

We have thus far, principally confined our observations to the production of muscular motion, by means of Electricity. We shall now make some extracts from well known authors, to show that the other functions of life are performed through the same agency. Indeed, there can be no doubt but that they all are.

The first experiment we shall quote, is related in McIntosh's Electrical Theory of the Universe, page 78.

AN INDIVIDUAL RAISED ON THE FINGERS OF FOUR OTHER PERSONS .- The heaviest person of the party lies down upon two chairs, his legs supported by one, and his back by the other. Four persons, one at each leg and one at each shoulder, then try to raise him, and they find his dead weight to be very great from the difficulty they experience in supporting him. When he is replaced in the chair, each of the four persons takes hold of the body as before, and the person to be lifted gives two signals by clapping his hands. At the first signal, he himself and the four lifters begin to draw a long and full breath, —and when the inhalation is complete, or the lungs filled with air, the second signal is given for raising the person from the chair-to his own surprise and that of his bearers, he is raised with the greatest facility, as if he were no heavier than a feather. It is also declared that the experiment would not succeed if the person lifted were placed upon a board, and the strength of the individuals applied to the board. It is stated that it is necessary the bearers should communicate directly with the body to be raised. There is no explanation given of this curious fact, and

we will not pretend to solve its mystery to a demonstration. We have already said that we inhale Electricity at every breath,—that this Electricity is either equivalent to or manufactured into Galvanic power, and that it is through this power that we raise the arm. Now, therefore, the more there is taken in at a full breath the stronger a person can make himself. It is also probably owing, in part to the impression made upon the belief of the lifters. Believing they can, they do. There is magic in the word *can;* there is a thousand weight in the word *cant*. We come now to more interesting facts. According to Ritter, the Electricity of the positive pole augments, whilst the negative diminishes the action of life, tumefaction of parts is produced by the former, depression by the latter.

The pulse of the hand, he says, held a few minutes in contact with the positive pole, is strengthened; that of the one in contact with the negative is enfeebled ;--the former is accompanied with a sense of heat, the latter with a feeling of coldness; -- objects appear to a positively electrified eye, larger, brighter and red; while to the one negatively electrified, they appear smaller, less distinct, and bluish, indicating opposite extremities of the prismatic spectrum. The acid and alkaline tastes, when the tongue is acted on in succession by the two Electricities, are well known and have been ingeniously accounted for by Sir Humphrey Davy, in his admirable Bakerian Lectures. The smell of oxy-muriatic acid, and of ammonia, are said by Ritter to be opposite odors, excited by the two opposite poles, as a full body of sound and a sharp tone are the corresponding effects on the ear.

We next quote from Dr. Wilson Philip, in respect to the effects of Galvanism on respiration and digestion. He says, "the eighth pair of nerves, distributed to the stomach and subservient to digestion, were divided by incisions in the necks of several living rabbits. After the operation, the parsley which they ate, was removed without alteration in their stomachs; and the animals. after evincing much difficulty of breathing, seemed to die of suffocation. But when, in other rabbits, similarly treated, the Galvanic power was transmitted along the nerve, below its section, to a disc of silver, placed closely in contact with the skin of the animal, opposite to its stomach, no difficulty of breathing occurred,-the voltaic action being kept up for twenty-six hours; the rabbits were then killed, and the parsley was found in as perfectly digested a state as that in healthy rabbits, fed at the same time, and their stomachs evolved the smell peculiar to that of a rabbit during digestion. These experiments were repeated several times, with similar results." "Hence," says Dr. Philip, "Galvanism seems capable of performing all the functions of the nervous influence in the animal economy."

But not only is Electricity capable of sustaining and carrying on the functions of life; it actually originates the animal organization. Mr. Alfred Smee, the inventor of the battery which bears his name, has announced the following discoveries in animal Electricity. "By a test, which he terms electro-voltaic, he has discovered that the termination of the sensor nerves are positive poles of a voltaic circuit, whilst the muscular substance is the negative pole. The sensor nerves are the telegraphs, which carry the sensation to the brain,
and the motor-nerves carry back volition to the muscles. The brain, he infers, to consist of five distinct voltaic circles, which, upon theoretical grounds, he believes to be sufficient to account for all mental phenomena. He has succeeded in making *artificial* electric fish and artificial muscular substance."

Mr. Crosse has thrown still more light upon science, by his discoveries, in his researches into the process of "He heated a flint to a white heat, crystallization. and then plunged it into water to pulverize it. The silex, thus reduced, was saturated to excess, with muriatic acid. The mixture was placed in a jar, a piece of flannel was suspended in it, one end of which extended over the side, and thus by cappillary attraction, the liquor was slowly filtered, fell into a funnel, and thence dropped on a piece of ironstone from Mount Vesuvius, upon which were laid the two wires connected with either pole of the battery. The ironstone had also been heated to a white heat, so that no germs of life could have existed upon it. On the 14th day, Mr. Crosse saw some small white specks upon the stone. Four days afterwards they had elongated and assumed an oval form. He concluded that they were incipient crystals. Great was his surprise on the 22nd day, to find eight legs projecting from each of these white bodies: still he could not believe that they were living beings. But on the 26th day, his surprise was complete; there could be no mistake; they moved, they fed, they were perfect insects. Eighteen or twenty of them have since appeared. Many have seen them, but there is no record of such an insect. It is in form something like a mite; it has eight legs, four bristles at the tail,

and the edges of the body are very bristly; its motions are visible to the naked eye; its color is grey; its substance is pulpy. It appears to feed upon the silicious particles of the fluid."

"The most extraordinary circumstance in this phenomenon is the nature of the fluid in which this insect lives and thrives. The acid instantly destroys every other living being."

"But a second trial has confirmed the fact beyond a doubt. Another portion of silex was prepared in the same manner, and reduced to a gelatinous form, but without the acid. A coil of silver wire was suspended in it from one of the poles of the battery, and the other pole was also immersed so as to send through the mass an incessant stream of the Electric fluid. About three weeks afterwards, Mr. C. examined the poles to search for crystals, and in one of the coils of wire he found one of these strange insects. This, proves that it is produced from the silex, and not from the acid."

These experiments ought to satisfy the most incredulous, and certainly explain the mysteries of life much more philosophically than the old hobby of the "vital principle" and the "vis medicatrix naturæ." We shalt give an account of one more experiment, showing the effect of Electricity on vegetation. "Take a small quantity of mustard or cress seed, and steep it for a few days in diluted oxy-muriatic acid; sow it in a fine light soil, in a garden pot, cover it with a metallic cover, and bring it in contact with the prime conductor of an electric machine. The seed will spring up, as if by magic, and in the course of a few minutes the crop will be ready to cut—the salad will be fit to be put upon the table."

LECTURE V.

Elective and directive affinity of mind.—Active and passive portions of brain.—Motion and thought, inseparable,—except the motion of nutrition.—Laws of insulation.—Process of inducing the Magnetic state.—Method of operating.—Application to disease.—Motion and its effects.—Man not an isolated being.— Nature of the brain.—Discrimination of vibrations.—Special cerebral motion.—Philosophy of seeing ghosts.—Motion from within and motion from without.

From a consideration of the foregoing principles, it must be evident to the least reflective mind, that the important and intimate relation, subsisting between mind and matter, is traceable to an electrical connexion. It has also been shown that the nerves are the Telegraphic wires, through which the communication is effected, for the division of a nerve at once cuts off all intercourse between the sensorium-the residence of mind, and the part to which the nerve is distributed. So that the will cannot have an actual contact, to influence and control the voluntary motions of the body, but is subject to those vehicles of communication. In other respects it is not so limited in its operations, for it has both an elective and a directive affinity, subservient, however, to the great ruling power-mind. Thus, when an individual raises his arm in pre-

ference to any other part of the body, he is said to call in play the voluntary muscles of that particular part. And what are voluntary muscles, but those obedient to the will, and the will, but an attribute of of mind? But here is exhibited a most perfect example of election and direction-election in preferring to move that particular portion of the body, and direction, by sending down through the nerves distributed to the arm, the electric current, to effect the motion intended. During this elective action of mind in the normal state. the other voluntary muscles are passive, and communicate no sensation unless excited by stimuli. The process of nutrition and atomic motion, constituting the involuntary, is still going on, and the waste and repair of every organ and tissue is in a great measure unaffected by volition. What has been said of the muscular system, as it regards elective action, applies with equal force to the brain. As mind can only manifest itself in concert with the highest and most etherial agency, that agency requires a corresponding organism; hence we find the brain more highly organized than any other portion of the body,—consisting as it were of a conglomeration of nerves. This curious and delicately wrought mass, holding within its complexities, that mysterious and God like resident-mind, is divided into lobes and organs, to each of which is assigned its appropriate office, of reasoning, recollecting, imagining, hoping, just as we find in the muscular system one set of flexors, another of extensors, one to expand the chest, and another to produce the harmony of sound. Now, as is familiar to every individual, one of these may be at rest while another is in motion.

So may one portion of the brain be passive while another may be very active. The passive portion of the brain can then no more give rise to thought, than the passive muscle be a medium of sensation. The muscle may be stimulated by almost any resisting power, and thus make its communication, whereas the medium of higher communication is by sound and shadow. To receive these impressions, a finer organization is required; hence the eye is more highly organized than the hand, and the ear, to convey the vibrations of sound, requires corresponding perfection. The brain, we have said, is still more delicately formed to manifest the operations of mind, a superadded principle, so subtile in its character as to forever elude the knife of the mechanical and microscopic anatomist. Motion of the brain is as requisite to the production of thought as motion of the muscle is for flexion or extension; in fact, motion and thought appear to be inseparable; that is to say, motion is an indispensable accompaniment of thought, yet there may be, and no doubt is motion ofthe brain without thought; but it is that motion arising from nutrition-having its origin in the vegetative system of man. Some authors have ingeniously argued, however erroneously, that thought is not the result of motion of the brain, because, say they, the blood flows to the head and produces motion while we sleep, consequently we ought to think as well when asleep as awake. But they should remember that the same blood also during rest, is carried to every part of the body as well as to the brain, and produces the pheno. mena or motions of nutrition and secretion, without those of sensation or voluntary motion. Consequently,

there are in the system, two distinct motions,-the one involuntary, arising from the nerves of the base of the brain and spinal chord, uninfluenced by the will, and constantly going on, whether waking or sleeping, to repair the waste of secretion; the other arising from the superior portion of the brain, to be exercised at pleasure-while waking, in thought and voluntary motion. These motions, whether voluntary or involuntary, appear also to be inseparably connected with Electrical action. In the vegetable world, by the play of affinities between the particles of matter, Electrical currents are constantly evolved, as in the silent and vital changes in the germination of seeds, the respiration and growth of plants, decay and decomposition. For Poullet says: "the surplus Electricity arising from a verdant area of one hundred square yards, is sufficient to charge a powerful battery"-and Faraday further declares that "the quantity necessary to separate a single grain of water, would produce a strong flash of lightning." The same thing precisely takes place in the living system. Electricity is inhaled at every breath. It is disengaged by the decarbonization of the blood, evolved by the various processes of digestion, nutrition, secretion and excretion, under the control of the vegetative system, to be taken up by the voluntary and held in reserve, as occasion may serve, for the various purposes of life, or to be again secreted by the brain for the higher manifestations of mind The hours of repose during the stillness of night, is the period chosen by nature for this accumulation of nervous energy.

"Tired nature's sweet restorer, balmy sleep."

Young.

This accumulation is still further aided by the laws of insulation or Electro-retention, observed by nature in the construction of the human body. Prof. Means observes that it is particularly displayed in the contour of the body, the rotundity and smoothness of the surface being less favorable for its escape, than if it were pointed and rough. Even where use requires the parts to be pointed, (which is well known to Philosophers to be favorable to the escape of Electricity,) they are tipped with non-conductors, such as the hoofs of animals, the claws of beasts and birds, and the nails of the fingers. Marshall Hall says that "the organs of secretion are found with non-conducting investments. Besides the nervous sheath, the sanguiferous tubes, oleaginous accompaniments of the exposed outposts of the system, are fenced in by a general subcutaneous expansion of adipose tissue, itself surmounted by a final and admirably insulating investment, the squamous cuticle." But experiment is the touchstone of Philosophy, and to this we shall now proceed, first showing the means by which the negative state of mind is most likely to be induced, and following a description of some of the most interesting experiments, by such comments as naturally grow out of the subject.

The process or means of inducing the magnetic state commonly used by public lecturers, is as follows: If it is in a public audience, cause your subjects, or those willing to be experimented on, to sit together and as much removed from the audience as possible, as they are then less liable to be disturbed by trifling and inquisitive persons near them. Enjoin on the entirecompany the importance of the most perfect silence.

Request your subjects to sit in that position, least fatiguing to the muscles. Require them particularly to observe the utmost quietness and submission, to lay aside all thought, to avoid all motions of the body or limbs, snapping of the eyelids, &c. Then place a magnetic button, in either hand, of all your subjects, upon which the eyes must be fixed for the space of fifteen or twenty minutes, they maintaining throughout, the strictest silence, thoughtlessness, and passiveness of body and mind. The magnetic button may be made to suit the fancy, out of copper and zinc-a dime, or anything else convenient; for there is, in reality, no inherent virtue in the button itself, as some lecturers really pretend and believe; but it is well, however, to give the impression that some singular power resides in the thing held, as such an impression is more likely to arrest and secure the attention of the sitters, and consequently more likely to effect the desired result. The audience should not only maintain profound silence throughout the sitting, but also during the experiments, -for all noises tend to restore the negative electric brain to its proper balance, and spoil the interest of the spectators. After the lapse of fifteen or twenty minutes, approach your subject, gently remove the button, take hold of his right hand with your right, and raise it to a slight elevation; tell him to place his eyes in yours; assume yourself an air of seriousness and earnestness; pass your left hand gently along his arm and at the same time tell him that he feels a numbress or pain following your finger. If he says he does, you may conclude your subject is in a negative state,-that is, negative to impressions, and you may proceed to carry the numbness across his shoulders, down the opposite arm and discharge it at the ends of his fingers. If you cannot by these assertions make any impression on him, that is, feel any numbness, it is best to leave him and go to the next, for he is but slightly magnetic, and you will have much difficulty in operating if you succeed at all. You may close the eyes by taking his hand as before, place the thumb of the left hand between the brows, gaze at him steadfastly a few seconds to engage his attention, then tell him to close his eyes, at the same time press gently with your thumb and say positively—"Now you cannot open them—no you can't, sir." Quickly remove the impression by a gentle slap on the shoulder, with the assertion—"now you can, sir."

The experiments should be performed as rapidly as possible. The two already mentioned, are generally the easiest performed, but as has been already said, that some portions of the brain may be magnetic and others not; so that the failure of one or both of these should not discourage the operator, as he may succeed in others. Before commencing any experiment or making any impression, you are more likely to succeed if you tell your subject to look steadily at you, as you thus secure his passiveness and re-charge the battery. Sometimes you will but partially succeed, for your subject may still have some control over himself. In that case, you must make him gaze at you steadily,arrest and turn his attention, and double your assertions. For this reason, unless your subjects are highly magnetic, your experiments should be short, for gradually consciousness will return, combat your assertion, and render your success less complete and satisfactory to the

audience. Every impression you make, especially if it be trifling, amusive, or any thing but one by which you intend to benefit, should be removed before making a new one, and this can always be done by a slap on the shoulder, with "all right, sir." "Now you can sir." But to proceed, you may fasten your subject to his seat so that he cannot rise, by engaging his attention, making a few passes down his legs, then tell him he cannot get up. Place his hands on his head, at the same time you do it yourself-then tell him he cannot take them down and he cannot. You may make any assertion you please if your subject is a good one and he will believe you. You may change the taste of water to that of wine, or vinegar to that of brandy, the various colors at your pleasure, the shape of substances to any thing you like, as a cap or a hat to a frog or a terrapin, a stick to a snake; the individual himself, no matter how humble or modest, may be transformed . into the dauntless and vaunting warrior, or the bashful lover into the impertinent wooer. In fact, the experiments may be varied to any extent, according to the ingenuity and skill of the operator; his assertions will always have a magical effect, especially if he seem really to believe what he says, and accompanies it with corresponding action or gesture. For in this as in other things, the maxim of Horace is true to the letter:

> "Si vis me flere Est tibi flere."

"If you wish me to weep you must weep yourself."

It is unnecessary to dwell longer on the mechanical part of the operating. Any one possessing a reasonable amount of common sense can vary the experiments according to circumstances; having in possession the key, it is only left for him skillfully to play the mechanical part to lend interest to his exhibition in producing the most startling phenomena. Success is always improved by practice, and a great number of lecturers look upon the production of these phenomena as the ne plus ultra of the science. Its principles and its practical utility they never aim to acquire, but to such we would say, if you succeed in inducing a magnetic state in any way unlooked for or alarming, never manifest any alarm yourself, (for remember your motions produce exact vibrations and impressions on your subject,) but endeavor by cheerfulness and assurance of " all right," to restore your subject to his natural and normal state.

The truly philosophic and scientific mind should look a little deeper than the surface, and aim at something more than mechanical operations. Its application to the removal of disease, is an auxiliary means, and justly belongs to the class of remedial agents. Many diseases may be cured and more relieved by its skillful application. But how is this to be effected ? What is its philosophy? Here we have to combat the prejudicies of those reared in the science and rules of the schools. They cannot perceive utility in anything not sanctioned by a name ancient and venerable only by age. But let them investigate the laws of health and disease, as founded in nature, and the true secret will be made apparent.

The vis medicatrix naturæ, being the resident power in the subject, these sittings in private may be turned to advantage by invalids; for if you produce the magnetic state, and by assertion make him forget his pain, it is a remission, and if by repetition you can prolong his relief from suffering to an indefinite period, it is health. By making the assertion, by consequence impression, you can very often by operating on the *belief* of the patient set up a motion, that restores to health. But this may be better understood as we proceed in the consideration of the Philosophy of Impressions.

What are we to gather from these numerous experiments? If rightly considered, they lead to the discovery of important principles, concerned in the actions of men. It is true, they may be said to be extremes of a state or condition of mind, which in its normal state, receives and accredits the actions and words of another. But they lead to practical results, and are illustrative of the nature of impressions, by which the few have controlled the many in all ages of the world.

That a state of mind above alluded to, can be induced, any one wishing to know the truth, can readily test, having a little practice and becoming acquainted with the mechanical process. If human testimony be competent to establish the existence of such phenomena, then its existence has been supported by the solemn declaration of witnesses who have experienced its effects, and whose veracity is unquestionable. But we do not beg the question on the issue of an experiment. Take some of the accredited facts of sacred and profane history, and what are they but instances of an exhibition of the same phenomena, brought about by a different combination of circumstances.

Witness the effect of the cursings of the ancient priesthood upon criminals spoken of by Anacharsis.

"The Priesthood of Athens by an order of the Ma-

gistracy, looking towards the west, would shake their purple robes, and doom to the infernal deities the criminal and all his posterity. From that moment the furies were supposed to seize upon him and his connexions, and never abate their torments, but with the total extinction of his race."

The button which an individual may hold, the chair in which he sits, the silence of the room, are but so many circumstances, possessing in themselves no intrinsic merit, apart from the resident forces in the body of the subject, they simply conspire to induce passiveness of the brain. Any other agent or combination of agents or circumstances would have the same effect, acting on the same principle, nay more, and far more permanent as we shall show in the course of these lectures.

Before, however, entering into the philosophy of impressions, we shall have to speak of motion and its effects, and here we will make a few extracts from the interesting work of Dr. Lardner on the effect of motion in producing vision, &c. "The sun or lamp," says he "acting on this ether, (that is, the connecting medium between the earth and sun,) puts it into a state of pulsation, the vibrations passing through it as those of sound through the air. This pulsation is propagated to the eye, reaches the retina and puts that delicate membrane into a state of tremulous motion, which is the proximate cause of impression of light, produced in the mind. The various colors. blue, green, &c., are nothing more than the effects of the different rates of pulsation imparted to the retina. The vibrations varying in individuals have

led to different impressions in regard to colors. There are hundreds of persons who are never able to distinguish by their colors, the cherries upon a tree from its leaves. The celebrated Dugald Stuart, the well known chemist Dalton-many other names might be mentioned, of persons who were unable to distinguish the different colors. By a little management we may be able to see bodies that do not exist, and if we take the evidence of the senses on these points, we should be lead to believe in all sorts of spectres-the effect of *fictitious* vibrations produced by various causes. Take a stick of red scaling-wax and place it between the eye and a sheet of white paper; after keeping the eye steadily fixed on the wax for a short time, look beside it, and you will see a stick of blue wax as distinctly as you perceived the red wax. In this way a succession of spectres may be produced. Thus by looking steadily at a red wafer for a short time, you will be able to see beside it, the ghost of a blue wafer, and conversely a blue wafer will give birth to a red one-these two colors being correlative to each other. The retina by the action of the one is put into a state of morbid vibration, by which the effect is produced. It is explicable, by supposing that when the retina is put into a state of pulsation, its motions continue for a short time just as a bell continues to ring for some seconds after it has been struck."

The vibrations of the retina may be still further illustrated by an exceedingly interesting experiment. Let an individual stand upon an insulated stool, placing his hand upon the knob of the principal conductor of an electric machine in motion and fixing his eye upon a revolving deeply serrated wheel—the rapidity of whose revolutions, will of course, give it the appearance of a perfectly solid surface. If then a spark be drawn from the eye, the wheel seems instantly to pause and presents the teeth perfect, with the intermediate spaces perfectly visible. What here, but an arrest of motion could give rise to this appearance.

"If two beams of light be admitted through small apertures in a screen, and be made to cross each other, under certain circumstances so that they fall upon the same point they destroy each other, and a black spot is observed at the point of intersection. If either of the beams be intercepted, the spot becomes luminous, but if both be allowed to fall upon it together it becomes black; either of the two will illuminate it. The two systems of waves or pulsations, here obliterate each other." A bell hung in an exhaused receiver, cannot be heard when rung by machinery, although that may be distinctly seen in motion. Light, heat and electricity pass equally well through a vacuum, as through the atmosphere, so that the eye must see through a higher or different medium from that which produces hearing. But whether we pass from inanimate to animate matter, and watch the motions of the living, the chain is still unbroken. Man is not an isolated being, independent of the earth's action. Nay, dust he is and unto dust he must return. His body possesses elements in common with the earth and in its ratio of proximity harmonizes with the mother of all flesh. Without air and water man cannot survive. The ear can only hear and the eye can only see in concert with organized nature, the great principles involved in the government

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of the one, are manifest in the other. If then Philosophy has demonstrated the existent forces of the earth to be electric or galvanic, common inference without an examination into the human system, would irrisistibly suggest the residence of like forces in the body; and that play of principles, that resolves the particles of the one, in their varied transmutations, is but a modification of those that continue life in health, and all but a link in the same chain that binds an atom and a universe.

We come now, briefly, to consider the nature of the human brain, and we prefer to give the acknowledged views of the most distinguished physiologists, as our inferences will be drawn from their premises.

The term brain designates those parts of the nervous system, exclusive of the nerves themselves, which are contained within the cranium or skull bones. They are the cerebrum, cerebellum and medulla oblongata. These are invested, and protected by membranes. The whole together constitute the encephalon from the Greek en, in, and kephale, head.

The brain is of a pulpy character, quite soft in infancy and childhood, but it gradually becomes more and more consistent and at middle life it assumes the form of determinate structure and arrangement. It is more abundantly supplied with blood than any other part of the system, about one-sixth of all the blood goes to supply the brain, yet it is not more than one-thirtieth of the whole body.

The brain is regarded by Physiologists and Philosophers as the organ of the mind. Most writers consider it as an aggregate of parts each charged with specific

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functions and that these functions are the highest and most important in the animal economy. To the large brain or cerebral lobes they ascribe the seat of the faculties of thinking, memory and the will. To the cerebellum or little brain the seat of the animal or lower propensities.

The constant relation between mental power and development of brain explains why capacities and dispositions are so different, and shows incontrovertably that the cultivation of the moral and intellectual faculties can be successfully carried on only by acting in obedience to the laws of organization.

The brain likewise holds an important relation to all the other organs of the system. To the muscular system it imparts an influence which induces contractions of the fibres. By this relation they are brought under the control of the will. The digestive, respiratory and circulatory apparatus are enabled to perform their functions, by the influence imparted to them by the cerebral organs of the nervous system.

As the different organs of the system are dependent on the brain and spinal cord for efficient functional action, and as the mind and brain are closely associated during life, the former acting in strict obedience to the laws which regulate the latter, it becomes an object of primary importance in education to discover what these laws are, that we may yield them willing obedience, and escape the numerous evils consequent on their violation.

The evils arising from excessive or ill-timed exercise of the brain or any of its parts, are numerous and equally at variance with the ordinary laws of physiology. When we use the eye too long or in too bright **a** light, it becomes bloodshot. The *increased action* of its vessels and nerves, gives rise to a sensation of fatigue and pain, requiring us to desist. If we relieve the eye, the irritation gradually subsides and the healthy state returns. But if we continue to look intently or resume our employment before the eye has regained its natural state of repose, the irritation at last becomes permanent and disease is followed by weakness of vision, or even blindness may ensue.

Phenomena precisely analogous occur from intense mental excitement, if the brain is kept long in a state of excessive activity. Sir Astley Cooper, on examining the head of a young man brought to him who had lost a portion of his skull, just above the eye-brow, says, "I distinctly saw that the pulsation of the brain was regular and slow, but at this time he was agitated by some opposition to his wishes and directly the blood was sent with increased force to the brain and the pulsations became frequent and violent." Indeed in many instances the increased circulation in the brain attendant on high mental excitement reveals itself, when least expected, and leaves traces after death, which are very perceptible. When tasked beyond its strength, the eye becomes insensible to light and no longer conveys any impression to the mind. In like manner, the brain when much exhausted becomes incapable of thought, and conciousness is almost lost in a feeling of utter confusion. If study or composition be ardently engaged in towards midnight, the increased action or motion of the brain, which always accompanies activity of mind, requires a long time in which to subside.

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Now what does all this mean? These are principles acknowledged by most physiologists, and as yet nothing contrary to these views has been discovered. Here they speak of action, or motion of the brain, a vascular excitement always accompanying mental activity, intense mental action producing so great motion as to injure the structure of the brain. The comparison above spoken of between the eye and the brain; the case cited by Sir Astley Cooper, are so palpably demonstrative of a cerebral motion accompanying mental action, that to dwell longer on this part of the subject would be a needless task. Many points in the preceding extracts will be passed over without notice in connexion with the Philosophy of Impressions, they being left to the suggestions of the reader.

Now then if thought produces motion, atomic motion of the brain, that motion is in concert with thought as much so, as the vibration of a string to a given particular note. The brain may indeed be compared to a harp; the mind, the performer, whose touch on its delicate strings, produces vibrations that result in thought, which may be termed the music or language of the soul. Derange the cords of this delicate instrument by sickness, or otherwise, and the mental tone will vary with its tension or looseness; embracing every variety of morbid mental phenomena, whether witnessed in the ravings of the maniac, or seen in the fatuous play of the idiot.

Take a circular brass plate, about eighteen inches in circumference, and one-twelfth of an inch in thickness of a smooth surface, supported at its centre, by a brass rod, and the rod connected with a pedestal of wood. A square plate may be used, supported in like manner. Now sprinkle black sand upon either plate, then take hold of the brass rod with the left hand in such a manner as to allow the thumb to press against any part of the plate from the centre to the circumference. Then by drawing a well rosined bow on the side of the plate, the vibrations thus given to the plate and modified by the pressure of the thumb, will cause the particles of sand to arrange themselves with mathematical precision in figures varying, according to the ingenuity and skill of the operator, in shifting his thumb and drawing the bow. The experiment was first made by a German philosopher.

The same harmony may be supposed to exist in the higher organization of matt-r, but in a higher degree, and an infinite variety of developement, and that the mind discriminates the difference of vibration. In music the single string had virtually no new sound, posssessing only originally the capacity for vibration, but it required a Paganini to bring out the harmony and variety of its sound, so with the human brain, great occasions bring out extraordinary developements of human mind.

The continued exercise of the mind in one particular direction excites of necessity a special cerebral motion and renders that portion of the brain more easily set in motion. The miser, by constantly exercising his acquisitiveness at last can think of, and adore nothing but his mammon. The imaginative and credulous mind can easily be made to see, " things that are not to be seen." Ghosts are seen upon this principle, the darkness of the night, the indistinctness of objects, the stillness, all conspire to produce a passiveness of brain, save that of credenciveness, till finally the cerebral action becomes so intense as at last to present the mental picture of a ghost, or give properties to vision, that clothe a post, a bush, a tree, in habiliments of the grave; and the longer and more intent the individual looks, the more accurately can he define its proportions.

We are also to infer from the premises, and indeed all experience goes to prove, that the impressions of one, are likely to become the impressions of the many, under similar circumstances, and also that the mind has the power of originating motion from within, or receiving it from without, that is to say there is a motion from within and a motion from without, by which impressions are given and received or prevented. What was it that spread the epilepsy in the school spoken of by Boerhaave. The first boy that fell down in a fit, at once arrested the attention of the other boys. The brain became passive, and soon the motions of the epileptic boy, excited corresponding motions "in another, a fit followed, and so it continued, one after another, until Boerhaave set up a counter motion in the minds of the rest, more powerful than the existing impression, by declaring he would thrust a red hot poker through the leg of the next boy taken. Here then is a remarkable example of the impressions or motions of the one affecting the rest in like manner, also of one motion from without, exciting another from within. which resisted or overcame the epileptic impression.

How is it in the swoon or faint, arising from witnessing a surgical operation. The surgeon's mind is so

occupied, that the action is from within, an internal cerebral action in concert with mental activity, which so controls the force of circumstances surrounding him as sometimes to cause even the screams of the patient not to be heard by him. An interesting anecdote is related of Dr. Physic, while performing a capital operation. The patient screamed most lustily, and heaped innumerable imprecations on him, until the limb was amputated and the wound dressed, when the Doctor very innocently asked of the spectators, if the patient had made any noise. Not so, however, is it with the looker on in these cases. Here the brain becomes passive, for want of thought; the writhings of the subject, the gaping wound; the spouting blood find a brain prepared to respond, and hence the feelings of horror and faint. Here then the action is from without, inwards, and no counter-motion from an active brain to reverse and modify it.

That continued exercise of the mind in one particular direction, of which we have spoken, in exciting a special cerebral action; thus rendering that portion of the brain more easily set in motion, may account for many of those curious and interesting cases termed the wanderings of the mind in death. "Dr. Armstrong," we are told, "died delivering medical precepts; Napoleon fought some battle o'er again, and the last words he muttered were *tete d'armes;* Lord Tenterden, who passed straight from the judgement seat to his deathbed, fancied himself still presiding at trial, and expired with "Gentlemen of the jury, you will consider your verdict." Dr. Adam, author of the 'Roman Antiquities ' imagined himself in school, distributing praise and censure among his pupils: 'But it is growing dark,' he said, 'the boys may dismiss '-and instantly died. The physician, soldier, judge, schoolmaster had each their thoughts on their several professions, and believed themselves engaged in the business of life, when life itself was issuing out through their lips. Whether such words are always evidence of internal conciousness may admit of a doubt. The mind is capable of pursuing a beaten track without attending to its own operations, and the least impulse will set it going when every other power has fled. De Lagny was asked the square of twelve when he was unable to recognise his friends about his bed, and mechanically answered 'one hundred and forty-four.'-Repetitions of poetry are frequent in this condition; and there is usually a want of coherence and intonation which appears to indicate a want of intelligence, and leaves the conviction expressed by Dr. Symonds, that the understanding is passive."

The only rational conclusion, therefore that we can arrive at, is that the *active* and *passive* conditions of the brain constitute the great secret of man's impressibility. His condition may be dependent either on a voluntary or involuntary cessation of thought, or the force of surrounding circumstances, controlling and neutralising the existing motion. But some deny the power of impressions, and declare man cannot be influenced by man. He that makes the assertion, however, knows but little of his own character. He is but a tyro in the knowledge of human nature and the workings of an active brain. All history goes to prove the converse, both sacred and profane. Were not the prophets stoned, the saints imprisoned and a Savior slain by the influence of a few turbulent and wicked spirits over the multitudes of their devotees? Did not Alexander conquer Asia; Cæsar over throw the Republic of Rome, and Napoleon become the terror of Europe, by impressing their followers with a portion of the ambitious fire that burned within their own mighty minds? Was not the voice of Demosthenes, that is, the influence of the impressions he made, more powerful than the armies of Greece? How often has the burning eloquence of patriotism turned aside the hydra-headed monster of sedition, anarchy and disunion, and saved the state from impending dissolution.

Man not influenced or impressed by man! The biological experiment by which you arrest and control the thoughts of your subject, so that you seat him and he cannot rise, is no more a stretch of power, than that influence which causes the people to rise in mass and steep their hands in the blood of the innocent. Did reason hold her sway, it would not be thus? Did sober second thought prevail, the mob-spirit would die away?

Man not influenced! Whence the turbulence of Demagogueism, or the ravings of fanaticism? Does not the one appeal to popular prejudice, to work out selfish ends, and succeed? Does not the other contaminate the ears of those who listen, by trampling under foot the simplest dictates of common sense? Was ever sentiment more forcibly set forth than that of Byron, Religion, freedom, vengeance what you will, A word's enough to raise mankind to kill; Some party phrase by cunning caught and spread, That guilt may reign and wolves and worms be fed

The Doctrine of Impressions runs parallel with man's existence, and as it was witnessed in the first creation—Adam, so will it be seen until the end, whereof is eternity.

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LECTURE VI.

Object of sutting.—Negative state of mind.—Portions of the brain magnetized.—Anecdote of the Irishman and Indian.—The magnetic state but a fragment of Impressions.—Mesmerism. Clairvoyance.—Miracles.

Electricity is often made visible in the motions of matter, and when we speak of motion, as concerned in producing certain phenomena, we mean certain electrical conditions. "A great body of facts," says Sir James McIntosh, "might be adduced to show, that all animal motion may be traced to electrical action." Motion and thought in the mind, seem to be as inseparable, as motion and temperature in physics, and motion may be resolved into the electrical conditions of attraction and repulsion. The object therefore of sitting is, to tranquilize the mind, to force the brain to leave off its action and bring it to a state of unity and passiveness. By action is meant, motion, that atomic cerebral motion, which is always accompanied with an electrical expenditure. When an individual maintains a perfect passiveness of the brain and a stillness of the muscles, there is in the system an accumulation of the electric or vital fluids, which are constantly evolved by the chemical and other changes silently going on, else why the use of sleep and rest to the wearied brain and limbs. Why not perpetual thought, incessant labor, never ending toil?

In the formation of the body, there is also the utmost care taken for its retention by the perfect and wonderful insulation displayed, which retention is without doubt intended to subserve the higher powers of nature-the mental manifestations, sensations and voluntary motions, whose action is always accompanied with electrical waste. That motion of the brain produces thought, we have abundant evidence. What is it, that causes delirium in fevers, but the increased arterial excitement producing a too great atomic cerebral motion? What surer method of causing restlessness, than to get the mind excited before retiring to rest? To lay and revolve difficult and abstruse subjects, is to set up an action in the brain that does not readily subside. and the vibrations thus produced, often in spite of all efforts to prevent it, keep up thought, and that thought again reacts and keeps up motion in the brain even after apparent and partial sleep has supervened, giving rise to dreams, disturbed sleep, and frightful images flitting across the imagination.

A most remarkable example, illustrative of this part of the subject, is related by Dr. Gregory, who has no doubt of its correctness. The person alluded to was an officer of distinction, and his companions were in the habit of amusing themselves at his expense. "They could produce in him *any kind* of dream, by whispering in his ear, especially if this was done by a friend, with whose voice he was familiar. At one time they conducted him through the whole progress of a quarrel which ended in a duel; and when the parties were supposed to be met, a pistol was put in his hand, which he fired, and was awakened by the report. On another occasion they found him asleep on the top of a locker or bunker in the cabin, when they made him believe he had fallen overboard, and exhorted him to save himself by swimming; he immediately imitated all the motions of swimming; they told him, that a shark was pursuing him, and entreated him to dive for his life; he instantly did so with such force as to throw himself entirely from the locker on the cabin floor, by which he was much bruised, and awakened of course." This case illustrates two very important points; first, that the whispering in his ear, excited vibrations in the auditory nerves, that these vibrations communicated motion to the brain, and that the atomic motion thus set up in the brain gave rise to the dreams, otherwise thoughts; secondly, their being able to produce any kind of dream when the voice was familiar, shows further that the words must be intelligible, in order to produce the desired impression on the magnetized subject. That a perfect stillness and passiveness of the person, who may wish to be operated on, is required, must now be apparent. A whisper in the room may produce a vibration on the auditory nerve, and that vibration awaken motion in the brain, by consequence thought and an electrical waste, which may frustrate the object to be obtained -a cerebro-galvanic accumulation or negative state of mind, a state absolutely prerequisite to a successful performance of biological experiments. In impressible subjects this state will generally be induced in from fifteen to twenty minutes, and the operator should not wait longer, but go up to his subject, remove the magnetic button, gently take him

Transformer Transformer Transformer by the hand, and operate as before directed; being careful to remember what has been said about motion of the brain being the result of thought, and vice versa.

Language is the common stimulus between man and man, but not the only one, by which to convey his ideas. Gesture may be termed mute language, and is often as expressive as spoken. An assertion, in the negative state alluded to, has a magic effect. A thing is positively asserted, and that assertion becomes a reality to the passive brain of the subject, for it should be borne in mind, that the brain is perfectly passive or motionless, and by necessity thoughtless; it is, as it were, a perfect blank; all former images and impressions being, temporarily blotted out of the memory by the accumulation of the electrical agent, as figures in wax are softened down by heat and made ready to receive new forms and shapes, or as an unblotted sheet, ready to receive in legible characters the "thoughts that breathe and words that burn," or the unspotted canvass the glowing image of the painter. The assertion, therefore, vibrating the connecting medium between the external and internal existence through the ear, produces exact and regular vibrations in the auditory nerve, consequently an atomic cerebral motion, sui generis, with the assertion; that motion in turn produces thought; that thought, the result of the assertion, and hence but an echo, of the one first having its existence in the mind of the operator. The subject thus becomes wholly obedient to external forces, and cannot, by any possibility, correct or control the impressions made upon his brain, until it so far returns

to its normal state, as to originate thought of its own, where with to combat the assertion of the operator.

Portions of the brain may become magnetic or negative, while others remain in a normal state, or are but partially charged. The operator will, therefore, fail in some experiments, no matter how hard he may try, yet succeed with the greatest ease in others; thus he may not be able to close the eyes, the simplest and generally the first experiment, yet will succeed in fastening his subject to the floor, changing the taste of water, wine, &c. If two violins, tuned precisely alike, are placed in a room, a tune played upon one, will be breathed upon the strings of the other with the utmost exactitude. But if three strings only of the second are tuned like the first, the fourth will give discordant notes. Now the brain of the individual may be compared to the tuned violin, and the sound, to the voice of the operator, producing that cerebral motion, that produces thought, and that thought the same as the operator's, when emanating from the magnetized portions of the brain, but discordant when from the unmagnetized. 'The sound to have its effect, must be intelligible to the subject, as our ideas have come to us through this medium, and we have learned to discriminate by variations of sound, what is meant by the individual addressing us. What is intelligible to one, therefore, may not be so to another. Much may be said of gesture, which may be termed the universal language of nature. The subject, being in full possession of the power of vision, will imitate gestures, expressive of anguish, joy or fear, as perfectly as if the vibrations of the connecting medium were stirred

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by the language of sound. The following anecdote of an Irishman and an Indian, is a most ludicrous example of Impressions in which the sounds were only seemingly intelligible. An Irishman, meeting an Indian one morning, said to him, " The top of the morning to ye." The Indian replied in his own vernacular something like "We see you," (how are you.) "You see me, ha! and be Jabers, I see you," responded the son of Erin somewhat sharply. The Indian again said, "Skine ke neck," meaning you are a bad man. "Skin me neck, will ye," says the Irishman, "you blasted Ingin, I'll skin your neck," and with the words commenced belaboring him. The Indian now said, "Nock a wah," that is "Quit." "Knock away, ha! and be Jabers I will," and he continued to deal him the blows.

The magnetic state induced by the common mode of sittings, is insignificant, when compared to other states. It is but a fragment of the doctrine of Impressions, a link only of the great electric chain, very small indeed, yet illustrative of an important and all pervading principle in society. The magnetic button and the operator are significant of the drama of life-an object to concentrate and a stimulus to propel. Mobs have their tise and run their terrible career on the same principle. The blazing torch, the axe, the bludgeon, the crowd, may be the magnetic button. These negative the brain, thought is arrested or directed to one particular thing, so absorbing, that other portions become passive, that is, the motions of the mob soon occupy alone the thoughts of the beholder; every thing else is forgotten; and it requires great moral stamina to resist

the influence. The dread cholera not unfrequently negatives the mind by the funeral pall, the habiliments of mourning, and suspension of business. Inaction or passiveness follows, and the patient is easily impressed with "fear and trembling," by the great Impressor. He sinks and dies, more through the terror of its name, than the reality of its pangs.

A remarkable case of Impression or fascination occurred to a gentleman residing near Republic, Ohio, who believed in the charming of snakes. He, to convince a friend, accordingly repaired one day to a neighboring wood, and it was not long before they found a copperhead. He told his friend to stand back and watch the process, and when he discovered that the snake had fascinated him, and he began to approach it, to interfere and release him from so dangerous a charmer. He fixed his eyes on the snake for about twenty minutes, he became perfectly fascinated and began to approach the snake, when his friend stepped in to the rescue. How this was brought about, can be easily accounted for. The snake served the purpose of the magnetic button, and his keeping his eyes fixed upon it rendered all other portions of his brain passive, save that of faith, and thus he became very easily impressed or charmed. Who is there, that after listening

"To many a tale of fairy and of sprite,"

has not had his mind -negatived by the darkness and loneliness of a midnight excursion, and looked hither and thither, with the expectation of seeing a hobgoblin or a ghost; yet who has not dissipated every fear by humming a tune or whistling a lively air, thus creating excitement in the brain and motion in the mind, of a different character.

MESMERISM. The practical utility of this subject seems to be very doubtful, and this is believed to be the sentiment of nineteen-twentieths of those who have investigated it. That numerous and startling phenomena have been produced by the manipulations of its advocates is not denied; but those phenomena may have been the result of an occult cause. and that cause, as has been shown, resident in the mind of the subject. The mesmerizer and looker on, seeing effects follow the apparent cause, look upon them as the all-pervading principle. Let us suppose their ideas to be correct, where is the practicability of it? In acting upon masses you cannot paw the air, and your will, silently expressed, will be as puerile as a whisper in a dead man's ear. Apply it to the removal of disease, and who are the subjects benefited by its use, but those in whom the same results would have been produced by any of the aforementioned agencies, under favorable circumstances. If the remarkable cures effected by these manipulations be adduced as evidence of the theory, then charms, chants, exorcisms and amulets are equally entitled to litigate the ground assumed, for these all, have achieved, whatever can be claimed by the followers of Mesmer.

Take the subject upon whom you wish to operate, stand behind him, and by an effort of the will alone, attempt to influence him, and you will have little or no effect. Then try simply an assertion or a gesture, and it will be magical. You have already been told, how an assertion or a gesture acts, but mesmerizers believe that a fluid emanates from the operator and goes into the body of the mesmerized, and many of them have even felt weakened after operating. But who is it that hard work will not weaken, especially when he believes it? The operator has even sometimes gone to sleep himself in attempting to put his subject to sleep. This has always been accounted for, by saying that the subject was too strong—when in truth the mesmerizer permitted his brain to become still or passive first, and hence first impressed.

What has been said of Mesmerism is equally applicable to Clairvoyance. That such a state does exist to a certain degree, and that there are individuals who can be put into this state, or rather, who by a combination of circumstances surrounding them, go into the clairvoyant state, is not denied; independent, however, it is believed, of the will or mind of the operator, and that when a clairvoyant becomes so, it is in consequence of a principle existing and acting entirely within himself. He is impressed through a higher degree of the same medium, or an extension of the principle by which it has been contended, that biological experiments have been performed. From some peculiar circumstances, the subject becomes so exceedingly magnetic, as to be in equilibrio with the surrounding medium.

Remember, that thought produces motion of the brain, if motion then an impression on the connecting medium, hence an impression and motion, corresponding in the brain of the subject. Independent clairvoyance is loaded with the difficulty of assertion and question of the operator, and that assertion and question

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awaken motion, and that motion results in producing erroneous conclusions. Hence such a state of mind must be looked upon, as wholly impracticable in its nature, as the peaks of the Andes or Appenines, in the physical world, are for the residence of man,—regions of perpetual snow and ice, too cold for his existence, and unfit even for the erection of an observatory. So with Clairvoyance in the moral world, yet some enthusiasts go so far as to pretend to examine by its means, planets, moons and stars, and have even laid impious hands upon the land of spirits, where mortal ken knoweth not.

Many amusing accounts of their discoveries might be given, yet the reader is referred to the many works extant on the subject. Some have ingeniously argued that in this state a man could read through the top or back of his head, as well as through the eyes; that seeing by magnetic light, and magnetism knowing no resistence, therefore the subject could see. The beautiful and classic writer Dodd has fallen into the same error. For although the premises be admitted, the inference is gratuitous. He argues from the oft repeated experiment, that if a piece of silver be placed under the upper lip, and a piece of zinc upon the tongue-the eyes being closed and the metals made to touch, a flash of light will be visible. This, therefore, says he, is proof positive that light is communicated to the brain by galvanic action, that here the individual sees light without eyes, and hence that a person can see as well through the top of his head, by the same agency. Yet these adepts in spirituality should remember, that the infra-orbitor nerve which spreads out largely upon the upper lip, becomes inducted by the action of the me-

tals, and lying close in contact with the optic nerve. inducts it. A blow over the eyes, will cause a flash of light to be seen; even closing the eyes, so that no external light can be perceived, and rubbing them pretty hard with the knuckles will cause a succession of bright sparks to be seen, yet a blow on the top of the head, or rubbing it with the knuckles, will only be productive of pain without the benefit of the light. It might upon the same principle be argued by these most sapient philosophers, that because the blow over the eyes causes a flash of light, ergo, any thing can be seen through the top or back of the head. So far, however, from this being so, it can be explained only on the rational principle, that the eyes, being made for light, can only convey their impressions to the brain, through galvanic action, whether excited by the great luminary of day, by the blow over the eyes, or the contact of the metals, while the top of the head being made for other purposes, can convey no such impressions.

Materialists and others, puffed up with arrogance and pride, have laid hold of the science we teach and the experiments we perform to disprove the divine mission of the Saviour, and to explain away the miracles he wrought to exemplify the teachings of his gospel. We have often been asked to lecture on the subject, by such; but whoever thinks the premises justify the inference, is deeply, blindly and ignorantly, if not willingly deluded. Whoever thus thinks to equal himself to God, will find himself overwhelmed perhaps too late, in his own nothingness, for "vengeance belongs to him," "who can create and who destroy," and he will visit it sooner or later on those who disobey. The
difference between an Impression of Deity and that of man is vastly great. Man was so constituted in the beginning, it is true, as to be made the ruler over the earth, yet subject to its influences. To become its inhabitant, it was requisite that there should be certain relations established between them. His physical organization was, therefore, made in harmony with the primal forces by which it was made and moved and still is governed. By a combination or aggregation of particles, man was moulded by the plastic hand of Deity. Each particle that entered into the mass, carried with it that principle, that redeemed it from chaos, and made it organic. When these particles were thus aggregated and made into that shape, denominated man, they were still obedient to the primitive forces in the aggregate. Had Deity stopped here, that beautiful fabric, by purely chemical laws, would soon have been resolved into its pristine elements, as witnessed now in the body, when the spirit has fled. Deity spiritualized that organization and endowed it with a kind of selfcreative power, thus in a degree overcoming the resolving agencies by the mysterious process of secretion and deposit of living matter.

All his impressions, therefore, whether from within or without, must grow out of the relation already alluded to. The eye was made for light, the ear for sound, infinite as sound may be, in fact, the capacity of every sense was predisposed for the perception of its peculiar office, so that man cannot go beyond his natural aptitude. He cannot create a new principle or awaken a new motion, either in organized or unorganized matter. His mental organization is such, too, that he becomes subject to the moral influence of spirit, and though mind has an ascendency over, and takes cognizance of the motions of matter, and matter becomes living organized existence under the influence of spirit, yet cannot he make it assume new forms and shapes and entities at his will, but is only allowed to carry out the fiat of the "Great I Am," who, as was stated in a former lecture, at the creation established certain laws and certain agencies, to work out these laws to the end of time.

Man *must* therefore obey the primal forces; while God the author and originator of all motion, either in materiality or immateriality, can at any time arrest or modify existing laws or motions, and create others anew whensoever it pleaseth his wisdom, his goodness or his mercy to do so.

The birth of our Saviour, is strictly in consonance with the divine character, but not altogether with natural or physical laws as established at the creation. It is itself a miracle, the greatest, best and most sublime ever presented to the faith of man. In order to fulfil his divine mission properly, it became necessary for Christ-the personation of the mysterious connexion between mind and matter, to appear in material form, and if in such form, of course in obedience to the highest principle governing organized existence. Man, therefore, was that form, because he is more delicately and highly organized than any other animal. Christ, being co-eternal with the Father-the cause of all motion, was the author of self-organization. Had he come into the world, as the real son of Joseph, according to the existing laws of matter, he could never have established his

divine character. He then would have been the result of circumstances already determined, and hence no more than any other man, just as an acorn falls into the ground, springs up and becomes the majestic oak, obedient to a combination of causes that preceded its formation. His birth being of man according to nature, he would only have been a man, but being Deity, it became necessary to have an extraordinary conception according to spirit. That he had power over matter thus to create himself, as man, we are forced to admit. His whole life is a volume of testimony. "I have power to lay down my life" says he, " and I have power to take it up again," and he confirmed his words whenever it was required by such acts as no mortal hand had done or could ever do.

This brief outline of the great Incarnation is here given for the purpose of illustrating the difference between the miracles of Christ and the phenomena of our experiments. We have been charged with advocating principles we disavow and which do not grow out of the premises. We are asked if the Saviour did not work his miracles by the same power? If he did, why did not his disciples do the same prior to his conferring an especial power? Why cannot man raise the dead and "make the lame to walk, the blind to see, the dumb to speak, the deaf to hear," by the magic words "Thy sins are forgiven thee," or "arise, take up thy bed and walk." What, therefore, is the issue? Go back to the first principle, that man can know nothing of matter, except by his organization, or the harmony between the external and internal perception. For example, the difference of color depends on the

amount of vibrations, the retina is stimulated to. If the object be red, it is because of so many vibrations, if blue or any other color, of so many. Here is perception from motion, and dependent upon the result for certain amounts of that motion. Taste is another sense, less delicate than sight, but capable of infinity of variations, according to the kind or quality of substances applied to the tongue. Each sense subserves its purpose, and man can administer to each, to a certain degree, to make things pleasant or unpleasantand each degree the result of a certain vibration. But man cannot so change the nature of things, as to taste with the eyes or see with the tongue, or smell with the ears, because he has not the power to set up in a different organ the peculiarity of motion required to convey the sensation to the brain and perception to the mind. Suppose, therefore, we admit that Christ did perform his miracles upon the principles of Biology, it takes nothing from his divine power. Man, we have seen, can modify motion, sensation and perception to a certain degree, but thus far can he go, and no farther; whereas, Deity being the author of motion has power to change any sense at pleasure, to suspend motion altogether, or give us the impression of color, through the tongue as well as the eye. It is true that the operator can, by words, that is by assertion, when he has a proper subject, take away, change and reverse for the time being, any of the senses; he can give his subject water and make him think it wine, or brandy, and even get drunk upon it; he can change sticks into snakes, take away all feeling so that you might amputate a limb without pain, yet he cannot raise the dead

as Christ did Lazarus, after putrefaction had taken place, nor feed the multitude of five thousand, with three loaves and two fishes, so that all were satisfied. Here then was a power displayed not accorded to man, by nature as established at the creation, but by the hand of mercy, given to a chosen few, by Immanuel hinself, conferred upon his disciples. The incarnate son of Joseph, was therefore more than man, in vitue of his heavenly origin. You may call the principle, by which the miracles were wrought, the same by which *operators* perform their wonders, if you please, or rather an extension of that principle, yet the exercise of it is a power, reserved alone to be used at the discretion of Deity, for the vindication of his power, wisdom and mercy.

But miracles are only relative. God works to himself no miracles absolutely; they are only so to us. A miracle is something beyond the power of man, something out of the regular order of nature. The establishment of that very order of nature, the creationevery thing in existence, is a miracle to us; to God nothing is. He can as easily arrest or modify the law now, at his pleasure, as he could make it at the beginning, when he said "let there be light and there was light." . The principle by which man displays his power, was implanted in his bosom, when the divine agency created Adam and breathed into him the breath of life. He does by artificial means influence, awaken and rouse it into action, but that action, necessarily begins and ends in man; while that action or miracle beginning in Deity, awakens motion, as in

chaos, and the blind see, the deaf hear, and the dead are raised to life.

But how is this science to be made useful? To the physician it is invaluable, not only as giving him an insight into the modus operandi and effect of the medicine he administers to the body, but also that, which is administered to the soul. How often has the long and solemn visage, the knowing look, the mysterious shake of the head, the doubtful expression, at once sent a chill to the heart of the patient, and thrown a saddening gloom over the attendants, which in turn reacted and caused death, rather from the impression of the individual and his friends that he must die, than the actual violence of the disease. How many cases have we not cited and how many thousand more might we not give of deaths caused by fear, despair, fright, and the impression that it was inevitable, as was the case with the man under the guillotine, when the wet towel was applied to his neck. What a picture does the reverse present; of elevating sentiments, of hope and joy and faith that "removes mountains," not to say disease. How often has not the cheerful smile, the encouraging look, the hopeful words of the attendant, inspired a confidence that overcame disease and resulted in cure. To the messengers of peace-the bearers of "glad tidings of great joy" to erring mortality, and those "learned in the Law," it is a source of never failing success. To business men in every department of life, the fascinating power with which they impress their own ideas upon others, is the grand secret of their prosperity. In the exposition of truth and the detection and exposure of Hum-

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buggery, it is the great lever in the hands of truth. It points out the secret of success of charmers and enchanters, of fire-blowers and blood-stoppers, (by words) of Homepathists and Quack Doctors, of fanatics and factionists, et id genus omne, and is the only effective weapon with which the truly scientific can combat the predilections of mankind for such pretenders. But perhaps it is in the training and education of youth, where its truths are of the most avail, and where its beneficial influence can be most judiciously exercised. The youthful brain is easily impressed, and by repetition, impressions become lasting, either for good or for evil. How important, therefore, that those having in charge the rearing and education of youth, should well understand the workings of the mind at that tender age, and be careful to set a good example, both by words and actions. It is by imitation that the child learns. What he perceives by his senses, is impressed upon What he sees and hears, he becomes his mind. familiar with, and whether it be for good or for evil, his habits in after life, will more or less be influenced by it. So that it is, at this interesting period of life, that the foundation of future greatness and utility or obscurity and infamy, is most generally laid.

'The manner in which children are corrected, when they have done wrong, requires great consideration, forbearance and patience. Instead of continually impressing upon them the idea that they are good for nothing, by such expressions as "you naughty little rascal," "you good for nothing fellow, you will never make a man," "I'll beat you to death," mild and persuasive means should be used to show their reasoning powers wherein

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the wrong consisted; and the way to avoid it in future, pointed out. The evil passions should be soothed and lulled to forgetfulness, by exercising the good. By continually telling a child he is good for nothing, he at length becomes fully impressed that such is the *fact*, and consequently every energy is paralized and every hope extinguished. But cheer him up, and inspire him with the confidence that he possesses within himself every requisite for greatness, and that although the road may seem long and wearisome, yet he has to advance but one step at a time, and there will be a magic change, wrought in the "naughty little rascal," no cudgel or cruel treatment could have brought about.

If our views of the doctrine of impressions be correct, then "like begets like," then anger, impatience, harshness and cruelty, must necessarily excite the same in those to be corrected, and instead of reversing the evil thoughts and impressions or curbing the unruly mental emotions, the reverse is the consequence.

How forcible, therefore, and how important to be carried out, does the scripture expression become that "if you train up a child in the way he should go, he will not depart from it, when he grows old."