ORGANIC PHILOSOPHY.

VOL. II.—OUTLINES OF ONTOLOGY.

ETERNAL FORCES, LAWS, AND PRINCIPLES.

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ERRATA.

Page 165, line 3, *for* "planet" *read* "plant."

Page 209, bottom line, *for* "elative of," *read* "of relative."

Page 401, line 6, *read* "in any system of alternation from invisible to visible forms of life."

PREFACE.

THE human body is a type of integrality; a Key to the Unity of Science and the "Interpretation of Nature." To verify this, we have analysed the realms of life and organization,—the data of Episcosmology —in the first volume of Organic Philosophy; the main divisions of Ontology, in this.

While needing indulgence for defects of thought and style in our investigation, we note that, however audibly an artist may "discourse most eloquent music," the theory is hard to learn. Mathematics are abstruse; rules of grammar, intricate; and vital phenomena extensively various in their complexity. Hasty glances cannot fathom any of the depths of knowledge, in which eternal laws and forces are contrasted with changing conditions and transitory facts.

PROLOGUE.

"Happy is he who lives to understand,
"Not human nature only, but explores
"All natures,—to the end that he may find
"The law that governs each; and where begins
"The union, the partition where, that makes
"Kind and degree, among all visible Beings;
"The constitutions, powers, and faculties
"Which they inherit,—cannot step beyond,--
"And cannot fall beneath; that do assign
"To every class its station and its office
"Through all the mighty commonwealth of things;
"Up from the creeping plant to sovereign Man.
"Such converse, if directed by a meek,
"Sincere, and humble spirit, teaches love:
"For knowledge is delight; and such delight
"Breeds love: yet, suited as it rather is
"To thought and to the climbing intellect,
"It teaches less to love, than to adore;
"If that be not indeed the highest Love."

(WORDSWORTH:—*Excursion, Book IV., Despondency Corrected.*)

OUTLINES OF ONTOLOGY;

OR,

ETERNAL FORCES, LAWS, AND PRINCIPLES.

PRELUDE.

ALL phenomenal forms of life, motion, and mutation, manifest the Laws and Forces which originate and govern them; and, therefore, a careful study of the uniformities of action, which persist amidst the ever-changing phases of evolution, will unfold to us the laws and forces which transcend the evanescent forms of matter.

What is known of these laws and forces? It is known that all forces are immaterial and indestructible: all laws, eternal and immutable: that immaterial forces are creative principles or causes, and that immutable laws are regulative principles. These rule all kinds of motion, and generate all types of form. Creative forces and regulative laws are eternal principles of being, and these are not only immaterial and indestructible, but coëxtensive with infinite substance, infinite space, and infinite time; which are also indestructible conditions of existence, and fundamental factors of science; in a word, necessary forms of thought. The word infinite is used to denote that which transcends the utmost *limits* of human speculation, as the atmosphere transcends the bodily limits of the birds which fly in it. The word

law is used to denote truths within given limits. Special definitions are true within narrow limits; general laws extend to wider fields; and fixed principles, to the utmost limits of human thought.

There are two aspects of Eternal principles, commonly termed objective and subjective; and although human thoughts are subjective phenomena, we speak of them as accurate reflexions of objective forces and conditions in the external world.

There can be no rational doubt of the existence of eternal forces; the only question is that of a human science of ontology. Is there such a science? Can the human mind discover any laws of being? To these questions we may reply, that all science is necessarily ontological as far as it is abstract, immaterial, positive, and certain; and, if nothing can be certain or absolute but that which is immutable, there can be no true science but that which is based on fixed laws.

How many kinds of principles are there? Where are they to be found actually manifested? What are the questions to be answered by a knowledge of these laws and principles?

The following questions are propounded and should be answered by Ontology:—

1. What are the creative forces of nature?
2. What are the regenerative laws of nature?
3. What are the evolutive factors of organic realms?
4. What are the experiential sciences of nature?

These are the leading problems of faith, science, and philosophy. The first are the data of theosophy; the second are the data of theology; the third belong to evolutive philosophy; the fourth to organic philosophy, properly so called. Beginning with the last and ending with the first, we shall investigate them, one by one, to the best of our ability.

Ontology thus defined includes all the aspects of philosophy. It is to cosmological and biological science what pure mathematics are to applied mathematics; what abstract principles are to concrete science. We therefore class abstract or transcendental biology (ontology) as quite distinct from experiential or concrete psychology and physiology. The following parallel will convey our view of this distinction :—

IMMUTABLE, ONTOLOGICAL, ABSTRACT, NOUMENAL,
mutable, biological, concrete, phenomenal,
TRANSCENDENTAL, IMMATERIAL.
experiential, material.

The word ontological is thus contrasted with all that is phenomenal and transitory. The same eternal factors underlie all possible worlds of existence, visible, invisible, or intermediate. There is much confusion where abstract *principles*, concrete *phenomena*, and discursive *modes* of reasoning with regard to the connection between causes and effects are alternately introduced as the chief points of explanation or of refutation. This is the case with Comte's "Positive Philosophy," where he discards all theological and metaphysical inquiries, on account of loose and inaccurate modes of reasoning which abound in the writings of some theologians and metaphysicians; we might discard "Positive Philosophy" on the same plea, and thus get rid of chaff and grain together, in winnowing the elements of food for the mind. Mr. Comte admits the abstract principles of mathematics, and seems to think there are no abstract principles of biologics; whereas it is plain to those who reflect sufficiently, that all abstractions are metaphysical or immaterial, from whatever field of phenomenal experience they be derived. We cannot do better than quote a few lines from Mr. Comte's own writings, to show that he fully admits the use and the

importance of abstract ideas. In Miss Martineau's translation, vol. i., p. 80, speaking of mathematical science, he says :—

"Though I was bound to exhibit the state of extreme "imperfection in which the integral calculus still re- "mains, it would be entertaining a false idea of the "general resources of the transcendental analysis, to "attach too much importance to this consideration. "However little advanced geometers are as yet in the "science of integrations, they have nevertheless derived "*from their few abstract notions* the solution of a multi- "tude of questions of the highest importance in *geometry*, "*mechanics*, *thermology*, &c. The philosophical explana- "tion of this double general fact is found in the *prepon- "derating importance and scope of abstract science*, the "smallest portion of which naturally *corresponds to a "multitude of concrete researches; man having no other "resource* for the successive extension of his intellectual "means, *than in the contemplation of ideas more and more "abstract*, and nevertheless positive.".

Mr. Comte thoroughly appreciates the importance of abstract ideas applied to physical phenomena, being careful not to confound the incomplete development of science with imperfect modes of reasoning. Transcendental mathematics he estimates most highly, but discards abstract biologics. A few pages further on he says :—

"Lagrange himself made an immense and all im- "portant application of his calculus of variation in his "'ANALYTICAL MECHANICS,' by employing it to dis- "tinguish the two sorts of changes naturally presented "by questions of *rational mechanics*, for the different "points we have to consider according as we compare "the successive positions occupied in virtue of its "motion, by the same point in each body in two con-

"secutive instants, or as we pass from one point of the "body to another in the same instant. One of these "comparisons produces the common differentials; the "other occasions variations which are, there as else- "where, only differentials taken from a new point of "view. It is such a general acception as this, that we "must conceive of the calculus of variations to appre- "ciate fitly this admirable logical instrument, the most "powerful as yet constructed by the human mind."

We shall find that the abstract principles of ontology are just as admirable a logical instrument for dealing with the variations of biological phenomena as the abstract laws of mathematics for dealing with the changing relations of physical phenomena. In both cases the study of concrete facts leads the way to that of abstract laws, and then, from these, new light is shed on general questions of concrete science, which could not otherwise have been explained. In speaking of mathematics, Mr. Comte says:—

"*Abstract functions* express a mode of dependence "between magnitudes which may be conceived between "*numbers alone*, without the need of pointing out any "phenomena in which it may be found realized, while "*concrete functions* are those whose expression requires "a specified actual case in physics, geometry, me- "chanics, &c.

"Most functions are concrete in their origin, even "those which are at present the most purely abstract; "and the ancients discovered only through geometrical "definitions, elementary algebraic properties and func- "tions to which a numerical value was not attached "until long afterwards, rendering abstract to us that "which was concrete to the old geometers."

In parallel with this, we may observe that all our abstract ontological principles are derived from the

study of concrete biological phenomena. The theory of organic method will show how the translation from concrete to abstract functions is effected, and the superiority of intellectual vision which is acquired by the translation of concrete particulars into abstract universals. But as Comte says of transcendental mathematics :—

"It is evident that the calculus cannot originate any "science. Equations must exist as a starting point "for analytical operations. No other beginning can "be made than the direct study of the object pursued "up to the point of the discovery of the precise rela- "tions."

So we must say of transcendental biologics. They cannot originate any concrete science. Material facts and relations must exist as a starting point for analytical operations. No other rational beginning can be made by the human mind, than that of the direct study of biological phenomena, pursued up to the point of the discovery of fixed laws which underlie and govern all possible forms of life and organization. As J. S. Mill truly observes :—

"All the laws of nature and the truths of science "must be in the facts or phenomena before they are "discovered or conceived by man."—(Sytem of Logic, vol. i., p. 325.)

There are, then, fixed laws and principles of being, without which life would be an accident of nature, subject to uncertain continuation or possible annihilation in the precarious vicissitudes of motion and mutation. Mr. Comte says :—

"It is no exaggeration to say that social physics "would be an impossible science, if geometers had not "shown us that the perturbations of our solar system "can never be more than gradual and restricted oscilla- "tions round a mean condition which is invariable.

"The stability by which we hold our existence is not "found in comets whose perturbations are not only great "but liable to indefinite increase, and their being in- "habited is inconceivable—this brings us back to the "*principle of the conditions of existence*, which is the "true positive transformation of the doctrine of *final* "*causes*, and of far superior scope and profit in every "way."

The principle of the conditions of existence here mentioned, is that of the stability and indestructibility of the laws of order and equilibrium in the forces, motions, and mutations of physical nature, and is, therefore, no transformation of the organic principle of design, or final aims of life and motion. We shall see that final causes are just as positive as efficient causes, and not a whit less indispensable as necessary modes of thought.

Mr. J. S. Mill, in his System of Logic (vol. ii., p. 447), speaking of Bacon's disparagement of deductive method, observes that—

"The error of ancient speculation did not consist in "making the largest generalization first (instead of pro- "ceeding by induction from the lowest to the middle "principles, and from these to the highest), but in "making them without the aid or warrant of rigorous "inductive methods, and applying them deductively, "without that important part of the deductive method "termed verification."

And again, speaking of final causes (vol. ii., p. 517), he says :—

"The art of life in its three departments, *morality*, "*prudence* or *policy*, and *æsthetics*; the *right*, the *expe-* "*dient*, and the *beautiful* or *noble* in human conduct and "works; to this art all others are subordinate—in "the scale of desirable things. Every art is thus a

"joint result of laws of nature disclosed by science, and "of the *general principles* of what has been called *tele-* "*ology*, or the *doctrine of ends:* according to German "metaphysicians, not improperly termed the principles "of practical reason."

From this we see that "final causes" are not utterly repudiated by all positive philosophers.

It is admitted then, that fixed principles and laws exist in nature, and therefore, that they form a legitimate subject of investigation. It is also acknowledged, that the Baconian method alone is insufficient for the present age of progress. The following quotation from J. S. Mill's System of Logic (vol. i., p. 526), will explain his views on this question:—

"The copiousness with which the discovery and ex- "planation of special laws of phenomena, by deduction "from simpler and more general ones, has here been "exemplified, was prompted by a desire to characterize "clearly, and place in its due position of importance, "the deductive method, which in the present state of "knowledge, is destined henceforth irrevocably to pre- "dominate in the course of scientific investigation. A "revolution is peaceably and progressively effecting "itself in philosophy, the reverse of that to which "Bacon has attached his name. That great man "changed the method of the sciences from deduc- "tive to experimental, and it is now rapidly reverting "from experimental to deductive. But the deductions "which Bacon abolished, were from premises hastily "snatched up, or arbitrarily assumed. The principles "were neither established by legitimate canons of ex- "perimental inquiry, nor the results tested by that "indispensable element of a rational, inductive method "—verification by specific experience. Between the "primitive method of deduction and that which I have

"attempted to characterize, there is all the difference "which exists between the Aristotelian physics, and "the Newtonian theory of the Heavens."

Physical and metaphysical philosophers make numerous deductive theories which cannot be tested by actual verification. In one school of thought, physical force alone is deemed infinite in extension and duration; in another school, creative mind is believed to be infinite. These questions will, henceforth, have to be discussed on the field of biological facts and principles. The exclusive rule of physics, mechanics, and mathematics, as umpires of philosophy, is over; the organic and the inorganic sciences, must sit together in the seat of judgment.

A few quotations from Mr. J. S. Mill's examination of "Sir W. Hamilton's Philosophy," will enable us to make this plain. For instance (p. 418):—

"Sir W. Hamilton thinks that the obstacle to belief "does not lie solely in an incapacity of our believing "faculty, but in objective incapacities of existence; that "the 'fundamental laws of thought' are laws of ex- "istence, too, and may be known to be true not only "of *phenomena*, but also of *noumena*. Of this, however, "as of *all else relating to noumena*, the verdict of philo- "sophy, I apprehend, must be that we are entirely "ignorant. The distinction itself is but an idle one, "for since noumena, *if they* exist, are wholly unknow- "able by us, except phenomenally, through their effects "on us; and since all attributes which exist for us, "even in our fancy, are but phenomena, there is nothing "for us either to affirm or deny of a noumenon, except "phenomenal attributes; existence itself, as we conceive "it, being *merely* the *power of producing* phenomena. "Now in respect to phenomenal attributes, no one "denies the three 'fundamental laws' (of logic) to be "universally true. Since then, they are laws of all

"phenomena, and since existence *has to us no meaning* "but one, which has relation to phenomena, we are "quite safe in looking upon them as laws of existence. "This is sufficient for those who hold the doctrine of "the relativity of human knowledge. But Sir W. "Hamilton's opinion is, that we do know something "more than phenomena: that we know the primary "qualities of bodies as existing in the noumena, in the "things themselves, and not as *mere powers* of affecting "us (p. 421). But if the mind is incapable of thinking "anything respecting noumena, except the phenomena "which it considers as proceeding from them, and to "which it can appeal to test its thoughts; and if we "are under no necessity of thinking those otherwise "than in conformity to what they really are; we may "*refuse to believe* that our generalizations from the "phenomenal attributes of noumena can be applied to "noumena in any *other aspect*, without in the least "invalidating the operation of thought, in regard to "anything to which thought is applicable. If the only "real objects of thought, even when we are nominally "speaking of noumena, are phenomena, our thoughts "are true when they are made to correspond with phe- "nomena; and the possibility of this being denied by "no one, the thinking process is valid, whether our laws "of thought are laws of absolute existence or not."

With this difference, however, that in one case we refuse to look into the complex unity of abstract principles, apart from their special manifestations in concrete phenomena. Mathematicians deal with algebraic factors in the calculus, irrespective of their special illustrations in practical mechanics, physics, and geometry! Is there no scientific use in algebra and the calculus, in abstract mathematics, apart from their actual existence in concrete facts?

Evidently Mr. J. S. Mill does not see the use of abstract biologics or ontology. What does he admit? that "existence itself is *merely* the power of producing phenomena." Very good. But is not that enough? Something must pre-exist, as an organizing force to produce the complex mechanism of the physical body, the complex phenomenon of the experiential mind.

May we ask if the refusal to admit the distinction of abstract mathematics, apart from special applications, would not "invalidate the operations of thought, in regard to anything to which thought is applicable?" Is it rational to assert that the distinction itself is an *idle one*, for since noumena *(if they exist)* are *wholly* unknowable to us, except phenomenally—there is nothing for us either to affirm or deny, of a noumenon, except phenomenal attributes.

And is not that enough? And does not the whole ontological question—as a factor of natural religion—rest upon this distinction of asserting or denying eternal laws and forces directly, or by implication? The cosmological manifestations of nature proclaim the existence of indestructible power; co-extensive, at least, with the cosmic universe. The organs and functions of the human body proclaim the existence of an organizing principle, or soul, sufficiently powerful to form and sustain the physical organism and the experiential mind, during their temporary operations in this natural world. And these are eternal laws and forces which are the data of ontology.

It is not the indestructibility of immaterial forces and the universality of invariable laws, which is denied by positive philosophers, and therefore, to this extent, they admit the existence of eternal causes, as factors of ontology; it is the existence of a spiritual and invisible universe which they place in doubt, while refusing to

examine or to give credence to such experience as history and tradition offer us. And what is worse, in order to elude the question of biological noumena, as abstract principles of science, they endeavour to disparage the use of the words ontological, eternal, and transcendental, as if these words were not as applicable to physical, as to spiritual laws and forces. We shall find, however, by a systematic investigation, that eternal principles and laws of phenomenal evolutions are necessarily both transcendental in the abstract, and immanent in every possible world of concrete motion and mutation, natural or spiritual. And, moreover, that it is possible to form illogical inductions in both the "psychological" and the "intuitive" schools of philosophy, by the abuse of either the inductive or deductive methods of speculation. As disciples of Bacon, we should endeavour to unfold the "*Latens schematismus corporum*," and the "*Latens Processus ad formam*," in order to discover the laws revealed in these aspects of the scheme of nature, both of which are manifest in living organisms. We cannot know the *nature* of immaterial forces, either physical or spiritual, but we can ascertain the *laws* of form and motion, in all kinds of phenomenal creation. We do not know the nature of heat, light, electricity, and gravitation in the atomic, molecular, and cosmic motions and mutations of matter, although many important laws of chemical, physical, and mechanical science have already been discovered. It is not the incomprehensible nature of immaterial forces, but the laws of motion and mutation, manifested by these invisible forces, that we have to discover in the study of phenomena, both physical and biological.

The pursuit of knowledge thus defined is not an idle occupation. We know where to look, what to look for, and how to look for it. We know that we can ascertain

the laws of number, order, weight, and measure, in all possible fields of observation.

The number of what, we may be asked? The order, weight, and measure of what? To which we answer:—

1. There are *constituent* laws of *number* in every complex organism, individual or collective, in every world; and these are openly revealed in the human body.

2. There are *distributive* laws of *order* and arrangement in every complex organism, cosmic and epicosmic, and these are easily discerned in biological phenomena.

3. There are *associative* laws of *weight*, or atomic affinity, molecular cohesion, and cosmic gravitation in every complex organism of nature, physical or biological, individual or collective, cosmic or epicosmic, planetary or sidereal, to regulate the combination of integral elements in social harmony and community of action. And these are manifest in man, not to mention cosmic worlds.

4. There are *rythmic* laws of *measure* and proportion in every complex organism, to regulate the liberty and independency of every elemental integer in the various movements and mutations of the whole community, as an industrial, artistic, scientific, and social integrality, and these are easily discerned in civilized communities, and in cosmic worlds. These are invariable laws which come within the limits of the relativity of human knowledge; fundamental factors of organic science and philosophy.

PART I.—INVESTIGATION OF PRINCIPLES.

SECTION I.—THE UNITY OF SCIENCE.

"Man is the measure of all things."

"Omnia reguntur numero, pondere et mensura."

Is there an all comprehensive unity of science in the mind of the Creator? Is this unity embodied and revealed in the creation? Is nature a chaos, without form and void, or is it an organic unity of forms and forces? Are there eternal and immutable principles of force and motion manifest in the uniformities of mutational phenomena? and if there be, where are they seen in a form or forms which may be analyzed?

Principles of unity must be embodied in forms of unity, and these are various in nature. Individual globes and solar systems are complex units of creation. Individual organisms and classes of organisms are complex units of the animal and vegetable kingdoms of our planet. What then, are the laws of organic unity and equilibrium in any of these complex units? Are they alike in all, or not alike? Are all earthly bodies like the human body; all heavenly bodies comparable with the earth. Is the difference we see, a difference of form alone, or one of principle; one of kind, or merely of degree? Is there a law of cosmic unity for every globe and every solar system; for every individual organism,

and every class of organisms? Are there immutable laws of order, number, weight, and measure, which regulate the ever changing phenomena of life and organization in the world? Are the principles of unity in human nature the same as those of universal nature; and if they are, can the sciences be classed systematically on these principles, so as to become accessible to human understanding?

Is there a science of imperfect human nature; a science of imperfect universal nature; a science of perfect Divine Being? And have these sciences any laws in common? The existence of God, of man, and of the universe may be self-evident to many minds, but the existence of Divine Being is deemed an open question by some philosophers. The "intuitive school" deals with these questions in one way, while the "empirical school" deals with them in another; but even the acutest thinkers of the latter admit that "one "luminous principle is worth a thousand unconnected "facts, for it contains within it the seeds of a thousand "discoveries."—(Aristotle, by G. H. Lewis, p. 290.) Is it possible, then, to find a "luminous principle" as a guide to the discovery of laws in the creation? We believe it is, if man be a microcosmic embodiment of all the laws and forces of the macrocosm.

All thinkers admit the existence of immaterial forces and laws, as permanent causes of form and motion, and this is quite sufficient for the groundwork of ontological science. The phenomenal existence of suns and planets is never questioned as the basis of cosmological science; and the existence of living organisms on our globe, are positive data of biological science. Ontological, cosmological, and biological distinctions, are natural then in the primary analysis of the unity of science; and if human nature is ontological as well as cosmological, we

have in it a key to both material existence and immaterial principles of being; this we shall find to be a fact. Immutable laws and indestructible forces, although invisible and immaterial, are revealed by uniform modes of manifestation in visible and mutable phenomena; and thence it is that positive science is accessible to man.

We have seen in the first volume what the factors of organic unity are, in the human body, and that they are the same as those of all the organisms and realms of our globe. We have now to show that principles are the same in every realm of nature; in every aspect of science and philosophy.

We need not ask those who deny that eternal laws and forces are manifest in man, where they are to be found, because they do not know, and cannot tell. Doubts are nevertheless legitimate reasons for investigation, and we must do our best to fix the limits of inquiry, and distinguish questions of immutable laws from those of experiential and mutable phenomena.

Dr. Whewell, in his "Philosophy of Discovery," shows how the ancients dealt with these questions, from the very limited data of positive science which they had obtained by observation and analysis.

"The knowledge of geometry of the Greeks," he observes, (p. 352,) "was the starting point of their "sound philosophy. It showed that something might "certainly be known, and it showed in some degree, "how it was known. But the Greeks tried to go "beyond geometry in their knowledge of the uni-"verse; they tried to construct a science of astronomy, "of harmonics, of optics, of mechanics. In the two "former subjects they succeeded to a very considerable "extent. The question then arose, what was the philo-"sophical import of these new sciences? What light "did they throw on the nature of the universe; on

"the nature of knowledge; on the nature of the "human mind? These questions Plato attempted to "answer. He said that the nature of these new sci- "ences is this:—that the universe is framed upon the "*Divine Ideas;* that man can, to a certain extent, obtain "sight of these ideas; and that when he does this, he "*knows* concerning the universe. And again, he also "put the matter otherwise:—There is an *intelligible* "*world*, of which the visible and sensible world is only "a dim image. Science consists in understanding the "intelligible world, which man is, to a certain extent, "able to do by the nature of his understanding. This was "Plato's philosophy, founded upon the progress which "human knowledge had made up to his time."

Dr. Whewell adds (p. 353.)

"It seems to me that new inferences remain to be "drawn of the nature of those which Plato drew, and "those I here attempt to adduce and illustrate."—(See his "Philosophy of Discovery.")

In addition to all that Dr. Whewell has put forth in his valuable writings, is there any new development of positive science which will enable us to carry forward the work of philosophical induction from the point where Plato left it, and from that which his followers in modern times have been able to attain? We believe there is, and that the science of biology furnishes a key to organic philosophy.

FAITH, SCIENCE, AND PHILOSOPHY.

WHAT IS FAITH?—There is an increasing undercurrent of discussion between Christian and sceptical rationalism which requires a technical *definition* of the word Organic Faith, by which we denote that drawing of the human soul to God, which is analogous to the gravitation of

the human body to the earth and of the planets towards the sun. This is quite distinct from any form of intellectual belief, creed, or opinion, being more akin to trust and confidence than to mere degrees of probability in any given doctrine.

Veneration may be compared with *Faith*, as solar gravitation and illumination may be compared with terrestrial attraction and reflected light. Organic faith is the force of stability in spiritual nature, as the physical gravitation of the planets towards the sun and towards each other is the cause of stability in the solar system. As the sun attracts the planets, so the Divine Spirit attracts all human spirits, whether they are conscious of the influence or not; and to say that prayer is useless because the *laws* of nature are *immutable*, is just as irrational as to affirm, that parents cannot listen to the supplications of their children and afford them succour, without infringing natural or spiritual laws. Parents do not always give their children exactly what they ask for, as that might be injurious; but they do supply them with that which is beneficial in case of need.

Again; we must have faith in the existence of natural and spiritual laws of order, or we could not deem it rational to look for laws of any kind in nature.

WHAT ARE SCIENCE AND PHILOSOPHY?—The word SCIENCE is applied to the invariable laws of order, number, weight, and measure, in the phenomenal experience of the human mind, amidst the ever changing states of forces and relations in the universe.

Organic science has, nevertheless, a deeper and fuller meaning than the word in its ordinary acceptation, as applied to living organisms. It means the unity of all the sciences, as branches of one universal law of order and association.

The word PHILOSOPHY is used in a double sense; first, to denote the laws of order in a given science; secondly, to denote a speculative inference derived from the known finite sphere of experience, and applied to the unknown limits of nature.

What are the meanings of the words physical philosophy, mental philosophy, positive philosophy, evolutive philosophy, and organic philosophy? Mental philosophy is merely a branch of psychology. "Physical philosophy" and "positive philosophy" suppose the universe to be a mechanism, and endeavour to explain its laws by means of the mathematical, the physical, and the mechanical sciences alone. Evolutionists have consulted physiological science as a means of supplementing the defects of physical speculations, but they have not avowed that evolutive science leads naturally to organic speculations, and must ultimately deal with nature, not as a mechanism only, but as an organism.

The convertibility of forces, so much dwelt upon by physicists, would ultimately lead to evolutive phenomena, as these lead to organic principles and forces; so that the drift of rational philosophy, in the present age, is from the physical and mathematical to the biological and sociological sciences; from the speculative study of nature as a mechanism, to that of nature as an organism. The meanings of the words faith, science, and philosophy, then, are somewhat various in different schools of thought, and we must endeavour to explain them from a point of view which may possibly conciliate physical with biological philosophy.

A short quotation from the writings of Sir Henry Holland, will serve to show the tendency of modern scientists in this direction. In his "Medical Notes and Reflections," he observes, (p. 328):—

"Much has been done to extend inquiry into that

"region of general laws towards which so many "separate paths converge. The suggestions derived "from every part of physical science, and especially "from the researches of Faraday on the mutual con- "nexion, interchange, and *preservation* of the elemen- "tary forces, have been methodized and analyzed "by Mr. Grove in a very remarkable treatise on the "'Correlation of Physical Forces.' To him we un- "doubtedly owe the first precise exposition of this great "doctrine, to which Dr. Carpenter has given further "extension, though with less certain data, by a paper "'On the Mutual Relations of the Vital and Physical "Forces,' (Phil. Trans. for 1850.) All science tends to "prove the unity of creation, through the evidence it "affords of mutual and universal relation of parts. "'L'univers, pour qui saurait l'embrasser d'un seul "point de vue, ne serait qu'un fait unique et une "grande verité,' says an eminent philosopher, though "in one sense it may seem a vague imagination, yet in "a larger scope of view involves the great result and "term of all philosophy. The 'single fact' and 'great "truth' is that of one Almighty cause; a conclusion to "which we are irresistibly carried forwards from every "side, surmounting in this inference, those intermediate "gradations of existence and power which are too dimly "seen to be rightly apprehended by the faculties of man "in his present state of being."

And again, (p. 181):—

"By facts already attained, and methods of thought "previously acquired, the mind becomes capable of "passing beyond its actual knowledge, and gain- "ing what may be deemed certainty, as the result "of combinations which have never yet existed, or "if existing, have never before been the subject of "human observation. Physical science abounds in

"examples where predictions thus made have been "verified in the event. The conversion by two reflec- "tions in glass, of the plane polarization of light into "the circular, is an instance of the highest class of such "generalizations directed towards the future and realized "in the progress of research. The undulatory doctrine "of light offers other examples no less remarkable, in "the anticipation by a profound theory of complex "effects wholly unknown as facts, and even in seeming "contradiction to all analogies of the science, yet which "experiment has since established as real and in har- "mony with other laws of light. The loftiest attributes "and objects of a philosophical spirit all lie in this "direction. Here it is passing from '*the region of facts* "*to that of laws,*' that man takes his peculiar position in "the scale of created beings, and here also, that the "intellect of one man stretches furthest beyond that of "another."

If all the sciences lead us from "the region of facts to that of laws," it is important to distinguish the one from the other; this is the special business of ontology.

Classification of the Sciences.—The natural *distinctions* of science, in parallel with their *limits* and their *uses*, are methodological, cosmological, and ontological. The human mind discovers certain laws of nature, and creates special sciences to register these principles of order, as methods of investigation and of demonstration; and thus we have a methodological group of sciences. When these have been applied to the ordinary purposes of life on the surface of our globe, and found to be perfectly applicable to all phenomena within those limits, we apply them to cosmic worlds, and thus obtain a cosmological group of sciences. By this means we gain some positive knowledge, but find that we have not yet fathomed all the depths of nature.

There is in the human heart a pre-conscious reflex of the Eternal Being, and a yearning for some degrees of knowledge of the principles of life in man, in God, and in the universe. Is it possible to measure the unknown by the means which have, to some extent, explained the known? Do the laws which rule the phenomena of life and organization in man, also rule the unknown forces and phenomena of life and organization in all creatures? It is commonly believed they do, and hence the admission of a third group of sciences, the ontological. This speculative mode of reasoning from the known to the unknown worlds of laws and forces, is called philosophy, and the most general outline we can trace of the natural delimitations of science, is shown in the following synopsis: all subordinate distinctions being marshalled under one or other of these general denominations:—

SYNOPTICAL TABLE OF THE SCIENCES.

Ontological Sciences.	Z.	Ontology of Infinite Being. (Theosophy.)
	Y.	Ontology of invisible worlds. (Theology.)
	X.	Ontology of intermediate worlds. (Evolutive philosophy)
	W.	Ontology of visible worlds. (Organic philosophy.)
Cosmological Sciences.	VII.	PANCOSMICS. (Unfathomable universe)
	7.	*Nebulocosmics.* (Nebular astronomy, &c.)
	VI.	GALACTOCOSMICS. (*Galaxy*, Milky Way.)
	6.	*Zodiacosmics.* (*Zodia* (animal) constellations.)
	V.	POLYCOSMICS. (Double or multiple stars.)
	5.	*Monocosmics.* (Solar system.)
Methodological Sciences.	IV.	BIOLOGICS. Special and general.
	III.	SOCIOLOGICS. Special and general.
	2.	*Dialegmatics.* Special and general.
	II.	MECHANICS. Special and general.
	1.	*Mathematics.* Special and general.
	I.	PHYSICS. Special and general.

In the *methodological* group of sciences we proceed from the most general and external to the most special

and internal *kinds* of forces and modes of action in nature. Mathematics, physics, and mechanics deal with matter and motion chiefly; while dialegmatics, sociologics, and biologics deal with mind as well as matter.

Comte places the biological sciences before the sociological, in his synopsis of progressive descent from the most simple, general, and external, to the most complex, special, and internal; but we must not allow imperfect definitions to guide us, in systematic classification. The division of labour in collective humanity causes each individual to represent a fraction only, of the complex organic unit of all kinds of forces and varieties of functions; while the individual organism, as a complex unity, contains all kinds of immaterial forces and phenomenal varieties of function, psychologically and physiologically consociated, so as to represent the most perfect finite type of infinite, complex, organic unity or Deity.

In the *cosmological* group of sciences, we proceed from the lowest solar degree of complex unity, to the highest sidereal degree of integral unity; from a simple solar system of individual orbs, to the whole pancosmic universe.

In the *ontological* group of sciences, we proceed from the study of the laws of being in the visible universe, to the laws of immortality in the supernatural or invisible universe.

We are conscious of a mortal and an immortal existence, both for individual man and for humanity. We may postulate eternal and transitory factors and functions, in all kinds of cosmic forces and mutations. The methodological sciences applied to transitory states of existence only, would not include the immortal life of man, nor the eternal laws and forces of perishable worlds. The same laws of coexistence and sequence

exist in the human mind, whatever world it may inhabit, and therefore we can apply the methodological sciences with almost equal certainty, to both the visible and the invisible worlds of life; to both the cosmological and the ontological aspects of nature. Abstract views of laws and principles may disregard time and space, but concrete views of force and motion cannot exclude the ideas of coexistence and succession. Dr. Whewell goes so far as to say, in his History of Scientific Ideas, (vol. i. p. 219), that "we are human beings "only in so far as we have existed in space and time, "and of our human faculties developed by our existence "in space and time, space and time are necessary con-"ditions. In like manner we are human beings only in "so far as we have bodies and bodily organs, and our "bodies necessarily imply material objects external to "us. And hence our human faculties, developed by our "bodily existence in a material world, have the condi-"tions of matter for their necessary laws."

This shows that space, and time, and bodily form of some ethereal kind, must be necessary conditions of coexistence and sequence in the supernatural world, as well as in the natural.

Astronomy does not include all the aspects of cosmic nature, and therefore we use the word cosmology, to denote a systematic view of life and motion on the surface of our globe, as well as organic distribution and arrangement in the perennial forces and motions of the sidereal heavens. Many suns and solar systems are grouped together in different degrees of complex unity, and definitions are required for each of the primary and secondary distinctions of simple and double stars, in multiple and universal systems of suns and planets.

The word philosophy includes a general definition of all kinds and degrees of ontological speculation, but

requires a qualifying adjective for each subordinate distinction; and as the perfection of all science is an accurate methodical abstraction and symbolization of eternal forces and mutable phenomena, it requires a definite translation of concrete factors into abstract terms. For instance, the philosophy of infinite being can only be a knowledge of eternal laws and forces; that of the invisible world can only be a knowledge of religious revelation and perfective principles; that of intermediate worlds can only be a knowledge of evolutive factors and phenomena; and that of the visible world a knowledge of the scheme of nature in all complex organisms.

These distinctions of science require appropriate denominations, subordinate to the general definition of philosophy. Thus:—

I. Organic or systematic ontology.
II. Organic or systematic cosmology.
III. Organic or systematic methodology.

The first of these may be fitly subdivided thus:—

1. Transcendental organic philosophy. (Theosophy.)
2. Perfective organic philosophy. (Theology.)
3. Evolutive organic philosophy.
4. Constitutive organic philosophy.

The subordinate distinctions of systematic cosmology and methodology are sufficiently definite in the table, and need no further notice.

From this general outline of classification, we may now proceed to the details of each division to obtain some knowledge of the real unity of all the sciences.

SECTION II.—METHODOLOGICAL SCIENCES.

BEFORE we explain the primary divisions of this section of our general synopsis, we will give a table of subdivisions, that the reader may have an idea of their relative affinities, before we enter into more minute investigations. The table will not explain itself, but it will show what is to be explained.

TABLE OF THE METHODOLOGICAL SCIENCES.

IV. BIOLOGICS.	1. Physical biology. 2. Instinctual biology. 3. Mental biology. 4. *Spiritual biology.*
III. SOCIOLOGICS.	1. Industrial organization and economy. 2. Artistic organization and economy. 3. Scientific organization and economy. 4. *Social organization and polity.*
2. Dialegmatics.	1. Musical sciences (impartative). 2. Linguistic sciences (impartative). 3. Dramatic sciences (impartative). 4. *Methodic sciences (investigative).*
II. MECHANICS.	1. Photological statics and dynamics. 2. Electrological statics and dynamics. 3. Thermological statics and dynamics. 4. *Barological statics and dynamics.*
1. Mathematics.	1. Geometry. 2. Arithmetic. 3. Algebra. 4. *Calculus.*
I. PHYSICS.	1. Photological physics and chemics. 2. Electrological physics and chemics. 3. Thermological physics and chemics. 4. *Barological physics and chemics.*

A very brief account of the secondary and tertiary subdivisions of these sciences, will be sufficient as an introduction to ontology; but we must give a reason for substituting technical for popular names and definitions in a general classification. It will be observed

that neither chemistry nor mixed mathematics find special places in the preceding scale; the reason is, that chemistry belongs to the genetic aspect of all the physical and mechanical sciences, not to mention its connection with mineralogy and physiology; applied mathematics belong also to all the sciences.

"Old things under new names" are not pleasant innovations, but new insights into old sciences cannot be obtained without new methods of investigation, and these require more accurate limitations and definitions than those which have prevented them from making further progress, in the explanation of natural phenomena. New technical expressions do not displace the old ones, in such cases: they merely assume special functions in new developments, and leave the old ones standing, as the landmarks of popular phraseology, still useful, and even necessary, in a literary point of view.

Chemistry, astronomy, and applied mathematics are names that will last as long as our language, although we sometimes find no place for them in the primary distinctions of universal science.

MATHEMATICS.—Organic method co-ordinates all natural definitions and distinctions, in parallel with those of human nature, and as these, being unfamiliar, may *seem* arbitrary in some cases, we briefly explain our reasons for adopting them.

Mathematical laws of order, number, weight, and measure rule all the phenomena of nature, and therefore mathematics pervade all other sciences, and constitute, in fact, the very foundations of positive certainty. Pure mathematics form a distinct branch of science, while applied mathematics affect not only the physical and mechanical sciences, but also the biological and the sociological, not to mention the cosmological and the ontological.

Besides the pure geometry of artificial forms as recognized and taught in schools, there is an applied geometry of inorganic and organic forms, (animal, vegetable, and mineral,) and this is partly recognized in crystallography, but not much studied, that we know of, with regard to the geometrical forms of bones and other parts of animal organisms.

In physical biology we have anatomy and physiology, histology and embryology; and in each branch of mathematics we have corresponding subdivisions. In geometry, for instance; 1st, the genesis of geometrical forms and science; 2nd, the geometry of artificial forms; 3rd, the geometry of organic forms; and 4th, the characteristic properties of conic sections, and of all other geometrical forms. The movement of a point gives a line, and the forms of squares, cubes, circles, cones, spheres, cylinders, as special types of lines, surfaces, and solids, are generated by simple or complex motions. The pure geometry of artificial forms is that commonly taught in schools; and the geometry of organic forms is a natural branch of mathematics. The characteristic properties of conic sections and other forms, is a fourth distinction, in parallel with physiological characteristics in biology, and we have thus four natural distinctions in geometry.

Arithmetic has also four natural aspects; 1st, the genesis of numbers; 2nd, the definite numbers of elementary combinations; 3rd, the constituent numbers of organisms; and 4th, the properties of numbers manifested in musical vibrations, and in systematic anatomy. Constituent organic numbers and fractions are thus recognized as a distinct branch of mathematics, variously illustrated in different complex organisms. The same distinctions exist in algebra, and in the calculus. Operations and differentials must apply to in-

organic and organic factors and functions; both involve peculiar characteristics, and neither could exist without a history of their genetic evolution. Mixt mathematics find a place in each of our subdivisions, and in fact, all the sciences involve pure or applied mathematics.

PHYSICAL SCIENCE. — Heat, light, electricity, and gravitation. In each of these we have four different aspects. In photological physics and chemics, the chemical generation of light is one aspect; the physiological absorption of light is another; radiation and reflection belong to catoptrics: refraction and polarization to dioptrics.

Electromagnetic phenomena afford similar distinctions. The chemical generation of voltaic electricity; the phenomena of conduction and induction; and the physiological characteristics of electro-magnetism, form distinct aspects of this branch of science.

Thermological physics and chemics involve the phenomena of radiation, and conduction, and the generation of heat, with the characteristics of latent and specific heat.

Barological physics and chemics also present four parallel aspects of motion and inertia, attraction and repulsion, with their different characteristics in all the phenomena of sidereal *coherence*, cosmic *gravitation*, molecular *cohesion*, and atomic *affinity*.

In dealing with these general definitions, we need not enter into questions of special science. It makes no difference to our views of systematic classification, to observe that chemistry explains the laws of atomic affinities and definite proportions; physical and mechanical sciences explain the laws of molecular motion and cohesion in solid, liquid, and gaseous bodies; astronomy explains the laws of cosmic gravitation in our solar system; and the perennial cohesion of the sidereal

heavens is a fact, though unexplained. All we have to do here, is to show that these phenomena belong to the barological aspect of universal physics and chemics, as a primary division of the methodological sciences.

MECHANICS.—Besides the purely physical and chemical aspects of the material forces and phenomena of nature, there is a mechanical aspect of all these forces. There are photological statics and dynamics in the modes of motion and inertia peculiar to light; electrological statics and dynamics in the modes of motion and equilibrium manifested by electricity and magnetism; thermological statics and dynamics in the modes of motion and latency observed in heat; barological statics and dynamics in the modes of motion and tension displayed in the sidereal heavens, in cosmic gravitation, molecular cohesion, and atomic affinity. It is not our business to explain the laws of mechanics, but we may observe that all kinds of physical force and motion have mechanical functions, and that statics and dynamics apply to every possible kind of mechanical equilibrium. We do not know how far the laws of mechanical force may have been detected in the phenomena of light and electricity, but these two modes of motion are necessarily subject to the same kinematic principles as all other modes of motion manifested by indestructible physical forces. The mechanical forces of sidereal cohesion and cosmic gravitation need not be questioned: the molecular forces of cohesion in elastic gases, flexible liquids, and rigid or elastic solids, are equally familiar. The atomic forces of physical and physiological phenomena are not less positive; and all the modes of motion and of tension, in these physical forces, are legitimate data for the science of kinematics. Atomic mechanics are practically useful in explosive com-

pounds and in blasting operations: molecular mechanics are familiar to sailors who wet their ropes to tighten them for purposes of traction; gravitational mechanics are familiarly known in waterfalls, which turn mill wheels and set machinery in motion.

The heat of the sun is known to raise vast quantities of vapour from the sea, which vapour being condensed into clouds, falls in millions upon millions of tons weight of water to the earth again, filling lakes and rivers, and propelling the machinery of flour-mills and other useful engines for the benefit of man.

The light absorbed by plants upon the surface of the globe in prehistoric ages, can be liberated from the coals and oils now buried in the bowels of the earth, and thus be rendered useful to the present generation of mankind. Electrical forces are stored up in all the physical bodies of the planet, and can be set in motion for the use of man in telegraphic mechanisms, and in numerous other ways subservient to the uses of the world. Heat, light, electricity, and gravitation, then, are modes of motion subject to the laws of static and dynamic equilibrium in all the realms of nature, and form the proper data of that general branch of science called mechanics.

In each of the four great modes of motion, light, heat, electricity, and gravitation, there are four leading aspects of mechanical science, namely: statics, dynamics, kinematics, or the abstract properties of motion, and the genesis of motion by artificial means, or the rupture of static equilibrium and inertia. We need not dwell on any of these aspects of special science, in our simple outline of a systematic classification.

Mathematics pervade physics; these involve mechanics; and here ends the outward sphere of investigation, although the same principles descend to inner depths of nature which now come under notice. New

sciences must be discovered to unfold the laws which govern organic phenomena, as manifested in the world of living beings.

Dialegmatics, sociologics, and biologics form a distinct subsection. The first is the science of expression and investigation; the communication of thoughts and feelings from one being to another. The word is unfamiliar, but Mr. A. M. Ampère has given very good reasons for coining it, and to his explanations we refer the reader who is interested in these questions.—(Essai sur la Philosophie des Sciences. Paris, 1834, p. xliii.)

Dialegmatics.—This general branch of knowledge includes the musical, linguistic, dramatic, and methodical sciences, and each of these presents four aspects—melody, harmony, musical composition, and philharmonics (the history of musical science and invention in all countries and all ages) form the leading subdivisions of musical science; and acoustics (applied mathematics) lie at the root of them; we say lie at the root, the root itself being in the human mind, while physical vibrations are external phenomena.

Grammar, logic, rhetoric, and philology are natural subdivisions of linguistics. Histrionics, dramatics, poetics, and philopoetics, (the evolutive history of poetic and dramatic art and progress) are the most natural subdivisions of dramatic science (distinct from dramatic art, as theory from practice.) Methodics present the same quarternary order of subdivision. *Experimental* methods, *statistical* methods, *organic* methods, and historical or *evolutive* methods are distinct branches of the one great investigative science of methodics. Dialegmatics thus include music, linguistics, dramatics, and methodics, and each of these contains four subdivisions. We need not dwell on the three first, which are wholly impartative, but the fourth, being mainly investigative,

and not well understood, is worthy of a more extended notice.

Methodics, as a branch of science, can hardly be said to exist in all its fulness. *Experimental* methods have been much developed since the time of Bacon and the Novum Organum; *statistical* methods have been more or less cultivated by political economists, and some historians in modern times; *evolutive* method has been recently much noticed, as the means of establishing a "new philosophy;" but *organic* method has not been named or thought of until very lately; unless we recognise the intuitive conjectures of Pythagoras and some modern authors, who speak of music as a type of natural organic method.

It must be acknowledged, however, that just as astrology was the natural precursor of astronomical science, (and alchemy of chemistry) so utopian theories are the natural precursors of true social science; and moreover, as positive science progresses towards completeness in any branch (as in the chemistry of the present age) many of the intuitive notions of antiquity are found to be very close approximations to the real truth; and not a few of the modern facts of social progress, such as the establishment of infant schools and coöperative societies, owe their origin to the speculations of utopian philosophers.

Each of the four branches of methodics is necessary for a complete investigation of natural phenomena, though one is more useful than another in special studies. Experimental method is indispensable in the acquirement of physical science, while other methods are necessary to harmonise the laws of physical with those of biological phenomena. The habitual use of any one method alone, generates conflicting theories in different schools of thought.

The so called "new philosophy" (of the *experimental* school of science) based on the theory of the convertibility of physical forces, is one of this kind; the philosophy of the *evolutive* school, based on the theory of the evolution of organic forms and forces, as propounded by Lamark, Darwin, and the author of "The Natural History of the Vestiges of Creation," is another; the *statistical* philosophy of history, as propounded by Mr. Buckle, is a third; and the theory of Ch. Fourier is a fourth.

Positive science cannot be attained without experimental method, nor safely generalized without statistical method, nor put in a systematic shape without organic method, nor harmonized in every department without evolutive method. None of these are perfect in the present day, but much is to be gained by the steady advancement of each one, and their syncretic development. The logical methods of demonstration are the same for all these methods of investigation, and are sometimes confounded with them.

Formal logic is a special branch of linguistic science, and philosophical method should not be a means of confounding questions of ontological and psychological investigation with rules of ratiocinative demonstration.

In another volume we shall give an outline of the principles of methodics. At present we have only to explain the definitions of the words we use in forming natural distinctions and denominations in the scale of sciences.

The four branches of investigative method are sufficiently distinct for all purposes, but for want of a due knowledge of the mutual dependency of these methods, men of special science are often led astray, in attempting to generalize within the limits of spontaneous induction. We might give numerous examples of this tendency, but two will be enough. The leading men in one of

the chief schools of naturalists, for instance, confine themselves almost exclusively to evolutive investigation and generalization, and in a recent work by one of the most eminent men of this school, we observe that he clings to the phenomena of embryonic evolution, in preference to the comparative differences of fully developed organisms, as a guide to zoological distinctions and classifications; and notwithstanding the manifestly wide diversities which separate the class of reptiles from the class of fishes, and the structural characteristics which designate amphibians as a natural sub-class of reptiles, he proposes to place them with fishes, because they have no amnion; not perceiving that this may be due to the mere fact of both being morphologically developed in the midst of a liquid element, where no soft, flexible, external cushion for the fœtus is required. He judges of the rank of the permanent type of architecture, by the temporary forms of the external scaffolding, and is thus misled by the influence of habit, in using not only one branch of method more or less exclusively, but one division only of that branch, namely, that of embryonic evolution.

Another very eminent professor speaks of a "new philosophy" derived from the hypothesis of the evolutive and convertible unity of every kind of physical and moral energy. We shall see by and bye what would be the necessary consequences of this hypothesis applied to universal nature, by the simple process of logical generalization.

Experimental methods are applicable to all classes of phenomena, chemical and physical, sociological and physiological. *Statistical* methods involve: 1st, the manifold and careful registration of lists and scales of facts; 2nd, the manipulation of these scales, and the establishment of various kinds of averages and extremes; 3rd, the recognition of variations and compensations in peri-

odic oscillations and perturbations; 4th, the relative degrees of influence amongst secondary causes, and the laws of probability with regard to their average influences and recurrences in the generation of results. This is one of the most complex and important branches of methodical investigation, requiring much skill and patience to work with it efficiently.

Mr. Buckle, in his history of civilization, observes very truly, that—

"*Statistics* have been so sedulously cultivated that we "have the most extensive information, not only respecting the material interests of men, but also respecting "their moral peculiarities; such as the amount of different crimes, the proportion they bear to each other, and "the influence exercised over them by age, sex, education, and the like . . . . At the same time, and that "nothing should be left undone which might enlarge "our knowledge of the events by which man is affected, "there have been instituted circumstantial researches in "many other departments; so that in regard to the "most civilized people, we are now acquainted with the "rate of their mortality, of their marriages, the proportion of their births, the character of their employments, "and the fluctuations both in their wages and in the "price of the commodities necessary to their existence. These and similar facts have been collected, "methodized, and are ripe for use."

This historian has made great use of all the statistics he could gather, and political economists depend mainly on this branch of method for the necessary data of their science.

Organic methods of investigation may also be applied to universal nature, but the type of natural organic unity is found in man; and therefore individual biology, collective biology, epicosmic unity, cosmic unity, and

ontological unity, are the natural fields of investigation most suited to this branch of method. (The word *epicosmic* denotes the kingdoms of nature on the surface of our globe, or of any globe in the sidereal heavens, and refers to the external crust of the earth, as the word *epidermis* refers to the external cuticle or scarf skin of an animal.)

Evolutive methods of investigation are derived: 1st, from the study of embryonic evolution; 2nd, the study of individual growth and development from birth to death; 3rd, the collective evolution of a race of beings, from its commencement to its final extinction, where evidence can be found of such a complete cycle of mundane existence; and 4th, from the evidence which may be found of cosmic and epicosmic evolution, in the reliquial realm of our planet. Our experience of embryonic evolution is easily improved by systematic observation, and has been already carried very far by modern physiologists. That of individual growth and development, through all the phases of infancy, adolescence, virility, maturity, and senility, is equally accessible in the life history of many organisms, but has not hitherto been as systematically studied as comparative embryology. The evolutive history of humanity has been very much investigated by ethnologists, philologists, historians, and antiquarians, with some success, though incomplete.

The natural laws and artificial rules of the impartative sciences of music, linguistics, and dramatics, are simple, definite, and extensively developed: they are equally numerous, definite, and simple, in the investigative science of methodics, though not as far advanced in theory or practice. The laws of order in this department are so little understood, that men of great intelligence imagine "new philosophies" of universal nature, explaining its creative or evolutive energies, organic constitution, and progressive development, from the

evidence obtained by experiments and observations in chemical, physical, anatomical, geological, embryological, and paleontological fields of study, without any adequate or even systematic investigation of psychological phenomena. Comte admits that mental biology is not yet a positive science, but thinks that phrenology is worthy of attention. Sociology, however, in his hands, can do without biology, by consulting history alone; and the universe, to be explained, requires no sciences but those of mathematics, physics, and mechanics, as the basis of a positive philosophy.

Such speculations would be harmless, did they not proclaim creative mind to be a superfluous factor in the world, and maintain that all the sciences are hostile, not only to theological and ecclesiastical aberrations, but also to the principles of religious faith.

The laws of number, order, weight, and measure, being the same in every integral part of nature, the abstract laws of method are the same in every science. Mathematics, physics, mechanics, dialegmatics, sociology, and biology are merely different aspects of one universal principle of order. This is not the place to give a complete illustration of the fact, but we may institute a parallel between the definite factors of organic method, as a branch of methodics, and those of arithmetic method as a branch of Mathematics. In arithmetical calculations, the RELATIONAL factors of method are natural *limitations* of degrees or numbers; *proportions* of parts in a collective aggregation; *permutations* of forms in the grouping of numbers; *fractions* of integers; *progression* in degrees of increase or decrease; logarithmic *parallels* between different orders of progression. The ORGANIC factors of arithmetic are *roots* and *powers*; *subtractions* and *additions*; *variations* and rythmical numbers. The connective factors are *special systems of notation*; symbols of *notation*; *conditions* of calculation;

elements of calculation, or forces and motions, in time and space. In organic method we have also natural *limitations* of degrees; relative *proportions* of parts; *permutations* of state; natural harmonic *fractions* of organic units; *progressive* degrees of collective unity; and *parallel* kinds of energy in the same organic individuality. *Subtraction* of parts; *addition* of parts; *germs* of increase; *powers* of increase; *accelerations* and *circulations*; *creative* energies; *resulting* forms; *contingent* resources; *supernal* forces and conditions. This is only one of the four natural aspects of organic method, and of arithmetical science; but abstract illustrations would be superfluous at present. We may however give the following table, as an example of parallel factors and functions in organic method, with a warning that concrete factors are always necessary for the verification of abstract parallels. In the human body the skin is a limitational factor, and the blood vessels are circulational factors, and each of the other systems and senses have their special correspondencies with abstract systematic factors.

	Systematic Factors and Symbols.	*Arithmetical Factors.*
Connective factors and symbols.	Z. Supernal forces and symbols.	Z. Factors to be measured.
	Y. Contingent resources and symbols.	Y. Conditions of calculation.
	X. Resulting forms and symbols.	X. Symbols of notation.
	W. Creative energies and symbols.	W. Systems of notation.
Organic factors and symbols.	VII. CIRCULATIONAL FACTORS AND SYMBOLS.	VII. RYTHMS.
	7. *Variational factors and symbols.*	7. *Variations.*
	VI. CUMULATIVE FACTORS AND SYMBOLS.	VI. POWERS.
	6. *Incremental factors and symbols.*	6. *Additions.*
	V. RADICAL FACTORS AND SYMBOLS.	V. ROOTS.
	5. *Decremental factors and symbols.*	5. *Subtractions.*

Relational factors and symbols.	IV. PARALLEL FACTORS AND SYMBOLS.	IV. LOGARITHMS.
	III. GRADATIONAL FACTORS AND SYMBOLS.	III. PROGRESSIONS.
	2. *Fractional factors and symbols.*	2. *Fractions.*
	II. PERMUTATIONAL FACTORS AND SYMBOLS.	II. PERMUTATIONS.
	1. *Proportional factors and symbols.*	1. *Proportions.*
	I. LIMITATIONAL FACTORS AND SYMBOLS.	I. LIMITATIONS.

There is a definite type of order in each branch of method, and a due acquaintance with these will lead the mind rapidly to the highest forms of truth, in all collateral branches of the sciences. Acoustics explain the laws of harmony and discord in vibration, the general relations of musical sounds and melodies to each other; and in these we have a specimen of scales and octaves in all the experimental sciences. The octaves or nodal intervals, and the harmonic fractions or degrees which form the diatonic notes, and the chromatic half tones of each octave, offer us a clue to the harmonies and discords of relation between vibratory motions in all bodies, and even of more subtile modes of motions, which are the causes of optical phenomena. The "Music of the Spheres" is not an idle speculation, although the intuition of the ancients may have been quite barren of results, for want of translating the idea from music to acoustics, investigating the laws of motions and relations, instead of sounds and musical perception. There is ample evidence that the heavenly bodies move around centres, which are relatively motionless; but the "fixed stars" are too far distant to be well observed, and the planetary bodies which revolve around them are too minute and dark for us to see them at such distances. A universe, however, may be compared with a series of concentric hollow spheres in general motion and vibra-

tion, the fixed stars being relatively motionless, as nodal points or lines in a vibrating plate, carried along in one general direction, while its molecular cohesions, oscillations, and nodes of comparative rest, are unaffected by the general translation.

Musical scales are the same as photological, electrological, thermological, and barological scales of motion and vibration, and the consciousness of this fact will give experimentalists a key to the method of looking for scales and octaves in all the phenomena of physical nature. We have shown that the same parallels exist in the harmonic fractions of organic nature; and a further development of evolutive and statistical methods will be found to illustrate the universality of the same principles of harmony, in every aspect of life and motion.

Experimental methods lead to the discovery of both inorganic and organic laws of order; statistical methods are also applied to inorganic and organic realms of nature; evolutive method is applicable to physical and biological phenomena, and although organic method might, at first sight, seem to be confined to biological phenomena alone, it will be found applicable to all the realms of nature, as we have shown in the science of epicosmology (see vol. i.).

Methodics, then, are an important branch of dialegmatics, and having defined the four leading aspects of this science, we may now pass on to the question of *symbolic notation*, as a most important instrument of thought, in every branch of dialegmatics.

Signs and Symbols.—What would the science of music be without the aid of symbols of notation? What would the science of linguistics be without letters to represent sounds, and words to represent ideas? What would the science of dramatics or poetics be without the art of mimic imitation, representative costume, scenery,

&c., to symbolise the characters and feelings, habits, and manners, thoughts and emotions of the *dramatis personæ?* What would the science of investigative method be without a corresponding art of symbolical notation? And yet no general system of notation has been devised for the experimental, the statistical, the organic, and the evolutive branches of methodics. This is one great cause of the slowness of discovery, with regard to the laws of organic unity and harmony.

To become a poet or a painter, an inventor of new forms of mechanism, or new forms of thought, a man must be born with aptitudes for poetry, invention, or discovery; but however strong the inborn aptitude may be, much may be learned from the labours of those who have already trodden the same paths, and left behind them traces of the methods by which they arrived at their degrees of evolution. Without the forms of language acquired by former generations of mankind, and transmitted to posterity, we could not think and speak as clearly and profoundly on all questions of art, science, and philosophy, as modern thinkers are enabled to do, by the aid of an instrument so near to perfection as that of modern languages. And what would mathematics be without the aid of symbols of notation? It is admitted that most of the great modern strides of progress in this science, could not have been made without the aid of the special notation of the differential calculus. The "philosophy of discovery," in fact, consists mainly in the creation of symbols of notation, to fix the method by which new discoveries have been made, and thus enable others to work the new vein of thought which has been opened by a predecessor. This fact seems to have escaped the notice of Dr. Whewell, who has written a "Philosophy of Discovery," near the end of which he says (p. 456):—

"There is no formula for the discovery of inductive "truth. It is caught by a peculiar sagacity or power of "divination, for which no precept can be given . . . . "As true inductive propositions cannot be logically de- "monstrated by syllogistic rules, so they cannot be dis- "covered by any rule . . . . But inventive sagacity "shows itself in the discovery of propositions which are "both *true* and *convertible* (*i.e.*, true both as a *special* "and a *general* formula)."

Here he touches the main question of the use and power of symbols when once invented, to enable others to continue in the same line of discovery, and seems to infer that there is nothing to expect from a "Philosophy of discovery," or methodical investigation, and that all discovery must depend upon "a power of divination for which no precept can be given." And yet he has previously (p. 298) stated that—

"Those precepts of the philosophy of discovery have "been neglected or violated at the outset by political "economy, as in so many other sciences: namely, that "we must first classify our facts before we generalize, "and then seek for narrower generalizations and induc- "tions before we aim at the widest."

Here it is evident that Dr. Whewell believes there are precepts of methodical investigation and discovery, since he has specified two of these precepts. He is much impressed, however, with the importance of innate aptitude, and observes (p. 138) that—

"Bacon did not rightly appreciate the sagacity, the "inventive genius which *all discovery* requires."

It is the word *discovery* which is ill defined in this instance, for in one place new veins of thought alone are designated, while in another, new developments of ideas in a given direction, are as plainly indicated.

"Scientific discovery," he remarks (p. 152), "involves

" the application to the facts (observed) of a *principle of* " *arrangement*, and an *idea* existing in the mind of the " discoverer, antecedently to the act of induction."

Very true, but where is the idea to come from in the mind of the discoverer? Must he not obtain it from the world around him? Where are *principles of arrangement* to be looked for, but in the phenomena in which they are manifested? And if the discoverer finds principles of arrangement manifested in nature, can he not show where those principles are found, on a small scale; on a larger scale; and on an infinite scale? And when once these principles of arrangement have been discovered in one series of phenomena, can they not be methodized and symbolized, so as to render them easily convertible into abstract factors, applicable to the most general, as well as to the most particular forms and limits of natural phenomena? Is it not thus that arithmetical methods and symbols gave birth to algebraical symbols and operations; and these again to those of the higher calculus?

This was clear enough in Dr. Whewell's mind when he wrote the "History of Scientific Ideas," in which he says (p. 154), speaking of Algebra:—

"Symbols were at first used only to represent num- " bers considered with regard to their numerical proper- " ties; and thus the science of algebra was formed. " But it was found even in cases belonging to common " algebra, that the symbols often admitted of an inter- " pretation that went beyond the limits of the problem, " and which yet was not unmeaning, since it pointed " out a question closely analogous to the question pro- " posed (as when the answer was a negative quantity), " for, when Descartes had introduced the mode of re- " presenting curves (by means of algebraical relations " among the symbols of the *co-ordinates*, or distances of

" each of their points from fixed lines), it was found " that negative quantities must be dealt with as not " less truly significant than positive ones . . . . Other " cases were also found in which the symbols, although " destitute of meaning, according to the original con- " vention of their institution, still pointed out truths " which could be verified in other ways, as in the cases " in which what are called *impossible quantities* occur."

And again (p. 155) :—

"Since in our symbolic reasoning our symbols thus " reason for us, we do not necessarily here as in geo- " metrical reasoning, go on adding carefully one known " truth to another, till we reach the desired result. If " we have a theorem to prove, or a problem to solve, " which can be brought under the domain of our sym- " bols, we may at once state the given but unproved " truth, or the given combination of unknown quanti- " ties in its symbolic form. After this first process, we " may then proceed to trace, by means of our symbols, " what other truth is involved in the one just stated, or " what the unknown symbols must signify, resolving " step by step, the symbolical assertion with which we " began into others more fitted for our purpose. The " former process is a kind of *synthesis;* the latter is " termed *analysis*. And although symbolical reasoning " does not necessarily imply such analysis ; yet the " connection is so familiar, that the term *analysis* is fre- " quently used to designate symbolical reasoning."

Here Dr. Whewell touches on the main question of the "philosophy of discovery," which truly consists of the discovery of the *principles of arrangement and of evolution* in the phenomena of nature, and of the invention or creation of symbols to represent the fundamental principles of nature, on the one hand, and the abstract factors of methodical arrangement, on the other. In

his "Philosophy of Discovery," (p. 206), Dr. Whewell again dwells on the importance of symbolization and language without defining the exact value of the instrument as a means of discovery.

"Condillac," he observes, "looked for the grounds of "certainty and reality of the knowledge contained in "those sciences which have the ideas of space and num- "ber for their foundation (geometry and arithmetic), "especially the latter, and found them, as he conceived, "in the nature of the *language* which they employ. "The *signs* which are used in arithmetic and algebra "enable us to keep steadily in view the identity of the "same quantity, under all the forms which, by composi- "tion and decomposition, it may be made to assume; "and these also, not only express the operations which "are performed, but suggest the extension of the opera- "tions according to analogy. Algebra, according to him, "is only a very perfect language . . . . Every language "is an analytical method; every analytical method is a "language . . . . The art of speaking, the art of "writing, the art of reasoning (logic), the art of think- "ing, are only at bottom one and the same art."

(Condillac on grammar) Dr. Whewell adds:—

"Each of the operations consists in a succession of "analytical operations, and words are the marks by "which we are able to fix our minds upon the steps of "this analysis."

We may add, music has a language of symbols and a method of notation. Linguistics have symbols and methods of notation; dramatics have special symbols and modes of representation, but investigative methodics have not yet formed a complete system of notation to facilitate the progress of discovery, and simplify the operations of the mind.

Mathematical methodics has acquired in all its

branches a system of abstract symbolical notation, with numerous important rules of operation, while dialegmatical methodics has only acquired a satisfactory system of notation in two of its main branches: namely, music and linguistics; for dramatic art and science have not yet acquired a perfect system of symbolical notation, in any one of its sub-divisions, and investigative methodics have still to create a special system of signs and symbols, as the representatives of abstract principles.

Ch. Fourier attempted to form a system of notation for the factors of evolutive and organic method, by an adaptation of the scales and octaves of musical notation, which became a snare to his imagination, and rendered comparatively valueless his applications of the method to the investigation of natural phenomena.

The human body is a concrete illustration of the organic principles of arrangement in all natural organisms. The life history of an individual organism is a partial type of natural evolution, but not complete enough to serve as the foundation of an integral evolutive method. For this, we must have the factors of embryonic evolution, as well as those of youth, maturity, decline, and decay; we must have the factors of collective evolution, as well as those of individual history.

The musical scales and octaves as explained by mathematics and acoustics, are a true type of the factors of experimental method; and with additional developments may serve as a model for statistical scales and octaves of arrangement; but evolutive and organic methods are more complex, and require much higher models, as the basis of natural arrangement and symbolical notation. The systems and series of organs in the human body form a scale analogous to that of an octave in music, but the meaning of each system, as a special factor of methodical arrangement, is very much more complex

than the value of a simple note in a musical scale. The two agree in number, and in some few functional characteristics, sufficient to mislead the mind in analogical imaginations, but not to guide it safely in methodical investigations.

We cannot give a complete system of symbolical notation for the branches of methodics here defined, as that belongs to a treatise on the science; but a general outline of primary notation for organic method, has been given in the volume on epicosmology, and is partially repeated here, in several parts of our analysis. The abstract method of applying it to special and to general views of principles, is also variously exemplified in the present volume.

Fundamental principles are the groundwork of all science, and the discovery of any fixed laws of nature, leads the mind to corresponding methods of definition and denomination. In the "History of Scientific Ideas," Dr. Whewell shows the manner in which the doctrine of limits led Newton and Leibnitz to the discovery of the method of fluxions and the differential calculus.

"A limit," he observes (p. 152), "is a peculiar and "fundamental conception, the use of which in proving "propositions of the higher geometry, cannot be super-"seded by any combination of other hypotheses and "definitions . . . . The curve line is the *limit* of the "polygon; and thence the axiom, what is true up to "the limit, is true at the limit."

"This mode of conceiving mathematical magnitudes "is of wide extent and use, for every curve may be con-"sidered as the limit of some polygon; every varied "magnitude, as the limit of some aggregate of simpler "forms; and thus the relations of the elementary "figures enable us to advance to the properties of the "most complex cases."

" . . . . This principle with its consequences, leads " to all the results which form the subject of the higher " mathematics, whether proved by the consideration of " evanescent triangles, by the process of the differential " calculus, or in any other way."

"This latent employment of the conception of a limit " reappeared in various forms during the early period of " modern mathematics. The ancients, by their *method* " *of exhaustion* (by which they show how to exhaust the " *difference* between a polygon and a curve, or the like); " the moderns . . . . as for example, in the *method of* " *divisibles* of cavaleri, and the characteristic *triangle* " of Barrow, till at last Newton distinctly referred such " reasonings to the conception of a limit, and established " the fundamental principles and processes which that " conception introduces, with a distinctness and exact- " ness which required little improvement to make it as " unimpeachable as the demonstrations of geometry. " And when such processes as Newton thus deduced " from the conception of a limit, are represented by " means of algebraical symbols, instead of geometrical " diagrams, we have then before us the *method of fluxions* " or the *differential calculus*, a mode of treating mathe- " matical problems, justly considered as the principal " weapon by which the splendid triumphs of modern " mathematics have been achieved."

" The use of general symbols has been another of the " main instruments to which the successes of modern " mathematics are owing. And here, again, results " depend for their evidence upon a *fundamental concep-* " *tion*:—the conception of *arbitrary symbols* as the *signs* " of quantity and its relations; and upon a corresponding " *axiom*, that the 'interpretation' of such symbols must " be perfectly general."

The importance of symbolical notation is thus recog-

nised in mathematical methodics, and their value in dialegmatical methodics will be quite as great, and not less indispensable, as an instrument of analytical investigation and philosophical induction.

According to the usual definitions, physics, mechanics, biologics, and sociologics are "concrete sciences," while mathematics are "abstract sciences," although all sciences are, in reality, creations of the human mind; that is to say, the human mind reflects the action of external forces and phenomena, according to the laws of experiential modes of thought; and as in optics, the angles of incidence determine those of reflection, so in human biology, objective modes of incidence determine subjecting modes of reflection. In both cases, there are different hues of colour in the light and in the reflecting factors. But these analogies would lead us into a useless digression.

Biological Science.—Here, again, we meet with a vast field of knowledge, and some confusion in the use of words. The science is not much advanced at present, nor likely to become popular in our day. We may, however, briefly explain the definitions and denominations here applied, and leave the science for a special treatise. The physical, instinctual, mental, and moral principles of life and organisation, are easily understood in their most general sense; and the next degree of analysis in each of these, is not more difficult to understand. In physical biology we have four natural aspects, technically called anatomy, physiology, histology, and embryology. In our views of psychology, we find that instinctual, mental, and spiritual biology, can only obtain rank as positive sciences, when systematically explained in parallel with physical biology. Phrenologists have given a rude outline of the instincts, propensities, and faculties of the human mind; the German philosophers have attempted to trace the evolution of ideas and of

thought, in the progressive development of experiential intellect. The English and Scotch philosophers have applied much analytical acumen to the same class of questions, but still the science is not constituted. Experiential psychology has been more or less confounded with ontology, as we shall show more fully in a treatise on biology.

Sociologics form another head in the general division of our scale. The roots of this are found in biology, properly so called. Sociology, in fact, is only another word for collective life and organization, in contrast with individual and comparative biology. The primary distinctions of industrial, artistic, scientific, and social organisation require no further explanation here; and each of these may be viewed in four aspects, just as the corresponding departments of individual biology. Physical energy lies at the root of industry; instinctual activity lies at the root of art; mental activity is the creator of science; and moral nature, the foundation of religious, social, and political society.

The elementary principles of sociology have not yet been regularly analysed, although innumerable secondary questions of political economy and polity, have been studied with elaborate minuteness. We trust we shall be able to give an outline of the principles of individual and collective biology, which will establish them as positive sciences in the commonwealth of human knowledge. Meanwhile, we may observe, that *subcreative*, *procreative*, *regulative*, and *conservative* energies, organised in *corporate*, *domestic*, *social*, *religious*, and *political* associations, are the natural secondary distinctions of human biology and sociology; but the science is so young and incomplete, that mere outlines of further subdivisions would be more or less obscure.

From this general outline of the methodological

sciences, we may pass on to the next section of our synoptic table, observing that the technical divisions and subdivisions of our general scale are, so far, as simple as the less accurate popular denominations; and that organic laws of order in the human body, are thus shown to be the same as those of mental order in the human mind. We shall find as we proceed, that the physical organism is not only the measure of the laws of order in the mind, but that "man is the measure of all things," human and divine, visible and invisible; and that we need not despair of penetrating ultimately, into some of the most hidden laws of the creation.

Astronomy has brought the distant stars within the reach of human vision and mensuration; cosmology will finally reveal to us innumerable laws and forces, hitherto but little thought of. Where mathematical, physical, and mechanical sciences are now applied alone to the investigation of sidereal phenomena, with remarkable results of insight and suggestion, the other sciences will be applied with still more interesting developments of insight and induction. Something like organic distribution must be noticed in cosmology, beyond the ordinary definitions and distinctions of astronomy, and these belong to the next section.

SECTION III.—ASTRONOMICAL SCIENCES.

Omnia reguntur numero Pondere, et mensura.

To have a definite idea of the natural order and distribution of suns and systems in the heavens, we must consult the best astronomers, and a few quotations from the "Outlines of Astronomy," by Sir John Herschell, will form an appropriate introduction to this section of our general classification of the sciences.

We may gain a general idea of the apparent relative

positions and motions of the so called "fixed stars" from those of our planets and their satellites, in connection with the sun. The moon and the earth swing round each other as a binary system, while the satellites of Jupiter, with their primary, swing round each other as a multiple star, or secondary complex unit. The same may be said of Saturn, Uranus, and Neptune, as secondary systems of opaque bodies. The closely combined cluster of asteroids forms another complex unit of the same solar system; and the very diverse motions and positions of comets, form a curious example of diversity in subordination to the higher laws of unity.

In this simple cosmic mechanism we find that the central orb exceeds the others in dimensions. Its mass and its volume more than equal all the other bodies collectively; and its influence controls their motions at enormous distances. The diameter of the sun is 882,000 miles (nearly a million), while the earth is situated at a distance of more than ninety millions of miles. The radius of the earth's orbit, then, is more than a hundred times the diameter of the sun; while that of Neptune, our remotest planet, is thirty times that of our earth. Whence it follows that the influence of the sun extends about three billions of miles in all directions, giving to the solar system a breadth of nearly six billions of miles, or six thousand times the diameter of the central orb.

The nearest "fixed star," *a* Centauri, is said to be "at a distance from us equal to 226,000 radii of the earth's orbit; that of 61 Cygni has been ascertained by Bessel to be no less than 592,200 such radii; while the observations of Struve place *a* Lyræ at 789,600 similar units of space from our system.

The nearest fixed star, *a* Centauri, is immensely far from us, but as it is a double star, forming a "binary system," of which some of the elements are known, we

may gain from it an idea of the relative positions of different solar systems.

Double Stars.—"The discovery of the parallaxes of *a* "Centauri and 61 Cygni," says Sir John Herschel, "enables us to speak with an approach to certainty as "to the absolute dimensions of both their orbits, and "thence to form a probable opinion as to the general "scale on which these astonishing systems are con- "structed. The distance of the two stars of 61 Cygni "subtends at the earth, an angle which, since the earliest "micrometrical measures in 1781, has varied hardly "half a second from a mean value of 15″·5. On the "other hand, the angle of position has altered since the "same epoch by nearly 50°, so that it would appear "probable that the true form of the orbit is not far "from circular, its situation, at *right angles* to the visual "line, and its periodic time, probably not short of 500 "years. Now, as the ascertained parallax of this star "is 0″·348, which is therefore, the angle the radius of "the earth's orbit would subtend if equally remote, it "follows that the mean distance between the stars is to "that radius as 15″·5 : 0″·348, or as 44·54 : 1. The "orbit described by these two stars about each other "undoubtedly, therefore, greatly exceeds in dimensions "that described by Neptune about the sun. Moreover, "supposing the period to be five centuries (and the dis- "tance being actually on the increase, it can hardly be "less). The general propositions laid down by Newton "(Principia, I. i. Prop. 57, 58, 59,) taken in conjunction "with Kepler's third law, enable us to calculate the "sum of the masses of the two stars, which on these "data, we find to be 0·353, the mass of our sun "being 1, the sun, therefore, is neither vastly greater "nor vastly less than the stars composing 61 Cygni."

"The data in the case of *a* Centauri are more uncer- "tain. Since the year 1822, the distance has been

" steadily and pretty rapidly decreasing at an average " rate of about half a second per annum, and that with " little change, till lately, in the angle of position. " Hence it follows, evidently, that the plane of its orbit " passes nearly through the earth, and (the distance " about the middle of 1834 having been 17½″), it is very " probable that either an occultation, like that observed " in ζ Hercules, or a close appulse of the two stars, will " take place about the year 1859. As the observations " we possess afford no sufficient grounds for a satis- " factory calculation of elliptic elements, we must be " content to assume what, at all events, they fully " justify, viz., that the major semiaxis must exceed 12″, " and is very probably considerably greater. Now this " with a parallax of 0″·913, would give for the real value " of the semiaxis 13·15 radii of the earth's orbit, as a " minimum. The real dimensions of their ellipse, there- " fore, cannot be so small as the orbit of Saturn; in all " probability exceeds that of Uranus, and may possibly " be much greater than either."

" The parallel between these two double stars is a " remarkable one. Owing, no doubt to their *comparative* " proximity to our system, their apparent proper motions " are both unusually great, and for the same reason, " probably, rather than owing to unusually large dimen- " sions, their orbits appear to us under what, for binary " double stars, we must call unusually large angles. " Each consists, moreover, of stars not very unequal in " brightness, and in each both the stars are of a high " yellow, approaching to orange colour, the smaller in- " dividual in each case being also of a deeper tint. " Whatever the diversity, therefore, which may obtain " among other sidereal objects, these would appear to " belong to the same family or genus."

Coloured Stars.—" Many of the double stars exhibit

" the curious and beautiful phenomenon of contrasted " or complementary colours. In such instances the larger " star is usually of a ruddy or orange hue, while the " smaller one appears blue or green, probably in virtue " of that general law of optics, which provides that when " the retina is under the influence of excitement by any " bright-coloured light, feebler lights, which seen alone " would produce no sensation but of whiteness, shall for " the time appear coloured with the tint complementary " of that of the brighter. Thus a yellow colour predomi- " nating in the light of the brighter star, that of the " less bright one in the same field of view, will appear " blue; while, if the tint of the brighter star verge to " crimson, that of the other will exhibit a tendency to " green, or even appear as a vivid green, under favour- " able circumstances. The former contrast is beautifully " exhibited by ι Cancri—the latter by γ Andromeda, both " fine double stars. If, however, the coloured star be " much the less bright of the two, it will not materially " affect the other; thus, for instance, η Casseopeiæ ex- " hibits the beautiful combination of a large white star, " and a small one of a rich, ruddy purple. It is by no " means, however, intended to say that in all such cases, " one of the colours is a mere effect of contrast, and it " may be easier suggested in words than conceived in " imagination, what variety of illumination *two suns*, a " red and a green, or a yellow and a blue one, must afford " a planet circulating about either; and what charming " contrasts and 'grateful vicissitudes,' a red and a green " day, for instance, alternating with a white one, and " with darkness, might arise from the presence or absence " of one or the other, or both, above the horizon. In- " sulated stars of a red colour, almost as deep as that of " blood, occur in many parts of the heavens, but no " green or blue *star* (of any decided hue) has, we believe,

" ever been noticed unassociated with a companion. " brighter than itself. Many of the red stars are " variable."

From this we learn that some of the binary systems are comparatively, not very remote in space, from our own simple solar system, and that their dimensions are very nearly the same.

Illuminating Powers.—" The light of Sirius is four " times that of *a* Centauri, and its parallax only 0″·15. " This, in effect, ascribes to it an intrinsic splendour " equal to 96·63 times that of *a* Centauri, and therefore " 224·7 times that of our sun."

Proper Motions.—" Another very interesting subject " of inquiry in the physical history of the stars," observes Sir John Herschel, " is their proper motion. " . . . . *A priori* it might be expected that apparent " motions of some kind or other, should be detected " among so great a multitude of individuals, scattered " through space, and with nothing to keep them fixed. " Their mutual attractions even, however inconceivably " enfeebled by distance, and counteracted by opposing " attractions from opposite quarters, must, in the lapse " of countless ages, produce *some* movements, some " change of internal arrangement, resulting from the " difference of opposing actions. And it is a fact, that " such apparent motions are really proved to exist, by " the exact observations of modern astronomy. Thus, " as we have seen, the two stars 61 Cygni, have remained " constantly at the same—or very nearly the same— " distance of 15″, for at least fifty years past, although " they have shifted their local situation in the heavens, " in this interval of time, through no less than 4′ 23″, " the annual proper motion of each star being 5″·3; by " which quantity (exceeding a third of their interval) " this system is, every year, carried bodily along in some

" unknown path, by a motion which, for many centu-
" ries, must be regarded as uniform and rectilinear.
" Among stars not double, and no way differing from
" the rest in any other obvious particular, ε Indi,
" (Groomb 1830,) and μ Cassiopeiæ, are to be remarked
" as having the greatest proper motions of any yet as-
" certained, amounting respectively to 7″·74, 7″·75, and
" 3″·74 of annual displacement. And a great many
" others have been observed to be thus constantly car-
" ried away from their places by smaller, but not less
" unequivocal motions . . . . No one who reflects with
" due attention on the subject will be inclined to deny
" the high probability, nay, certainty, that the *sun* as
" well as the stars, must have a proper motion in *some*
" direction, and the inevitable consequence of such a
" motion—if unparticipated by the rest—must be a slow
" *average* apparent tendency of all the stars, to the
" vanishing point of lines parallel to that direction, and
" to the region which he is leaving, however greatly
" individual stars might differ from such average, by
" reason of their own peculiar proper motion. This is
" the necessary effect of perspective, and it is certain
" that it must be detected by observation, if we knew
" accurately the apparent proper motions of all the stars,
" and if we were sure that they were independent: *i. e.*,
" that the whole firmament, or at least all that part
" which we see in our own neighbourhood, were not
" drifting along together, by a general *set* as it were, in
" one direction, the result of unknown processes and
" slow internal changes going on in the sidereal stratum,
" to which our system belongs, as we see motes sailing in
" a current of air, and keeping nearly the same relative
" situation with respect to one another."

" . . . . The sun advances through space (relatively
" at least among the stars), carrying with it the whole

" planetary and cometary system, with a velocity of " 1·623 radii of the earth's orbit, or 154,185,000 miles " *per annum*, or 420,000 miles (that is to say, nearly its " own semi-diameter) *per diem:* in other words, with a " velocity very little greater than one-fourth of the " earth's annual orbit."

" The whole of the reasoning upon which the deter- " mination of the solar motion in space rests, is based " upon the entire exclusion of any *law*, either derived " from observation or assumed in theory, affecting the " amount and direction of the real motions, both of the " sun and stars. It supposes an absolute non-recogni- " tion, in those motions, of any general directive cause, " such as for example, a common circulation of all about " a common centre. Any such limitation introduced " into the conditions of the problem of the solar motion " would alter *in toto*, both its nature and the form of its " solution. Suppose for instance, conformably to the " speculations of several astronomers, the whole system " of the milky way, including our sun and the stars, " our more immediate neighbours, which constitute our " sidereal firmament, should have a general movement " of rotation in the plane of the galactic circle (any " other would be exceedingly improbable, indeed hardly " reconcilable with dynamic principles), being held toge- " ther, in opposition to the centrifugal force thus gene- " rated, by the mutual gravitation of its constituent stars. " Except we at the same time admitted that the scale on " which this movement proceeds is so enormous, that all " the stars whose proper motions we include in our cal- " culations, go together in a body, so far as that move- " ment is concerned (as forming too small an integrant " portion of the whole to differ sensibly in their relation " to its central point); we stand precluded from drawing " any conclusion whatever, not only respecting the abso-

" lute motion of the sun, but respecting even its relative " movement among those stars, until we have established " some law—or at all events, framed some hypothesis " having the provisional force of a law, connecting the " whole, or a part of the motion of each individual, with " its situation in space."

" Such speculations have not been wanting in astro- " nomy, and recently an attempt has been made by M. " Mädler, to assign a local centre in space, round which " the sun and stars revolve, which he places in the " group of the Pleiades, a situation in itself utterly " improbable, lying as it does no less than 26° out of " the plane of the galactic circle, out of which plane it " is almost inconceivable that any *general* circulation " can take place." (Sir John Herschel, "Outlines of Astronomy," fifth edition, 1859.)

Sidereal Stratification.—" If the comparison of the ap- " parent magnitudes of the stars with their numbers leads " to no immediately obvious conclusion, it is otherwise " when we view them in connection with their local distri- " bution over the heavens. If, indeed, we confine ourselves " to the three or four brightest classes, we shall find " them distributed with a considerable approach to impar- " tiality over the sphere, a marked preference, however, " being observable, especially in the southern hemi- " sphere, to a zone or belt, following the direction of a " great circle passing through ε Orionis and α Crucis. " But if we take the whole amount visible to the naked " eye, we shall perceive a great increase of number as " we approach the borders of the milky way. And " when we come to telescopic magnitudes, we find them " crowded beyond imagination, along the extent of that " circle, and of the branches which it sends from it; so " that in fact, its whole light is composed of nothing " but stars of every magnitude, from such as are visible

" to the naked eye, down to the smallest point of light " perceptible with the best telescopes."

" These phenomena agree with the supposition that " the stars of our firmament, instead of being scattered " in all directions indifferently through space, form a " stratum of which the thickness is small, in comparison " with its length and breadth, and in which the earth " occupies a place somewhere about the middle of its " thickness, and near the point where it sub-divides into " two principal laminæ, inclined at a small angle to " each other . . . . Such is the view of the construction " of the starry firmament taken by Sir William Herschel, " whose powerful telescopes first effected a complete " analysis of this wonderful zone, and demonstrated the " fact of its entirely consisting of stars. So crowded " are they in some parts of it, that by counting the stars " in a single field of his telescope, he was led to con- " clude that fifty thousand had passed under his view " in a zone two degrees in breadth, during a single " hour's observation."

The Milky Way.—" The course of the Milky Way as " traced through the heavens by the unaided eye, neg- " lecting occasional deviations and following the line of " its greatest brightness, as well as its varying breadth " and intensity will permit, conforms as nearly as the " indefiniteness of its boundary will allow it to be fixed, " to that of a great circle, inclined at an angle of about " 63° to the equinoctial, and cutting that circle in R. A. " 0*h.* 47*m.*, and 12*h.* 47*m.*, so that its northern and " southern poles respectively are situated in R. A. 12*h.* " 47*m.* NPD 63°, and R. A. 0*h.* 47*m.* NPD 117° . . . . " Beyond the obvious conclusion that its form must be, " generally speaking, *flat*, and of a thickness small in " comparison with its area in length and breadth, the " laws of perspective afford us little further assistance

" in the inquiry . . . . On a comparison of many hun-
" dred 'gauges' (of the heavens) or local enumerations,
" it appears that the density of star-light (or the number
" of stars existing on an average of several such enume-
" rations, in any one immediate neighbourhood) is least
" in the pole of the *galactic circle* (the circle to which
" the course of the Via Lactea most nearly conforms),
" and increases on all sides, with the *galactic polar dis-*
" *tance* (and that nearly equally in all directions), down
" to the Milky Way itself, where it attains its maxi-
" mum. The progressive rate of increase in proceeding
" from the pole, is at first slow, but becomes more rapid
" as we approach the plane of that circle, according to
" a law . . . . from which it appears that the *mean*
" density of the stars in the galactic circle, exceeds in a
" ratio of very nearly 30 to 1, that in its pole, and in a
" proportion of more than 4 to 1 in a direction 15°
" inclined to its plane. (The average number of stars
" in a field 15′ in diameter, increases very nearly as
" follows, proceeding from 0 to 90° of galactic north
" polar distance, 4, 5, 6, 10, 17, 30, 122.)"

" When examined with powerful telescopes, the con-
" stitution of this wonderful zone is found to be no less
" various than its aspect to the naked eye is irregular.
" In some regions the stars of which it is wholly com-
" posed, are scattered with remarkable uniformity over
" immense tracts, while in others the irregularity of
" their distribution is quite as striking, exhibiting a
" rapid succession of closely clustering rich patches
" separated by comparatively poor intervals, and indeed,
" in some instances, by spaces absolutely dark, *and com-*
" *pletely void of any star*, even of the smallest telescopic
" magnitude. In some places not more than 40 or 50
" stars on an average, occur in a 'gauge' field of 15′,
" while in others a similar average gives a result of 400

" or 500. Nor is less variety observable in the charac-
" ter of its different regions, in respect of the magni-
" tudes of the stars they exhibit, and the proportional
" numbers of the larger and smaller magnitudes asso-
" ciated together, than in respect of their aggregate
" numbers. In some, for instance, extremely minute
" stars, though never altogether wanting, occur in num-
" bers so moderate, as to lead us irresistibly to the con-
" clusion that in these regions, we see *fairly through* the
" starry stratum, since it is impossible otherwise (sup-
" posing their light not intercepted) that the numbers
" of the smaller magnitudes should not go on continu-
" ally increasing ad infinitum. In such cases, moreover,
" the ground of the heavens as seen between the stars,
" is for the most part perfectly dark, which again would
" not be the case, if innumerable multitudes of stars,
" too minute to be individually discernible, existed
" beyond . . . . Throughout by far the larger portion
" of the extent of the Milky Way in both hemispheres,
" the general blackness of the ground of the heavens
" on which the stars are projected, and the absence of
" that innumerable multitude and excessive crowding of
" the smallest visible magnitudes, and of glare produced
" by the aggregate light of multitudes too small to
" affect the eye singly, which the contrary supposition
" would appear to necessitate, must, we think, be con-
" sidered unequivocal indications that its dimensions, *in*
" *directions where these conditions obtain*, are not only not
" infinite, but that the space penetrating power of our
" telescopes, suffices fairly to pierce through and beyond
" it. It is but right, however, to warn our readers that
" this conclusion has been controverted, and that by an
" authority not lightly to be put aside, on the ground of
" certain views taken by Olbers, as to the defect of
" perfect transparency in the celestial spaces, in virtue

" of which the light of the more distant stars is enfeebled " more than in proportion to their distance. The " extinction of light thus orginating, proceeding in geo- " metrical progression, while the distance increases in " arithmetical, a limit, it is argued, is placed to the " space penetrating powers of telescopes, far within that " which distance alone, apart from such observation, " would assign."

This description of the *Milky Way* suggests to us the idea that galactic orders of sidereal constellations may differ from each other, in general structure, as our planets differ; and that the system of Saturn with its rings and moons, may be a type of our galactic universe. A solid globe with revolving belts and satellites, may be compared with a sphere of stars, surrounded by numerous zones of still more distant and thinly scattered constellations, belonging to the same complex universe.

The Milky Way is a distinct sidereal world. Innumerable other worlds exist in the heavens, and some of these are described by Sir John Herschel in his chapter on " *Clusters of Stars and Nebulæ.*"

Nebulæ.—" When we cast our eyes over the concave " of the heavens in a clear night, we do not fail to " observe that here and there are groups of stars which " seem to be compressed together in a more condensed " manner than in the neighbouring parts, forming bright " patches and clusters, which attract attention as if " they were there brought together by some general " cause, other than casual distribution. There is a group " called the Pleiades, in which six or seven stars may " be noticed, if the eye be directed full upon it, and " many more, if the *eye be turned carelessly aside* while " *the attention* is kept directed upon the group. Tele- " scopes show fifty or sixty large stars thus crowded " together in a very moderate space, comparatively in-

" sulated from the rest of the heavens. The constella-
" tion called Coma Berenices is another such group,
" more diffused, and consisting on the whole of larger
" stars."

"In the constellation Cancer there is a somewhat
" similar but less definite luminous spot, called Prœsepe,
" or the beehive, which a very moderate telescope re-
" solves entirely into stars. In the sword handle of
" Perseus, also, is another such spot crowded with stars,
" which requires a better telescope to resolve into indi-
" viduals separated from each other. These are called
" clusters of stars, and whatever be their nature, it is
" certain that other laws of aggregation subsist in these
" spots, than those which have determined the scatter-
" ing of stars over the general surface of the sky. This
" conclusion is still more strongly pressed upon us, when
" we come to bring very powerful telescopes to bear on
" these and similar spots. There are a great number
" of objects which have been mistaken for, and in fact,
" have very much the appearance of comets without
" tails; small, round or oval nebulous specks, which
" telescopes of moderate power only show as such.
" Messier has given in the *Connois: des Temps* for 1784,
" a list of the places of 103 objects of this sort . . . .
" That they are not however comets, their fixity suffi-
" ciently proves; and when we come to examine them
" with instruments of great power, they are, for the
" most part, perceived to consist entirely of stars crowded
" together so as to occupy almost a definite outline, and
" to run up to a blaze of light in the centre, where their
" condensation is usually the greatest . . . Many of
" them, indeed, are of an exactly round figure, and con-
" vey the complete idea of a globular space, filled full of
" stars insulated in the heavens, and constituting in
" itself, a family or society apart from the rest, and

" subject only to its own internal laws. It would be a " vain task to attempt to count the stars in one of these " *globular clusters.* They are not to be reckoned by " hundreds; and on a rough calculation, grounded on " the apparent intervals between them at the borders, " and the angular diameter of the whole group, it would " appear that many clusters of this description must " contain at least five thousand stars (suns) compacted " and wedged together in a round space, whose angular " diameter does not exceed eight or ten minutes; an " area not more than a tenth part of that covered by " the moon."

" Perhaps it may be thought to savour of the gigan- " tesque to look upon the individuals of such a group " as suns like our own, and their mutual distances as " equal to those which separate our sun from the nearest " fixed star; yet when we consider that their united " lustre affects the eye with a less impression of light " than a star of the fourth magnitude (for the largest of " these clusters is barely visible to the naked eye), the " idea we are thus compelled to form of their distance " from us, may prepare us for almost any estimate of " their dimensions. At all events, we can hardly look " upon a group thus insulated, thus *in seipso totus, teres,* " *atque rotundus,* as not forming a system of a peculiar " and definite character. Their round figure clearly in- " dicates the existence of some general bond of union in " the nature of attractive force; and, in many of them, " there is an evident acceleration in the rate of conden- " sation as we approach the centre, which is not merely " referable to a uniform distribution of equidistant stars " through a globular space, but marks an intrinsic *den-* " *sity* in their state of aggregation, greater in the centre " than at the surface of the mass. It is difficult to form " any conception of the dynamical state of such a

" system. On the one hand, without a rotatory motion " and a centrifugal force, it is hardly possible not to " regard them as in a state of progressive collapse. On " the other, granting such a motion and such a force, " we find it no less difficult to reconcile the apparent " sphericity of their form, with a rotation of the whole " system round any single axis, without which internal " collisions might, at first sight, appear to be inevitable. " If we suppose a globular space filled with equal stars " uniformly dispersed through it, and very numerous, each " of them attracting every other with a force inversely as " the square of the distance, the result and force by " which any one of them (those at the surface alone " excepted) will be urged, in virtue of their joint attrac- " tions, will be directed towards the common centre of " the sphere, and will be directly as the distance there- " from. This follows from what Newton has proved of " the *internal* attraction of a homogeneous sphere. Now " under such a law of force, each particular star would " describe a perfect ellipse about the common centre of " gravity as its centre, and *that* in whatever plane, and " whatever direction it might revolve. The condition, " therefore, of a rotation of the cluster, as a mass about " a single axis would be unnecessary. Each Ellipsis, " whatever might be the proportion of its axis, or the " inclination of its plane to the others, would be inva- " riable *in every particular*, and all would be described in " one common period, so that at the end of every such " period, or *annus magnus* of the system, every star of " the cluster (except the superficial ones) would be " exactly re-established in its original position, thence " to set out afresh, and run the same unvarying round " for an indefinite succession of ages. Supposing their " motions, therefore, to be so adjusted at any one mo- " ment as that the orbits should not intersect each other,

" and so that the magnitude of each star, and the sphere " of its more intense attraction, should bear but a small " proportion to the distance separating the individuals, " such a system, it is obvious, might subsist, and realise " in great measure that abstract and ideal harmony " which Newton, in the 89th Proposition of the First " Book of the *Principia*, has shown to characterise a " law of force directly as the distance."

" It is to Sir William Herschel that we owe the most " complete analysis of the great variety of those objects " which are generally classed under the common head " of Nebulæ, but which have been separated by him " into— 1st. Clusters of stars, in which the stars are " clearly distinguishable, and these again into globular " and irregular clusters. 2nd. Resolvable nebulæ, or " such as excite a suspicion that they consist of stars, " and which any increase of the optical power of the " telescope may be expected to resolve into distinct stars. " 3rd. Nebulæ, properly so called, in which there is no " appearance whatever of stars, which again have been " sub-divided into subordinate classes, according to their " brightness and size. 4th. Planetary nebulæ. 5th. " Stellar nebulæ; and 6th. Nebulous stars. The great " power of his telescopes disclosed the existence of an " immense number of these objects before unknown, and " showed them to be distributed over the heavens, not " by any means uniformly, but with a marked preference " to a certain district, extending over the northern pole " of the galactic circle, and occupying the constellations " of Leo, Leo Minor, the body, tail and hind legs of " Ursa Major, Canes Venatici, Coma Berenices, the pre- " ceding leg of Bootes, and the head, wings, and " shoulder of Virgo. In this region, occupying about " one-eighth of the whole of the sphere, one-third of " the entire nebulous contents of the heavens are con-

" gregated. On the other hand, they are very sparingly " scattered over the constellations Aries, Taurus, the " head and shoulders of Orion, Auriga, Perseus, Camelo- " pardalus, Draco, Hercules, the northern part of Ser- " pentarius, the tail of Serpens, that of Aquila, and the " whole of Lyra. The hours 3, 4, 5, and 16, 17, 18 of " right ascension in the northern hemisphere, are sin- " gularly poor; and on the other hand, the hours 10, " 11, and 12 (but especially 12), are extraordinarily rich " in these objects. In the southern hemisphere a much " greater uniformity of distribution prevails, and with " the exception of two very remarkable centres of accu- " mulation, called the Magellanic clouds, there is no " very decided tendency to their assemblage in any par- " ticular region."

"Clusters of stars are either globular—such as we " have already described—or of irregular figure. These " latter are, generally speaking, less rich in stars, and " especially less condensed towards the centre. They " are also less definite in outline, so that it is often not " easy to say where they terminate, or whether they are " to be regarded otherwise than as merely richer parts " of the heavens than those around them. Many, in- " deed the greater proportion of them, are situated in " or close on the borders of the Milky Way. In some " of them the stars are nearly all of a size, in others " extremely different, and it is no uncommon thing to " find a very red star much brighter than the rest, occu- " pying a conspicuous situation in them. Sir William " Herschel regards these as globular clusters in a less " advanced state of condensation, conceiving all such " groups as approaching, by their mutual attraction to " the globular figure, and assembling themselves together " from all the surrounding region under laws of which " we have, it is true, no other proof than the observance

" of a gradation by which their characters shade into " one another, so that it is impossible to say where one " species ends and the other begins. Among the most " beautiful objects of this class is that which surrounds " the star κ Crucis, set down as a nebula by Lacaille. " It occupies an area of about 1-48th part of a square " degree, and consists of about 110 stars from the 7th " magnitude downwards, eight of the more conspicuous " of which are coloured, with various shades of red, " green, and blue, so as to give to the whole the appear- " ance of a rich piece of jewellery."

" The *nebular hypothesis* as it has been termed, and the " *theory of sidereal aggregation* stand, in fact, quite inde- " pendent of each other, the one as a physical conception " of processes, which may yet for ought we know, have " formed part of that mysterious chain of causes and " effects, antecedent to the existence of separate self- " luminous solid bodies, the other as an application of " dynamic principles to cases of a very complicated " nature, no doubt, but in which the possibility or im- " possibility at least of certain general results may be " determined on perfectly legitimate principles . . . ."

" Next in regularity of form to the globular clusters, " are elliptic nebulæ, more or less elongated; and of " these it may be generally remarked, as a fact undoubt- " edly connected in some very intimate manner with " the dynamical conditions of their subsistence, that " such nebulæ are for the most part beyond comparison " more difficult of resolution than those of globular " form . . . ."

" Annular nebulæ also exist, but are among the rarest " objects in the heavens. The most conspicuous of " this class is to be found almost exactly half-way " between β and γ Lyræ. It is small and particularly " well defined . . . . The axes of the ellipse are to each

" other in the proportion of about 4 to 5, and the open-
" ing occupies about half, or rather more than half the
" diameter. The central vacuity is not quite dark, but
" is filled with a faint nebula, like gauze stretched over
" a hoop. The powerful telescopes of Lord Rosse re-
" solve this object into excessively minute stars, and
" show filaments of stars adhering to its edges."

"PLANETARY NEBULÆ are very extraordinary objects.
" They have—as their name imports—a near, in some
" instances a perfect, resemblance to planets, presenting
" discs round, or slightly oval, in some quite sharply
" terminated, in others a little hazy or softened at the
" borders; not above four or five-and-twenty have been
" hitherto observed, and these chiefly in the southern
" hemisphere . . . . Among these may be more par-
" ticularly specified the sixth in order, situated in the
" cross. Its light is about equal to that of a star of
" the 6·7 magnitude, its diameter about 12″, its disc
" circular or very slightly elliptic, and with a clear,
" sharp, well defined outline, having exactly the appear-
" ance of a planet, with the exception only of its colour,
" which is a fine and full blue, verging somewhat upon
" green . . . . On the disc of No. 3, and very nearly
" in the centre of the ellipse, is a star 9*m*., and the
" texture of its light being velvety, or as if formed of
" fine dust, clearly indicates its resolvability into stars;
" the largest of these planetary nebulæ is No. 5, situ-
" ated somewhat south of the parallel of β Ursæ
" Majoris, and about 12*m*. following that star. Its
" apparent diameter is 2′ 40″, which supposing it placed
" at a distance from us not more than that of 61 Cygni,
" would imply a linear diameter seven times greater than
" that of the orbit of Neptune."

" Whatever idea we may form of the real nature of
" such a body, or of the planetary nebulæ in general,

" which all agree in the absence of central condensation, " it is evident that the intrinsic splendour of their sur- " faces, *if continuous*, must be almost infinitely less than " that of the sun."

" *Double Nebulæ* occasionally occur, and when such is " the case, the constituents most commonly belong to " the class of spherical nebulæ, and are in some in- " stances undoubtedly globular clusters. All the varie- " ties of double stars, in fact, as to distance, position, " and relative brightness, have their counterparts in " double nebulæ . . . . Nothing more magnificent can " be presented to our consideration than such combina- " tions. Their stupendous scale, the multitude of indi- " viduals they involve, the perfect symmetry and regu- " larity which many of them present, the utter disregard " of complication in thus heaping together system upon " system, and construction upon construction, leave us " lost in wonder and admiration at the evidence they " afford of infinite power and unfathomable design." (" Outlines of Astronomy," by Sir J. W. F. Herschel, fifth edition).

From these descriptions of the heavens, we see there are innumerable simple suns and monocosmic systems like our own, and multitudes of double stars.

Beyond the spaces occupied by secondary constellations in our sphericosm, astronomers discern more distant nebulæ, which seem to be sphericosmic masses, more or less inferior in dimensions to our own universe, but nevertheless, independent worlds containing thousands upon thousands of complex zonocosmic, and sphericosmic units. Beyond these again, we imagine space may teem with endless worlds, and hence we rise through an ascending scale of cosmological degrees, from monocosmic to pancosmic systems.

These distinctions do not exhaust our ideas of the

hosts of heaven, and hence we recognise the existence of different classes of nebulous clusters within the limits of telescopic vision, and innumerable worlds extending beyond the limits of imagination. Sidereal realms, classes, orders, families, genera, and species, then, correspond to positive distinctions in the heavens, and in the human mind.

The ultimate limits of our universe we may fitly call pancosmic, and as there are numerous degrees of complexity in the great and small clusters of suns and stars, within the limits of this sidereal unit, we should have appropriate names and definitions for the most marked grades of distinction in collective order and association.

Our solar system is a very humble portion of the universe. Astronomers describe worlds in which several suns are grouped together in one complex unity of gravitation and illumination, along with secondary bodies like our planets, but too remote for reflected light to become visible in our telescopes. These "double and multiple stars" form *polycosmic* systems of a higher order than our *monocosmic* system, with its single sun. Of a higher order still than "double stars" and systems, are general clusters, containing hundreds of suns, in some of those regions, designated as *zodiacal constellations* (from *zodia*, animal), because they are represented on maps and globes by the configurations of animals and men. These very complex clusters may be fitly called *zodiacosmic systems*, to distinguish them from inferior polycosmic systems. These are well described in a work called "The Heavens," (by M. Amedée Guillemin,) recently translated into English, and from which we may quote a few descriptions.

Double and Multiple Stars.—"There is in the vicinity "of Vega, the brightest star in the constellation of the "Lyre, a small star (ε Epsilon Lyræ) which appears

" elongated to some persons possessed of a very keen " eye-sight, and this appearance suggests that it may " really be composed of two luminous points; indeed, it " is only necessary to examine it with an opera glass to " see that it really consists of two stars, separated by an " interval equal to about a ninth part of the apparent " diameter of the moon. But this is not all, if we em- " ploy an instrument of considerable optical power, we " find that each component itself consists of two stars, " so near together that the intervals separating them " are not more than the 1.70th part of the total distance " of the couples themselves, so that we have here a " double-double star. A century ago only about twenty " double stars were known, now, however, we possess " catalogues of more than 6,000."

" Is the union of two suns purely accidental, or does " it indicate a real physical connection? As soon as the " number of double stars began to increase, it was " thought extremely probable that groupings of this " kind might not all be owing to the effects of perspec- " tive; the existence of real systems of suns was sug- " gested, and this suggestion has since been abundantly " justified. Out of a total number of 6,000 double stars " known at the present time, 650 have been demonstrated " to be physically connected systems—two suns turning " round a common centre of gravity. There are still more " complex groups,—systems of three, four, or even more, " suns. In the constellation of Orion, there is a system " where the unaided sight only distinguishes a luminous " point. With the help of a powerful telescope, this " point is divided into four stars, accompanied by two " other very small stars, and forming altogether a group " of six suns. Probably, says Humboldt, the sextuple " star (θ Orionis) constitutes a real system, for the five " smaller stars have the same proper motion as the

" principal one. Mr. Lassell has discovered a seventh " star in this system, so that θ Orionis is a septuple " star . . . . These will be seen to progress in their " orbits, and science will be enriched with a new fact, " well worthy of attention,—the reciprocal and simul- " taneous movement of seven suns."

" In the constellation of the great Bear, the star ζ " has been known as a double star since 1782. The " two components of this system are one of the fourth, " the other of the fifth magnitude. The movement of " revolution of the second round the first, takes place in " a period of sixty-one years. The elliptical or oval " form of the orbit of this binary is very decided; its " excentricity is comparable to the orbits of our periodi- " cal comets, since even among our telescopic planets, " there is no orbit which differs so much from a circle. " But among the double stars there are some, the orbits " of which are still more elongated. Such is that of α " Centauri, the period of revolution of which exceeds 78 " years."

Star-Groups.—" Are the stars visible to the naked eye " spread orderless on the celestial vault? or is there not " between those, apparently most closely connected, some " real or physical connection, which requires us to rank " them in natural groups? These questions have been " already partly solved by what is known of the double " and multiple star systems. Soon, exploring the regions " of the sky visible by means of the telescope, we shall " have to pass in review a multitude of stellar associa- " tions, in which suns are found so compact and so " numerous, and the form of the groups so regular, that " it is impossible to deny their reciprocal dependence. " But long before the discovery of these archipelagoes " of worlds, scattered with such astonishing profusion " over the infinite, the naked eye had already distin-

" guished a certain number of groups, the stars of which " were so near together, that it was impossible to doubt " their physical connection. Such, for example, is the " group of the Pleiades. Such again are the groups " known under the names of the Hyades, of Præsepe, " and of Berinice's Hair. All are visible to the naked " eye."

" *The Milky Way* contains at least 18,000,000 stars, " as gauged by Sir W. Herschel. The small breadth of " the zone, compared with its other dimensions, shows " that it is formed of a stratum of suns, distributed " irregularly, and comprised between nearly parallel " planes, which give to the whole the figure of a flat- " tened millstone, the rim of which is split into two " portions throughout one half of its circuit . . . . The " stars visible to the naked eye comprise the first six " orders of magnitude. Sir W. Herschel established " that in the mean, those of the sixth order, are twelve " times more distant than the stars of the first magni- " tude. From this he inferred that with his great " telescope, he could observe in the depths of the " heavens, stars situated at a distance 2,300 times " greater than the mean distance of the stars of the " first magnitude. His 40-feet telescope could not reach " the limits of the star-zone, which he deemed unfathom- " able . . . . From this it follows, that the Milky Way, " in the direction of the most distant regions accessible " to our view, can only be completely traversed by a " light-ray in a period of upwards of 10,000 years."

" Calculating the thickness of the Milky Way from " its apparent breadth, Herschel arrives at the result " that its thickness is about eighty times greater than " the distance of the stars of the first magnitude. Thus " the stellar stratum greatly surpasses in this direction, " even the space penetrating power of the human eye.

" Whence it follows that not only our sun, but all the " stars, that we can see with the naked eye, are deeply " plunged in the Milky Way, and form an integral " portion of it." (Struve, " Etudes sur l'astronomie stellaire.")

" *Other universes*," Sir W. Herschel remarked in 1818, " that some of the nebulæ of cometary form, many of " the stellar nebulæ, and a considerable number of ne- " bulous stars are banished in space to such depths, that " the penetrating power of the telescope has not yet " been able to resolve them. This opinion has now " become a certainty, thanks to the power of modern " instruments."

" The stellar clusters and nebulæ are then the most " distant of celestial objects which the eye can reach, " the accumulation in a small space, of a multitude of " luminous points, allows them only to be distingushed " as a whole. Sir W. Herschel estimated the distance " of the 75th clusters in Messier's catalogue, at more " than 700 times that of the stars of the first magni- " tude. (It is not visible to the naked eye, but would " become so at a quarter of that distance.) If we sup- " pose it removed to five times its actual distance, that " is to say 3,500 times the distance of Sirius, the large " Herschelian telescope of 40-feet focus, would still show " it, but only an irresolvable nebula. It is then ex- " tremely probable, that among the many nebulæ inde- " composable into stars, beyond the Milky Way, in the " depths of the heavens, many are as distant as that of " which we speak. Doubtless many are still more so. " Now, to reach us, light rays must have left stars " situated at such a distance, more than 700,000 years " ago . . . . In the depths of limitless space, exist " numerous assemblages of stars, like so many archi-

" pelagoes in an infinite ocean. Each of these universes " is itself formed of a multitude of clusters, in which " the suns are grouped like so many systems, the con- " densation of which is more decided than in the struc- " ture generally." ("The Heavens.")

Astronomers describe "*solar systems*" like our own, with a single sun as a central orb; "*double stars*" and systems, with several suns revolving round each other, in binary, or multiple conjugation; *zodiacal constellations* of suns and systems, combined in still more complex order and association; the *Milky Way*, as a distinctly connected universe; "*nebulæ*" and "*other universes*" immensely distant from the limits of the Milky Way, but still within the boundaries of telescopic vision.

Astronomy explains only the lowest of these systems, but may perhaps in time bring others within the reach of positive analysis. We have a definite science of monocosmic astronomy, some glimpses of polycosmic astronomy, with only a few descriptive glimpses of the "Milky Way," and "other universes." If we cannot have a science of all these degrees of sidereal combination and complexity, we may have at least appropriate definitions and denominations for them. The first four may be fitly distinguished from each other by the words monocosmics, polycosmics, zodiacosmics, and galactocosmics. To the science of "nebular clusters" and "other universes," we may give the name of *nebulocosmics*, and as these remote worlds are contained within a more extensive though invisible and unknown sphere of space, we should have a general denomination for a branch of science corresponding to the ultimate degree of systematic delimitation which may be named *pancosmics*, and a complete scale of primary definitions may be tabulated thus, as part of a general scale of the sciences:

COSMOLOGICAL WORLDS AND SCIENCES.

	Complex Worlds.	*Radiative Dimensions.*
VII.	PANCOSMIC WORLDS	MILLIONS OF YEARS.
7.	*Nebulocosmic Worlds*	*Hundreds of Thousands*, id.
VI.	GALACTOCOSMIC WORLDS	THOUSANDS OF YEARS.
6.	*Zodiacosmic Worlds*	*Numbers of Years.*
V.	POLYCOSMIC WORLDS	NUMBERS OF WEEKS.
5.	*Monocosmic Worlds*	*Numbers of Days.*

The distances of heavenly bodies are so immense, that the number of miles becomes inconvenient as a rule of measurement. To obtain a definite idea of relative proportions in the heavens, we must compare suns and planets with each other, and their distances in space, by the time which light requires to travel through a small or a large sidereal community. Light requires some days to travel from our sun to the remotest boundaries of the system. Weeks may be required for light to travel from the centre to the circumference of a polycosmic system. Years are required for light to travel from one fixed star to another, which is its nearest neighbour in a different system; thousands of years are necessary in the Milky Way, and hundreds of thousands of years for the light of the remoter nebulæ to reach our earth. Millions of years are probably required for light to travel through the limits of a pancosmic universe.

The *distances*, the *magnitudes*, the *motions*, and *connections* of stars and systems, are very interesting questions of astronomy, but little is yet known of all these problems.

Magnitudes of Stars.—With regard to the *magnitudes* of stars, we may observe that in our solar system, the planet Jupiter is 1,400 times the volume of our earth; the sun alone is 600 times the volume of all the planets of the system, and 750 times their mass; this shows that the sun is an immense orb, but it is estimated to

be one of only secondary rank among the suns of the heavens.

"Suppose the intrinsic intensity of light to be the "same for the star Sirius, for example, as for the sun of "our system, the diameter of Sirius would be fifteen "times that of our sun; and granting it may be triple "the intrinsic brightness of our sun, the diameter would "still be five times greater, and the volume 125 times "that of our sun." ("The Heavens.")

From this it follows that the diameter of Sirius is at least four millions of miles, and possibly more than twelve millions, the volume being more than a hundred times that of our sun, at one estimate, and more than three thousand times the size, if we suppose the intrinsic brightness to be only equal. The volume, therefore, of very distant suns, may be prodigious, in comparison with that of our sun, and their distances almost incalculable.

Distances of Stars.—The limits of our solar system are not exactly known, but the distance of the planet Neptune from the sun, is nearly three thousand millions of miles; and supposing the extreme limits to be more than three times that extent (upwards of nine thousand millions), the light of the sun travelling millions of miles a minute, would require about eleven days to reach the circumference. The nearest fixed star would then be many times as far from us as the sun is from its own boundaries. The distance of our sun from the circumference of the system, measured by the rapidity of light in motion, is under twelve days, while that of the nearest fixed star (α Centauri) is three and-a-half years; that of other fixed stars is more than nine years, while others again, are more than twenty years. The pole star is fifty years remote from us, and the star Capella seventy-two years. *Monocosmic* systems, then,

such as that of our sun, require a few *days* only to send the rays of light from the centre to the circumference. *Polycosmic* groups may possibly require some weeks or *months*, while *zodiacosmic* clusters require *years*, or scores of years; and our *galactocosmic* universe requires *ten thousand years*, to send its rays of light from one remote sun to another, in the prodigious vastness of its limits. The distances from universe to universe are still more wonderful; not by tens of thousands, but by hundreds of thousands of years, are their radiative times measured by astronómers. The limits of pancosmic unity being quite unknown, and possibly unknowable to us, we cannot even guess what the time required may be, for a ray of solar light to travel from a central to a peripheral universe, in the depths of infinite extension. It must, however, be a definite time, proportioned to a finite limit of space; for we cannot conceive that a pancosmic universe is absolutely infinite, since we have mentally defined its limits, in some given proportion, with the nebular universes which it contains, and as these require hundreds of thousands of years to send their rays of light from one great limit to another, it is not improbable that pancosmic dimensions require millions of years, for the rays of light to travel from central to peripheral systems.

This brings us to a point of view by which we see that mind is much more definite than the sense of vision, for where the boundaries of astronomic space and time become physically unfathomable, the mental vision remains clear, and able to discern the necessary order of phenomena, beyond the limits of experience.

Having followed the natural delimitations of the heavens as described by our astronomers, we have now to ask what are the secondary distinctions of this section, in parallel with those of the ontological and the

methodological sections? Are there not pancosmic realms, Nebulocosmic classes, galactocosmic orders, zodiacosmic families, polycosmic genera, and monocosmic species of suns and worlds? There must be such distinctions, although we may not yet be able to describe them from experience, or verify the suggestions of organic method by actual demonstration. The noble science of astronomy has already achieved wonders of observation and calculation, but much remains to be determined by experimental and mathematical processes, before we can advance further in these sciences, so vast, and difficult to fathom in organic depths of force.

An approach to the natural order of distinction, may however, be made from a careful study of the facts unfolded by astronomy, especially in the lower and more positive degrees of complexity. Different species of suns may be distinguished by the colours of their light; red, yellow, blue, and blended; orange, green, purple or white: distinct generic groups may be recognized in polycosmic systems, as binary, ternary, multiple, and compound, or double-double stars. Zodiacosmic families of constellations may be classed in equatorial, medial, polar, and central zones; distinct galactic orders may be recognized in the central, medial, peripheral, and divergent strata of the Milky Way. Nebulocosmic classes have been indicated by astronomers as resolvable and irresolvable nebulæ; some being stellar, while others are presumed to be composed of incandescent gas. Recent observations by spectrum analysis, suggest that certain nebulæ are but more or less undeveloped forms of cosmic worlds. We may naturally surmise then, that there are different classes of nebulæ, or variously developed forms of the same general type. And again, with regard to the existence of pancosmic realms, beyond the limits of our sidereal system, we may easily suppose

that a definite world, however vast and unfathomable in extent, is but a finite unit in the infinite; and that other forms of collective unity may coexist with this, as easily as different realmic types of organism on our globe. In the midst of inorganic nature, we have different organic realms commingled on the surface of the earth, as we conceive it possible for numerous unfathomable worlds, to move within the limits of unbounded space. On this hypothesis, one pancosmic type of world may be as different from another as a vertebrate is from a radiate organism. These, of course, are merely speculative views, but they enable us to form a systematic scale of cosmological realms, classes, orders, families, genera, and species, without which science will remain unmanageable in the human mind. It will simplify didactic labour, and may easily be rectified, as accurate knowledge becomes more developed. For the present, then, we give the following table, in parallel with that of the methodological sciences :—

COSMOLOGICAL TABLE.

VII.	PANCOSMIC REALMS.	1. Transcendent connection. 2. Superior pancosmic worlds. 3. Inferior pancosmic worlds. 4. Inorganic pancosmic spaces.
7.	*Nebular classes.*	1. Perfect stellar nebulæ. 2. Superior stellar nebulæ. 3. Intermediate stellar nebulæ. 4. Inferior, or gaseous nebulæ.
VI.	GALACTIC ORDERS.	1. Central spheres and zones. 2. Intermediate spheres and zones. 3. Peripheral spheres and zones. 4. Divergent strata and groups.
6.	*Zodiacal families.*	1. Connective constellations. 2. Equatorial constellations. 3. Intermediate constellations. 4. Polar constellations.

V. POLYCOSMIC GENERA.
1. Compound groups of suns.
2. Multiple groups of suns.
3. Ternary groups of suns.
4. Binary groups of suns.

5. *Solar species.*
1. Achromic suns, (white light.)
2. Polychromic suns, (mixed colours.)
3. Dichromic suns, (purple, orange, green.)
4. Monochromic suns, (red, yellow, blue.)

Motions of Stars.—The space in which the heavenly bodies move may be compared to the homesteads of human families, and each family of stars occupies its own domain of space, as each human family its own strip of territory. The distance of suns and stars from each other therefore, is only one aspect of astronomy; that of their wanderings in space, and the extent of each sidereal domain is another, and equally important. There is also the question of collective as well as that of private homes, in every community of stars. We need not dwell on this, however, beyond observing that satellites are grouped around planets, as members of one family, and planets around the sun in our solar system, as different families in one small community; minor suns and systems are grouped around major suns and systems, as municipalities in provinces, and these again in national societies. Our solar system with a single sun, may be compared to a corporate association of human beings, or to a domestic community of one family, while binary stars and systems hold a higher rank of collective association and co-operation. Ternary, quaternary, and multiple stars of all degrees, we call polycosmic systems. These are counted by thousands in our universe, and are all, no doubt, connected locally and generally in the higher unity, as different municipalities and provinces are united in a nation.

There is, however, another aspect of sidereal unity, and the relations of heavenly systems to local and

general delimitations of space. Just as birds are exceedingly minute bodies, in comparison with the immense ranges of space in the atmosphere through which they roam at will, so the stars are exceedingly small atoms compared with the immensities of space in which they move. The distance of our earth from the sun is more than 90,000,000 of miles, and that of Neptune is 2,700,000,000 of miles; while the nearest fixed star, α Centauri, is at least seven thousand times more remote than Neptune.

The planets in each solar system, and the "fixed stars" or suns in each universe, have relatively as much space to move in freely, as birds of all kinds have to move in our terrestrial atmosphere; and though the stars of heaven appear to remain always stationary, this is merely an appearance, and not a literal fact. The sun appears to rise and set, while in reality, our earth rotates upon its axis, and turns its surface towards the sun. The senses give rise to many other delusive impressions, caused by the motions of bodies at a distance. A knowledge of the laws of motion enables us to rectify all such illusions; and since the ratio of motion in the light of the sun has given us a means of gauging space by time; and as the parallactic distance of the nearest fixed stars has been proximately determined, we can form a general idea of the reason why the stars seem always in the same relative positions, while they are constantly in motion.

It is known that the light of the sun is about eight minutes in coming to the earth, and several days in travelling from the centre to the circumference of the system; some of the less remote fixed stars require nearly ten years for the light which they emit to reach us, while others are computed to be so remote that light is several thousands of years in coming from them to

the earth. We see the distant stars of the universe then, not exactly where they are now, but where they were thousands of years ago; and unless we possessed accurate charts of the heavens for every century, during the historic ages of the human race, we could not know what changes had occurred in the relative positions of the so-called fixed stars. Their parallactic distances from us and from each other are so immense, that their real motions, however great, are almost imperceptible by any means we can devise. Our own globe seems to be at rest, while it moves with an immense velocity through space; and the distant stars seem to be equally at rest, although they change their relative positions with electric speed. As motion is the link however, between space and time, and we can measure the motion of light travelling from star to star, these three factors of cosmic forces (time, space, and motion), become in some degree, exponents of each other; and thus we learn to note their relative proportions, on the smallest and the largest scale.

Besides the factors of time, space, and motion, as means of computing the forces, volumes, masses, distances, and movements of heavenly bodies, we have the experience of relative degrees of motion and apparent rest, in other particles of matter. In our solar system the sun is a fixed centre with regard to the movements of the planets, although it is known to turn on its own axis, and is supposed to have a proper motion in the heavens. The latter fact is not understood in connexion with any other known system; astronomers are therefore left to the resources of comparative observations and conjectures. They have obtained some ideas of the mutual connections and revolutions of double stars, but nothing is yet known of zonocosmic or of sphericosmic mechanism and motions. We may, nevertheless, form

an idea of the possible relations of a zonocosmic or a sphericosmic universe, by the phenomena of vibrations in the particles of a plate of metal, held together in their moving relative positions, by the laws and forces of cohesion. In a vibrating plate covered with dust or sand, the particles are known to oscillate violently to and fro, and are supposed to rotate on their axes. The general waves of motion which pervade the whole mass, are seen to have definite limitations or nodes of rest, forming very curious lines and patterns on the surface of the plate, distinctly marked by the heaps of dust accumulating at all these points and lines of stationary equilibrium. In parallel with this example, we may suppose a spherical or a zonal system of suns (accompanied by their attendant planets) as formed of so many stationary points or nodal lines of distribution, apparently at rest, while the secondary bodies are in rapid movement, all around them. And as a plate of metal may be carried from one point to another in a room, while its particles are moving violently amongst each other, so a sphericosmic universe of suns might be carried bodily along in space, while all its suns and planets were in a constant state of rotatory, revolutive, and oscillatory motions amongst themselves.

There is no difference in principle, between the motions of particles of matter and those of the comparatively minute globes of a cosmic world; and as different degrees and tones of vibratory motion, in the particles of a metallic plate, give varieties of distribution to the stationary nodes and pattern lines, marked upon the surface by the sand, we may easily imagine a similar variety of distribution, in the nodal points or suns of any system; and supposing these lines of distribution to form different patterns analogous to the various types of living organisms in animals or plants (which also manifest different modes

of moving in the surrounding medium of air and water) we may further imagine that numerous species, genera, families, orders, classes, and realms of cosmic systems are organized on different plans, with special modes and modulations of vibratory and progressive motions, just as different animals are formed on one general plan of body and limbs, with an infinite variety of particular shapes, and modes of action. And just as we find varieties and species of organism in epicosmic nature, so we may imagine cosmic orbs and systems distributed in numerous species, orders, and classes in universal space.

The connection of Stars and Systems.—The problems of sidereal connection are not yet solved, in all degrees, by astronomic science, but the lower degrees of cohesive force and unity, have been partially explained by the physical and mathematical sciences of *gravitation*, in our solar system; molecular *cohesion*, in material bodies, on our earth; chemical affinity and union in the constituent atoms of complex molecules, such as those of inorganic and organic bodies.

Heavenly bodies gravitate to their respective centres of attraction, but molecules do not cohere in all conditions; nor do atoms unite promiscuously in forming molecules. There are questions of affinity, then, in the chemical union of atoms, and something of a similar quality in the cohesion of molecules of matter. Nothing of the kind has been observed in the phenomena of gravitation, but then we have no means of judging of the difference of magnetic sympathies and antipathies, in the cosmic bodies of our solar system, and still less of any such qualities, in different suns and groups of stars. All we can say on this point is, that there is some kind of coherency in the clusters and systems of the sidereal heavens, which indicates the existence of a universal cohesive force, analogous to the forces of gravi-

tation in our solar system, and the subordinate forces of molecular cohesion and atomic affinity. Monocosmic gravitation and illumination; polycosmic gravitation and illumination; zodiacosmic constellation and illumination; galactocosmic stratification and illumination; nebulocosmic aggregation and illumination; pancosmic connexion and illumination, are well known facts, but the laws which govern these phenomena are only partially explained by science. There can be no doubt, however, of the existence of immaterial connective forces and regulative laws, co-extensive with the sidereal universe. Are there not mental and volitional forces transcending these, as the supernatural transcends the natural; the immortal spirit of a man, the mortal body? We need not give an opinion on these questions; but we may observe, that much remains to be examined, not only with regard to the essential unity of different kinds of supersensual forces, and their various modes of motion, in phenomenal evolutions, but with regard to the essential unity of immaterial physical forces, and their various modes of motion.

Black has proved that "latent heat" is only another word for "cohesive force;" a particular mode of action of the force called heat; and Leslie asserts that "heat "is light in comparative repose, and light is heat in "rapid motion. When light is combined with a body "it becomes heat, but when it is thrown off from that "body, it again becomes light." Light is therefore nothing but the *velocity* of a force which, in slow motion is called heat, and heat is only an *expansive* mode of action, of an occult force which, in a *cohesive* mode of motion, is called "latent heat." The essential unity and universality of one *kind* of supersensual force, then, (the physical,) seems almost certain, notwithstanding the diversity of its phenomenal modes of action: and we

may ask ourselves if the essential unity and universality of spiritual forces are not as probable, notwithstanding the diversity of instinctual and mental modes of motion, and the difference of degrees of power manifested in experiential organisms.

The laws of equilibrium in physical forces are still but partially explained, and those of equilibrium in spiritual forces, not at all. In one aspect of physical force and motion, we know that *sidereal coherency* and *starlight* are the most universal degrees of equilibrial phenomena; *solar gravitation, light,* and *heat,* are the next degrees of known equilibrium; *molecular cohesion* and *magnetism,* the next lower degree; *atomic union* and *electricity,* the most elemental factors of physical tension, motion, and equilibrium. Tension, motion, and velocity are physical modes of motion; attraction and repulsion are other names for contractive and expansive modes of action; and some of the laws of atomic modes of union and disunion, molecular modes of cohesion and oscillation, solar gravitation, revolution, and rotation; thermotic, photologic, and electromagnetic motion and tension, have been explained by chemical, physical, mechanical, and mathematical science; but the analogous modes of spiritual tension, motion, and velocity, or excitement, have not been thoroughly explained by the science of biology and sociology, neither in parallel with sidereal coherency and light, or with solar gravitation and heat, nor even in parallel with molecular cohesion and atomic union, in the animal and vegetable organisms, of our tiny globe.

The most remarkable difference in the physical forces is that of their respective degrees of velocity. "If the action of gravitation is not instantaneous at any distance of our solar system," says Laplace, "it is at least several hundreds of millions of times more rapid than that

of light, which travels at the rate of some two hundred thousand miles in a second."

The velocity of light is supposed to be one of the secondary causes of atomic combination. It is known that chlorine gas has a strong tendency to unite with hydrogen, but the two gases may be mingled together in the dark, without forming a chemical union. Admit a ray of light, and the gases rush into union with a loud explosion. Light has also a marked influence, as well as heat and moisture, on the physiological modes of action of vegetable organisms.

The influence of attraction extends, then, to an infinite distance; that of light, to an almost infinite distance; that of heat and electricity being relatively, much more limited.

In parallel with these modes of action in physical forces, we may observe that the organic forces of human nature are confined within the limits of the body; the instinctual forces are extended to external nature, on our globe; the mental forces travel to the utmost limits of the visible universe, and the spiritual forces, to the mysterious depths of transcendent being, and the invisible or supernatural universe.

But these questions are leading us from astronomy, and the mutual relations of suns and planets, with their subordinate creations.

From the description of "fixed stars," we may now descend to the planets of our solar system, and the living organisms which inhabit one of these.

Within the limits of the system, we have a number of subordinate planets and satellites, and upon the surface of our globe, there are living bodies of minute dimensions, though not of insignificant importance.

What relation do these minute organisms bear to the earth on which they live? and what is the function of

our globe in the solar system? Questions very difficult to answer.

Planets and satellites are *pericosmic* orbs, and the innumerable hosts of minute organisms that live upon the surface of an opaque planet, like our earth, may be called *epicosmic* bodies. *Epiderm* is the technical name of the cuticle or scarf skin of the human body, and the word *epicosm* may fitly designate the external crust or scarf skin of a globe, including the animal, vegetal, and mineral kingdoms.

Within the limits of our monocosmic solar system, we have to study secondary groups of pericosmic orbs, single globes or comets, and the subordinate realms of nature upon the crust of an individual planet. To these degrees of secondary sub-division we may apply the words *pericosmics*, *orbicosmics*, and *epicosmics*. The general denominations of cosmics and hypocosmics are subdivided in the following manner:

Cosmics.	6. Pancosmics. 5. Nebulocosmics. 4. Galactocosmics. 3. Zodiacosmics. 2. Polycosmics. 1. Monocosmics.
Hypocosmics.	3. Pericosmics. 2. Orbicosmics. 1. Epicosmics.

Orbicosmic is a hybrid term, but asterocosmic or planetocosmic would not be sufficiently definite.

ORBICOSMICS.

How shall we analyze the internal and external factors and functions of a planet? We may take a cosmic orb as an individual, and establish a parallel between it and any other individual organism, such as that of man. In the latter we observe physical energies, instinctual energies, mental energies, and spiritual energies; in the

former, only one of these kinds of motive power is manifest. If the other three are present, we cannot observe them, or discern their modes of action.

Taking an individual planet however, and analyzing it, as we would the body of an animal, without regard to other than the physical forces of nature, we may observe it under any of the four aspects of organic method, exemplified in anatomy, physiology, histology, and evolution. The anatomic view gives us the following formula, in its first degree of analytical progression :—

U. Relational mechanism.
∩. Mixed mechanism.
O. Organic mechanism.
H. Connective mechanism.

The first three of these again, cannot be known experimentally, but the last may be partially observed and analyzed. As the external cuticle of an animal or vegetable, along with the peculiar clothings and infestations which surround it, belong to the connective mechanism of the body, so we may regard the external crust of our planet, as a kind of *epiderm* or *epicosm*, infested by the animal and vegetable organisms which live upon its surface. From this point of view, we obtain some partial knowledge of the structure and functions of individual planetary orbs, in parallel with those of individual epicosmic bodies. Thus :—

Connectives.
- Z. Supernal forces and conditions of a globe.
- Y. External resources of a globe.
- X. Superficial productions.
  - H. Parturitional and necrological productions.
  - U. Epicosmic realms and infestations.
  - ∩. Glandular productions.
  - O. Internal lubrications.
- W. Connective producers.
  - H. Amniotic connectives.
  - U. Glandular connectives.
  - ∩. Adiposerous connectives.
  - O. Areolar connectives.

Organic mechanism.	VII.	Vascular system of a globe
	7.	Vascular adjuncts of a globe.
	VI.	Alimentive system of a globe.
	6.	Alimentive adjuncts of a globe.
	V.	Genetic system of a globe.
	5.	Genetic adjuncts of a globe.
Relational mechanism.	IV.	Electro-magnetic system of a globe.
	III.	Skeletal system of a globe.
	2.	Vibratory adjuncts of a globe.
	II.	Motorial system of a globe.
	1.	Radiatory adjuncts of a globe.
	I.	Limitative system of a globe.

We cannot observe all these systems in a planet, but we can discern the functions of some of them. Rotatory motions and vibratory oscillations are known in the orbital movements of planets and their satellites; while the radiatory motions and relations of gravitation and illumination, are equally manifest in heavenly bodies. Electromagnetic forces and relations are not less evident in our earth, and every orb has limits and dimensions, which mark it as a special type in the collective system. Meteorologists tell us of " magnetic storms and synchro- " nous pulsations of electrical forces over the whole " globe, either from the centre of the globe within, or " from the sun without;" so that something like organic rythm and motion, has been observed in the neural or magnetic functions of the earth, as an individual organism.

There is a *relational* mechanism then, in our globe; and although we cannot yet discern the factors of organic mechanism, we can perceive the parallel of connective elements in cosmic orbs, as well as in minuter bodies.

Anatomical methods are not easily applied to cosmic bodies, but they help to strengthen other modes of investigation. In applying the physiological method, we obtain a better view of the physical structure of cosmic matter, as well as of the radiatory and vibratory

modes of action of the sun and of the planets. Diurnal rotations, annual revolutions, periodical mutations, and other astronomical phenomena, become interesting; but on these we need not dwell, as they are somewhat foreign to our aim. Enough has been said to show that some slight degrees of orbicosmic science are within the reach of systematic analysis, and astronomy has already thrown floods of light on the mathematical, physical, and mechanical laws of order in our solar system. The same laws are applicable to the great and the small bodies of nature; to collective and individual integralities of structure. With this knowledge we are enabled to state questions more plainly, and solve them more easily. We know better what to look for, and how to look for it.

It is not our business however, to form conjectures with regard to orbicosmic forces and functions, but to show that man is deeply interested in one at least, of the subordinate aspects of this question, namely:—that of epicosmic life and organization.

EPICOSMOLOGY.

Epicosmology is a subordinate branch of orbicosmology, as the study of the epidermic clothings and infestations of animals, is a subordinate question of biology. All heavenly bodies have annexes of some kind, such as atmospheres and photospheres, and these may be analyzed to some extent, as a branch of positive science. The whole universe being formed of individual suns, planets, satellites, comets, &c., some kind of external crust must exist in every cosmic body, so that the limits of epicosmic science are co-extensive with those of astronomy. We can more easily observe and analyze epicosmic realms and organisms, than the internal structure of suns and planets.

Collective unity in epicosmic nature, is governed by the same laws of order as that of cosmic unity, and a knowledge of one is a key to that of the other. In epicosmic realms we have the following natural divisions and connections, as a clue to those of cosmical distinctions and associations.

SYNOPTIC VIEW OF OUR EPICOSMIC UNIVERSE.

Social world.	Z.	Supernal forces and conditions.
	Y.	Providential revelations and resources.
	X.	Social or human creations.
	W.	Human empires or republics, (sub-creators).
Organic world.	VII.	VERTEBRATE REALM OF ANIMAL LIFE.
	7.	*Articulate realm of animal life.*
	VI.	MOLLUSCAN REALM OF ANIMAL LIFE.
	6.	*Radiate realm of animal life.*
	V.	PHŒNOGAMIC REALM OF VEGETAL LIFE.
	5.	*Cryptogamic realm of vegetal life.*
Inorganic world.	IV.	ELEMENTAL REALM OF INORGANIC FORCES.
	III.	GEOSPHERIC REALM OF INORGANIC FORCES.
	2.	*Reliquial realm of inorganic forces.*
	II.	OCEANIC REALM OF INORGANIC FORCES.
	1.	*Pluvial realm of inorganic forces.*
	I.	ATMOSPHERIC REALM OF INORGANIC FORCES.

The collective unity of epicosmic realms could not be classed in any scale more simple, definite, and complete, in parallel with that of the human body and its surroundings. We have then, a perfect pattern of natural order in human nature, which may serve as a guide to the analysis of universal nature.

But how can we apply this law to the pericosmic investigation of our solar system? That is a question we do not deal with, but a simple glance will show us the first step of the proceeding; and that is all we aim at here.

HELIOCOSMICS OR MONOCOSMICS.

According to the formula of organic method, the primary distinctions of our solar system are those of

orbs, orbits, and connective elements, and these may be classed in a synoptic scale, as follows :—

Elements of our Solar System.

Connectives.	Z.	Supernal forces and conditions.
	Y.	Physical resources.
	X.	Physical productions.
	W.	Physical connectives. { Photospheres, rings, &c. Epicosmic realms, and internal connectives.
Organic orbs.	VII.	CENTRAL SUN.
	7.	*Lunigery planets.*
	VI.	SIMPLE PLANETS.
	6.	*Satellites or moons.*
	V.	CHOREGRAPHIC ASTEROÏDS.
	5.	*Comets and meteorites.*
Relational orbits	IV.	SOLAR ORBIT AND AREA.
	III.	LUNIGERY ORBITS AND AREAS.
	2.	*Satellitic orbits and areas.*
	II.	PLANETARY ORBITS AND AREAS.
	1.	*Cometary orbits and areas.*
	I.	ASTEROÏDAL ORBITS AND AREAS.

This table shows that our solar system has all the factors of a complex organism, and that a careful study of these, might bring to light numerous indications of organic laws of order now unnoticed or misunderstood. Differences of form and structure are manifest in all parts of the system, but little thought has been concentrated on their possible significance. Much attention has been given to the orbits of the comets and the planets, with their respective planes of revolution, but what of the question of co-ordination and community of purpose, in their relative positions and translations? The sun has evidently an important function as the centre of gravitation and illumination for the secondary bodies; what are the uses these perform to one another and the sun?

Innumerable cosmic elements whirling invisibly around the focus, and often coming in the path of our own orbit, as "shooting stars" and meteorites, are supposed

to converge gradually towards the sun, and finally to fall upon it, as fuel for combustion, to supply the waste of radiation; but this is merely a conjecture amongst physical astronomers. It would, however, show, if proved to be correct, that alimentary factors exist in the system, and that would be another link in the chain of evidence, denoting parallelism between cosmic and epicosmic organisms, as far, at least, as physical constitution and sustentation are concerned. Many other parallels may be discerned, when the minds of our astronomers become imbued with the ideas of organic method, applicable to the greatest and the smallest units of creation. We need not dwell on the details of what has been surmised of the physical structure of the sun and other bodies of our solar system, nor on the probable existence of an intercosmic ether, in which the planets move at different distances from the common centre. The laws of gravitation, with those of numerous other physical forces and phenomena, are more or less known; something has been done by Laplace towards the establishment of a science of "celestial mechanics;" but nothing is yet known of the laws of distribution and association of the heavenly bodies, either in our own solar system, or in any of the constellations of the universe. Organic method may enable astronomers to see many indications of law and order in the heavens, which are now unnoticed by ordinary modes of investigation. Evolutive method may assist them also, when both are added to the experimental and statistical methods of observation and analysis.

The physical modes of action are very similar in all kinds of organism, large and small, and the sun is by some means enabled to sustain immense proportions of waste. Mechanical modes of action are very similar in all moving bodies, cosmic and epicosmic. Questions of

parallel suggest themselves at every step of inquiry into the principles of force and motion, in all parts of nature, but the line is difficult to draw between the limits of inorganic and organic physical forces. Teeth, and nails and hair, in the human body, apparently belong at once to the internal organism of sensation, and to the external world of matter, without life. If planets were living organisms, the superficial crust might be composed of insensible matter, just as the cuticle, the hair, and the hoofs of an animal are composed of matter without feeling. There is nothing radically absurd, therefore, in comparing cosmic with epicosmic bodies; nor would it be more wonderful to contemplate millions of finite creatures, such as suns and planets in the universe, than to recognise the existence of nearly a thousand millions of human beings on the surface of our globe, along with countless millions of inferior animals, and myriads of minor swarming creatures, in the sea and on the land. Minute atoms and infusorial organisms endowed with life, are just as far below the highest animal intelligence, as this is lower than the human; and between the limited forms of life in man, and the omnipotence of the Creator, any number of degrees of physical and vital power in finite suns and systems, may be imagined without doing violence to common sense and logical consistency.

The laws of order are the same for every kind of force, physical and hyperphysical, and difference in degrees of power, make no fundamental difference to the laws of motion and equilibrium, in each degree. Illustrations of this view may be found in every field of nature; comparing small things with great, for instance, some very curious parallels may be formed between the physical properties and relations of the constituents of different bodies. The distinct particles of matter, held

together by gravitation in our solar system, are the planets and satellites revolving round the sun. This general cohesion of globular masses may be compared with the physical cohesion of the molecules of water on the surface of our globe; and the mechanical motion of the planets in their orbits, may be compared with the mechanical work done amongst the particles of water, when acted upon by heat, within the limits of greatest density. In dealing with questions of specific heat and molecular forces, physical science tells us that—

"The magnitude of the forces engaged in the interior work of atomic or molecular motion, as measured by any ordinary mechanical standard, is enormous. A pound of iron, on being heated from 0° C. to 100° C., expands by about one 800th of the volume which it possesses at 0°. To give its atoms the motion corresponding to this augmentation of temperature, and to shift them through the small space indicated, an amount of heat is requisite which would raise about eight tons one foot high. The force of gravity almost vanishes in comparison with these molecular forces; the pull of the earth upon the pound weight, as a mass, is as nothing compared with the mutual pull of its own molecules. Water furnishes a still subtler example. Water expands on both sides of 4° C. or 39° Fahr.; at 4° C. it has its maximum density. Suppose a pound of water to be heated from $3\frac{1}{2}$° C. to $4\frac{1}{2}$° C.—that is, one degree—its volume at both temperatures is the same; there has been no forcing asunder whatever of the atomic (molecular?) centres, and still, though the volume is unchanged, an amount of heat has been imparted to the water, sufficient, if mechanically applied, to raise a weight of 1,390lbs. a foot high. The interior work done here by the heat, is simply that of causing the atoms (molecules?) of water

"to rotate. It separates the attracting poles of the "atoms by a tangential movement, but leaves their "centres at the same distance asunder, first and last." ("*Heat as a mode of motion.*") (Atoms of oxygen and hydrogen form molecules of water.)

In this description of heat, within certain limits, as a promoter of molecular motion, without causing either expansion or contraction of the mass of water, we have a picture of the motions excited in the (comparatively molecular) orbs of our system by the heat of the sun, which maintains them in a state of rotation and revolution around itself, without causing any very marked variation in their mean distances from each other and from the sun.

The mode in which the expenditure of an amount of heat in the sun, radiating throughout the system, to keep up this continual motion, is supplied by physical or by mechanical action in the system, has been surmised by two different and equally ingenious hypotheses; *i.e.*, the physical theory of very slow continuous contraction in the body of the sun, as a sufficient source of heat and radiation, has been propounded by Helmholtz and by Mr. Waterston; the theory of an incessant series of mechanical shocks, caused by the showering down of innumerable meteoric bodies upon the surface of the sun, has been put forth by Dr. Mayer, and is held, by competent authorities, to be sufficient to account for the necessary expenditure of heat in the continuous and powerful radiation of the sun, during countless myriads of ages. Both theories may be true, to some extent, as the showering down of meteoric bodies, and the concentration of the matter of the sun, may be concomitant phenomena; but to render these theories complete, there should be some hypothesis concerning the origin of the substances, supplied to repair the constant waste of

matter, consumed in solar radiations. Where, on the one hypothesis, does the nebulous matter come from, before it begins to be formed by the physico-mechanical forces of rotation, revolution, and concentration into solar systems? Whence originate the countless myriads of meteorites which perennially supply new matter to the sun, according to the other theory? We cannot suppose that matter is derived from nothing. And if we admit that solar systems are formed of nebulous matter by integration or creation, we must also admit that nebulous matter is derived from some kind of sidereal system, by disintegration or dissolution; and this hypothesis takes us out of the purely physical into the organic sphere of ontological speculation. As epicosmic bodies obtain sustenance from their immediate surroundings, so cosmic bodies must repair their waste from their immediate surroundings; and, in both cases, as much is ultimately yielded to the external world as taken from it.

The highest order of cosmological problems may require many centuries of investigation, by the most refined developments of method, before they can be brought within the limits of organic certitude, but the lowest order of epicosmological problems has already been brought within these limits, by our own exposition of the science of "Epicosmology" in a previous volume. A dissertation on these sciences, however, is not the object of the present volume, which is mainly devoted to the investigation and discussion of First Principles.

Every school puts forth its own ontology, for every sect admits that natural forces are indestructible, and are controlled by laws which are invariable. Physical forces and laws alone are infinite, according to one view: Mental and moral forces are also infinite, according to another. The question has been controverted in many

ways, by different sects, but nothing definite has yet been settled, on any point of the discussion. The very first question that occurs to our mind, has not been fairly mooted—that is, how many immaterial forces and principles are there in phenomenal nature, as we see it in our earth and in our solar system? and how many *kinds* of force and law can we discern within these limits? How many *ranks* of power can we discover in the universe? and how many definite *degrees* of extension, between the lowest and the highest?

These are questions of ontology, and we must now proceed to an investigation of eternal principles, as the foundation of all science.

The inquiry will involve us in "metaphysics" and "theology;" and we may have to differ from some learned men, on controverted questions of faith, science, and Philosophy; but this is the common fate of all systematic investigations.

SECTION IV.—ONTOLOGICAL SCIENCES.

SUBSECTION I.—DISCURSIVE ANALYSIS.

From the methodological and cosmological divisions of our general classification, we now proceed to a systematic view of the ontological section, the primary divisions of which are the following:—

Z. Transcendant ontology of infinite creative being.
Y. Immanent ontology of supernatural created worlds.
X. Immanent ontology of intermediate created worlds.
W. Immanent ontology of natural created worlds.

Ontology has been defined as "that part of the science of metaphysics which investigates and explains the

nature and essence of all beings, their qualities and attributes." What is the difference between physics and metaphysics? In our definitions, all matter is physical; all forces and laws are immaterial or metaphysical; the science of principles, considered in the abstract, is ontological; the science of these same principles, laws, and forces, in connection with physical forms and phenomenal existence, is experiential. All the cosmological sciences are therefore experiential, in contrast with the abstract science of laws and forces. What, then, are the *nature* and *essence* of beings in the natural world? What are their *qualities* and *attributes?* The beings known to us are men and animals, and in these we must look for a reflex of all kinds of beings, in all states of existence. What is the nature and the essence of the human soul? What are its characteristic qualities and attributes? What is the difference between psychology and ontology, as special branches of human science?

Psychology analyses the experiential faculties and functions of moral and mental life in man, while ontology deals with the eternal laws and forces of existence, in human nature, and in universal nature. What, then, are the indestructible forces, the immutable laws, the inevitable destiny, and the final causes of being, in man, during his career in this natural world; and also in a future state of existence? Before we can speak of unknown worlds, we must have a clear idea of the principles of force and life in this world. And as "man is the measure of all things," we may learn to know something of the nature and the essence of all kinds of being, from this complex type and mirror of eternal life.

The immaterial forces in human nature are of four kinds: *physical*, *instinctual*, *mental*, and *spiritual*. The inevitable destiny of these forces is *industrial*, *artistic*, *scientific*, and *social*; the manifest designs or final pur-

poses of these different forms of organic activity are to fulfil the ends of *use*, *beauty*, *truth*, and *goodness* in perfection; and the eternal laws of equilibrium, by which all these principles are regulated in their action, are those of *number*, *order*, *weight*, and *measure* in perfection. Indestructible forces, organic forms, immutable laws, and definite purposes, are some of the ontological principles of being in this natural world; and also in the supernatural; for man is still a human being in the spiritual world, however much he may advance from imperfection towards perfection.

The principles of being then, are easily determined in human nature, and the question now presents itself, concerning the existence, or the non-existence, of these principles in universal nature, and in Deity.

Organic forces, laws, and purposes are not limited to human nature only; for we see them manifested in the heavens, as far as human vision has power to penetrate into the unfathomable depths of space. Are physical forces the only factors which are infinite in nature? This is a main question of ontology. "Theology" says nay: "Metaphysics" say nay: "Positive Philosophy" says, aye: not openly, but indirectly, in acknowledging no other view. We must look at the question without evasion of any kind, and give each view impartial scrutiny.

In the natural world we know that all forces are immaterial and indestructible. The persistency and conservation of forces are indisputable formulas of physical science. The only question still unsettled is that of the convertibility of forces of all *kinds*. We know that physical forces are convertible, one with another, but we do not know that mental forces are convertible with physical. We have no proof of any such convertibility. Supposing them to be convertible, however, in human

nature, we may suppose them to be so in universal nature. Convertibility throughout the universe, or inconvertibility in every sphere of phenomenal existence, bring us to the same conclusion; and therefore we need not quibble in the dark, on questions which inevitably lead to the same result.

The data of ontology are certain, in the natural world, but the existence of a supernatural world is, with some minds, a question of faith and hypothetical speculation. The existence of an infinite creative being has by more than one philosopher been deemed an "open question."

Ontology, therefore, necessarily involves questions of faith, science, and philosophy; and it is only by means of known facts and laws, that we can hope to obtain a rational insight into the principles of being, in the infinite unknown.

We can obtain without much labour, a very firm grasp of the first principles of life in man; and these being indestructible, must be one with those of infinite eternal being. We can easily trace efficient forces in finite phenomenal existence of all kinds; and these forces being eternal, must be a part of that which is infinite. Reasoning, however, may often be obscure where truth is certain; we must therefore do our best to keep a steady light, in wending our way through the mystic mazes of ontological controversy.

Definitions.—Before we deal with the ontological sciences, properly so called, we should define the limits of natural, supernatural, and supernal points of view. The factors and the definitions in each of these are parallel, but quite distinct. The words, immaterial, ethereal, and material; ontological, hypercosmological, and cosmological; transcendental, supramundane, and mundane, denote the difference of these three points of view; although ontological principles are involved in all worlds

of phenomenal existence. Indestructible forces are immaterial, transcendental, and ontological; the manifestations of these forces, in the supernatural world, are ethereal and hypercosmological; in the natural world, material and cosmological. The following tables will give an idea of what is meant by these definitions :—

Ontological Aspect of Immaterial Creative Principles.

1. Efficient forces.	1. Organic forces. 2. Instinctual forces. 3. Mental forces. 4. Spiritual forces.
2. Creative actions.	1. Physical industrial creative actions. 2. Instinctual artistic creative actions. 3. Mental scientific creative actions. 4. Spiritual moral creative actions.
3. Regulative laws.	1. Organic laws of order. 2. Organic laws of number. 3. Organic laws of weight or attraction. 4. Organic laws of measure or proportion.
4. Definite Purposes.	1. Uses in perfection. 2. Beauty in perfection. 3. Truth in perfection. 4. Goodness in perfection.

What is the use of such tables as these? we may be asked; and we reply by another question. What is the use of tables of declension and of conjugation in the abstruse science of grammar? Numbers, genders, modes, and cases; persons, tenses, modes, and conjugations, are abstract principles, irrespective of the meanings of the words and symbols of any particular language, in which these principles are applied. Latin, Greek, and Hebrew, English, French, and German languages are all governed by the same fixed principles of grammar, and all experiential sciences, cosmological and methodological, are equally grounded in the immutable laws of nature.

There are remarkable differences in the external forms and idioms of different languages, although the *principles* of grammar are alike in all; and there may be still more remarkable differences in the experiential conditions of life and organization in different worlds, while the immaterial forces of the human soul are the same in all. But what is the use of ontology itself, as distinct from the experiential sciences? A systematic analysis of fundamental principles of all kinds, is useful as a guide to the mind, in dealing with abstruse questions of religion and philosophy, and in refuting the fallacies of spontaneous inductions from a few known facts and special laws, to an unlimited number of universal negations; to show that a positive knowledge of one kind of forces is not enough to decide all questions, while other kinds of laws and forces are ignored, or insufficiently explored.

In general definitions we can only speak of forms and forces, matter and ether, as they are manifested. There is always some danger of confounding forces with motion, and forms of matter with modes of action. We may, however, distinguish different kinds of organic forces; lower kinds of immaterial physical forces; and still lower classes of elemental matter, by their phenomenal modes of action, thus:—

Immaterial Organic forces.	1. Organic forces. 2. Instinctual forces. 3. Mental forces. 4. Moral forces.
Immaterial Physical forces.	1. Forces of Gravitation. 2. Forces of Electricity. 3. Forces of Light. 4. Forces of Heat.
Material Elements.	1. Basic (metals). 2. Connective (oxygen, &c.). 3. Amphigene (sulphur, &c.). 4. Neutral (nitrogen?).

It is difficult to draw distinct lines between visible and invisible substances. The words matter, ether, and spirit, are however recognised denominations of force and substance, supposed to be always intimately united in human nature, and more or less in universal nature. The immaterial forces of the spirit are deemed more subtile than those of imponderable ether, and these again more subtile than the atomic elements of matter.

These elements have never yet been converted, one into another, that we know of, although the alchemists of old attempted to transmute common metals into gold; the organic forces manifest in vegetable organisms have not been converted into instinct, nor instinct into reason; but then, gravitation, electricity, light, and heat have been partially converted one into another, and from this fact it is rashly inferred, that all *kinds* of force and motion are mutually convertible.

Spiritual, ethereal, and material forces and modes of motion are intimately combined in organic nature, although distinctly separate in the inanimate realms; but as our present aim is merely one of analytical definition and distinction, we need not dwell on other questions now.

First Principles. — First principles exist *per se*, eternally, and prior to all phenomenal manifestation. They exist in potentiality, before any world can be designed or created in which they may be manifested in progressive evolution. Not that we suppose they ever were inactive, or without manifestation; but as indestructible factors, they must exist prior to any given date of the creation of a transient world.

Faith in the absolute universality and indestructibility of principles or causes, precedes all science, and transcends all modes of reasoning in the human mind. We cannot suppose their non-existence, or their derivation

from matter alone, nor even from the convertibility of immaterial physical forces. The eternal existence of time and space, force and motion, cannot be doubted by any rational man, and therefore, faith is a fundamental factor of human understanding. We are not reduced to faith alone, however, for a conviction of the existence of all, or any of these principles of being; for we can obtain certain knowledge of their manifestations, in the natural world of life and organization. And moreover, all science is only a certain knowledge of eternal and invariable laws. The human mind in this world, has not yet obtained much knowledge of the relative degrees of uses in perfection, beauty in perfection, truth and goodness in perfection. The laws of order, number, weight, and measure, in phenomenal experience, are but little known to human science. Newton has thrown light on the laws of gravitation in our solar system, but other kinds of attraction and repulsion, physiorganic, instinctual, mental, and spiritual, are still waiting for a Newton to explain them. The laws and forces of phenomenal existence, then, are the real foundation of all the sciences; nor can there be imagined any other. Without faith in the existence and immutability of laws, and the indestructibility of forces, no science could be rationally looked for, as the result of our most persevering and successful investigations. We may expect to find them always present, then, in every world. What are their invisible modes of manifestation in the external world?

An ethereal substance is supposed to be the basis of living forms in the invisible world, as a material substance is the basis of phenomenal organism, in the natural world; and as these substrata of creation are very different, it is presumed that the experiential manifestation of life and organization may be very different

also. This, however, is merely an hypothesis, and as positive science has to deal mainly with the laws of life in this world, we may defer all speculation with regard to the possible diversities of law and order in ethereal worlds. There is, nevertheless, sufficient evidence to warrant the belief in a future life, as more than an open question of philosophy.

Natural World of Phenomenal Creations.

1. Physiorganic manifestations of laws and forces.
2. Physio-instinctual manifestations of laws and forces.
3. Physio-mental manifestations of laws and forces.
4. Physio-moral manifestations of laws and forces.

Here we come to a plane of experiential existence, in which we can observe the manifestation of indestructible forces, and investigate their laws of evolution. We quit the plane of supernatural faith, to enter that of natural science. Philosophy, however, includes all aspects of existence, and ontological science, properly so called, is the link between the visible and the invisible creation, between the known and the unknown laws of order in all worlds; we have, therefore, at least four aspects of ontology, namely:—

1. Supernal being and ontology.
2. Hypercosmic or supernatural being and ontology.
3. Metacosmic or transitional being and ontology.
4. Cosmic or natural being and ontology.

The four sciences which correspond to these distinctions may be fitly called—

Z. Theosophy or transcendental philosophy.
Y. Theology or perfective philosophy.
X. Evolutive philosophy (*latens processus ad formam*).
W. Constitutive philosophy (*latens corporum schematismus*).

By analyzing the natural world of forces, motions, laws, and aims, we have the following synoptic view.

Natural Worlds of Subcreative Being.

Pancosmic	Forces,	*Physical, instinctual, mental, spiritual.*
Nebulocosmic	Forces,	*Physical, instinctual, mental, spiritual.*
Galactocosmic	Forces,	*Physical, instinctual, mental, spiritual.*
Zodiacosmic	Forces,	*Physical, instinctual, mental, spiritual.*
Polycosmic	Forces,	*Physical, instinctual, mental, spiritual.*
Monocosmic	Forces,	*Physical, instinctual, mental, spiritual.*
Pericosmic	Forces,	*Physical, instinctual, mental, spiritual.*
Orbicosmic	Forces,	*Physical, instinctual, mental, spiritual.*
Epicosmic	Forces,	*Physical, instinctual, mental, spiritual.*

If all the kinds of forces manifest in man are convertible in epicosmic nature, they may also be convertible in pancosmic nature; and if they exist together without being convertible in human nature, they may also exist together, without being convertible in universal nature. This is, at least, an open question, which every one will deal with as he likes.

The *identity* of principles which, according to Schelling's philosophy, includes all manifestations of cause in the effects produced, gives us a clue to the laws of eternal being, manifest in the phenomenal world of life and organization.

ORGANIC THEOSOPHY.

1. Psychogony (creation of souls).
2. Hypercosmogony (creation of spiritual worlds).
3. Metacosmogony (creation of intermediate worlds).
4. Cosmogony (creation of natural worlds).

These branches of philosophy have been much investigated by the ancients, and the reader may learn what their ideas have been, by consulting Vaughan's "Hours with the Mystics," a very readable and impartial history

of theosophic speculations. There are two modern theories of cosmogony and psychogony; namely, the so-called "nebular theory" of the creation of physical worlds, and the Darwinian theory of the creation of animal and human souls, by a process of "cell formation," and the gradual evolution of organisms, from the convertibility of physical forces into instinctual, mental, and spiritual forces, by "natural selection," and "hereditary transmission," amidst an "incessant struggle" for existence.

The cosmogony of the Bible is supposed to be in contradiction with the revealments of geology, and some theosophists, aware of the apparent literal discrepancy, explain the meaning of the Bible narrative, by means of "spiritual interpretations." Swedenborg has written a dozen volumes of such explanation, in his "Arcana Celestia." To them we may refer the reader, and pass to the next branch of ontology; namely,

ORGANIC THEOLOGY, OR DIVINITY.

1. The providence of God.
2. The inspiration of prophets.
3. The revelation of the Word.
4. The interpretation of Scripture.

It is not our province to deal minutely with questions of theology. The existence of angels and ministering spirits, as instruments of God's Providence, to convey His Word, by means of inspiration, to the prophets and evangelists, and the interpretation of the scriptures thus delivered, are questions of divinity, rather than of philosophy, properly so-called. We leave them to divines then, observing simply, that modern spiritualism affords experiential evidence of the existence of spirits.

EVOLUTIVE PHILOSOPHY (*processus ad formam*).

1. The laws of physio-organic evolution.
2. The laws of physio-instinctual evolution.

3. The laws of physio-mental evolution.
4. The laws of physio-moral evolution.

The data and principles of natural evolution are very definite, and will be carefully analysed in another chapter.

CONSTITUTIVE PHILOSOPHY (*schematismus corporum*).

1. The laws of physio-organic organization, &c.
2. The laws of physio-instinctual organization, &c.
3. The laws of physio-mental organization, &c.
4. The laws of physio-moral organization, &c.

The forces of nature are prior and superior to the phenomena of experiential life and organization, and therefore, as eternal principles, they belong to ontological science; while the transitory facts and phenomena of evolution belong to the methodological sciences of biology, sociology, &c.

It is of primary importance to disengage the fixed principles of being, from the phenomenal factors of experiential organism; the secondary causes and processes of evolution in adaptation to external forces and conditions, from the principiant factors of design and structure, in the *schematismus corporum* of animated nature.

ONTOLOGY AND PSYCHOLOGY.—The three great questions of ontological inquiry are those of faith, science, and philosophy: *science* of the natural world and its laws; *faith* in the existence of a future life for man; *philosophy* of the eternal principles of finite and infinite being. The immaterial forces of life are indestructible, but the manifestation of these forces, in connection with the human body, in this world, is quite distinct from the existence of the immortal soul, in connexion with an ethereal organism, in any of the "many mansions" of a future state. Ontological man, psychological man, and physiological man, are not three individuals, but three

aspects of the same personal being; showing that the principle of life in the human soul, although necessarily involved in experiential conditions, is quite distinct from all particular states or modes of connection with material or ethereal substance. Life in itself, irrespective of experiential conditions and temporary associations, is one continuous identity of being, constantly undergoing changes of state, in contact with new substances and new ideas, which are as constantly exchanged for others, in the progressive discipline of the soul, passing through imperfect states of evolution and regenerative processes towards the goal of absolute perfection.

The laws of order in the natural world are the legitimate data of science; revelation and mystical phenomena, are the data of religious faith; the immaterial forces of existence are the necessary data of philosophy. Sceptics may deny the immortality of the soul, but they cannot deny the phenomena of the natural world, nor the immateriality and indestructibility of physical forces. To this extent they must admit the data of ontology; for vital forces are manifested in connexion with physical forces, in this world; and if they are convertible, they must be reconvertible. We shall have a controversy, therefore, with those who deny the persistency of spiritual forces; and in order to avoid confusion of argument and inference, we must define our principles, in outlines of sufficient clearness, to avoid mistakes of language and of logical coherence.

In our definitions, the word *absolute*, means *indestructible* in principle, and *infinite* in time; the word infinite means unlimited in space and time. To us, all being is a mystery. Life is a mystery in finite beings, as well as in the infinite Creator.

The relativity of knowledge does not preclude investigation, with regard to that which is eternal and immu-

table. The unfathomable mysteries of being do not interfere with the distinctions of indestructible forces and invariable laws which are the proper data of all science, ontological and cosmological. The absolute is the necessary substratum of finite and infinite being, the indestructible and the immutable, underlie all that is changeable or phenomenal; and as the foundations of all things have an inseparable connection with the superstructure of all things, so the absolute, in this sense, has an ineradicable relation to the mutable or conditional. The *nature* of being is a mystery, but the *principles* of being are definite and comprehensible.

The laws and forces (not the mysteries) of being, are the legitimate foundations of science. The unity of finite and infinite being is the characteristic doctrine of theistic philosophy.

Man is made in the image of his Maker. One in principle and one in substance with the Creator. But how is man a finite image of the infinite? This is the question to be answered by organic philosophy.

That which is indestructible in man, is eternal in existence. As far as human thought can penetrate, we have only to extend those principles of force and life which are limited in man, to the infinite totality of being, and we shall obtain a biological view of the absolute, which is otherwise incomprehensible.

Man is a finite limitation of space, substance, force, and motion, but he is an epitome of all known forces, physical, instinctual, mental, and spiritual. These forces are indestructible and infinite in time. Man is thus one with God; who is infinite in space, substance, force, and time; omnipresent, omnipotent, omniscient, and eternal. Finite forces and forms belong to the same principles of life and motion, as the infinite totality of force and motion, and therefore finite ontology is a key to infinite

ontology. We may analyse human nature as a type of infinite nature, and give to ontology the form of biology. There may be more kinds of indestructible force and motion in infinite than in finite being, but there cannot possibly be fewer. It is not unreasonable, therefore, to compare the finite with the infinite, as far as the known powers of nature can harmonize with the unknown.

Different Aspects of Ontology.—Beginning with the human body as a type of form, in which the principles of law and order are distinctly manifest, there are four aspects of investigation, namely, anatomy and physiology, histology and embryology, in parallel with which we have a fourfold view of each division of ontology. This would require generations of investigation; we must be content then with outlines, and even with approximations of correct delineation. We must first have a unitary view of the sciences, to show where these are partially developed, and require continuous elaboration; this is the main burden of the work, as we shall dwell but lightly on other questions. Faith will, nevertheless, require some notice in a systematic outline of philosophy. We may refer the reader to Whewell's History of the Inductive Sciences, and the best Histories of Religion and Philosophy, for information on the evolution of all the experiential sciences, and other aspects will be noticed briefly on occasion.

Different Schools of Philosophy.—As questions of ontology are often confounded with those of psychology, our definitions may be misunderstood, unless we state that our method is not that of any other school. We do not regard matter as a "permanent possibility of sensation," in the unfeeling hairs of our head, although in one view we regard "sensation, reflection, and association, as the origin of ideas." To make this plain, we may state, that ontology and experiential biology are dis-

tinct sciences; preconscious and conscious being are two different aspects of life. The immaterial forces of the soul which organize the experiential body and the conscious mind, are ontological forces; and such ideas as pertain to the preconscious soul, are not what are commonly termed conscious ideas, nor does it make the matter plain to call them intuitive ideas. They may possibly be what Plato defines as innate archetypal forms of relative perfection in thought and evolutive motion, inherent in the predetermined life of every creature.

All the organs of the body are formed and continuously sustained, by a process of absorption and association of the elements of matter in the womb, and during life; all the instincts of the experiential soul are formed by the accumulation and association of sensational experiences; all the faculties of the experiential mind are acquired by the accumulation and association of perceptions or ideas in the natural world, and all the moral faculties are evolved by the continuous association of emotions or affections in the spirit. The experiential body, soul, mind, and spirit of conscious life, in man, are external, conditional, mutational, and transitory forms and faculties of existence, gradually assumed, continuously obliterated and renewed, and finally moulted by the preconscious soul, which lived before the natural body, and will live after the dissolution of the mortal frame, retaining the discipline of experience in new conditions of existence, just as the expert musician retains the dexterity of vocal or digital execution, long after the material substance of the well trained organs and faculties has been lost and renewed, by the continuous waste and repair of the external organism. Experiential life brings discipline to the immortal soul, and discipline is progress towards perfection. To this extent we agree entirely with the physiological school of psychologists,

but we postulate an ontological existence for the human soul, which is an open question with sceptics. We believe that all experiential faculties and ideas are derived from external nature, through a process of absorption and appropriation, by a living organizing principle of incarnation in the body, and of ideation in the mind. An ethereal being in the human form, clothes itself with elemental matter, sensational impressions, perceptional ideas, and emotional experience, and the evolution of these mental faculties and physical organs constitutes the life of man in this world, while the organic forces are themselves immaterial, invisible, and immortal.

All our ideas and our sciences are derived from deliberate and spontaneous observation and induction. We have no clear apprehension of what are called "intuitive ideas," beyond what is understood by the immediate perception of self-evident truths. We have no recollection of experiential life in a previous existence, and yet we cannot doubt of the indestructibility and immateriality of all kinds of forces, physical and mental. The question of alternating states of reminiscence and obliviscence will be dealt with in our treatise on Experiential Biology, and therefore, we purposely exclude it now. We may observe, however, that Mr. J. S. Mill recognizes the existence of ontological forces as the permanent substratum of experiential life in man.

"Our notion of mind as well as of matter, is the "notion of a *permanent something*, contrasted with the "perpetual flux of the sensations and other feelings or "mental states, which we refer to it . . . . If we speak "of the mind as a series of feelings, we are obliged to "complete the statement by calling it a series of feel-"ings which is aware of itself as past and future."

Ontological forces, forms, and disciplines may be retained through all experiential phases of existence in

successive worlds, while the particular elements of substance, forms of ideas, states of feelings, and modalities of sensations are continuously moulted and renewed, in strict association with the immaterial principles of being; and, indeed, so closely interwoven in the web of experiential life, that some philosophers mistake the elemental matter of the natural body, for the physi-organic principle which attracts the substance, and gives it the human form. And yet the elementary ideas of the experiential mind are not the organic forces and faculties which imbibe ideas, feelings, and sensations, and give to them the form of an ill or well trained experiential soul. The matter of the body is not the organic force: the ideas of the mind are not the organic principles of the mind; the sensations of the soul are not the soul; the feelings of the spirit are not the spirit; modes of motion and sensation are not living forces. Material elements come and go in the body, while the living form remains; ideas come and go in the mind, while the living intellect remains; sensations come and go in the soul, while the typical instinct remains; feelings and emotions come and go in the spirit, while the loving principle remains. The physiorganic forces must nevertheless organize a material body to accumulate physical strength; experience sensations to manifest instincts; absorb ideas to clothe the mind with science; and seek for affections to clothe the loving spirit with motives of social life.

A sparrow and a swallow have different forms of body and instinctual energy. Although both frequent the haunts of man, and often build their nests in or near his dwelling, they do not build alike; they do not feed, nor seek their food in the same manner; their modes of flight, their language, their habits of location and migration are different; and yet the matter of their bodies is

the same, and their physical sensations very similar. The matter of the body is the same in animals and men, while many of the natural sensations and ideas are not dissimilar in many points; the human form and faculties of man are different from those of animals, not only in that which is moulted by both, but in that which is vital and indestructible.

And here we come to the question of organizing forces, in contrast with organized substances, ideas, and emotions.

Do the organic forces of the human soul exist before the natural body and the experiential mind are organized? Do they continue to exist after the mortal body has been decomposed? We need not consult the evidence of mystical experience, as a means of solving this problem, because we have other evidence more accessible, and quite as good. We know that the matter of the body is wasted and renewed daily, although the form and personality of man remain identical through life; but we cannot see the invisible principle which carries on these operations; and when the body dies, the soul, for ought we know by visible experience, may be utterly dispersed. Have we then no experience of incarnative forces continuing to exist after they become invisible? Is not the plumage of a bird as distinct and material a fact as the whole body? and do we not see it moulted and replaced once or twice a year in birds, which show that while the old clothings are cast away as dead bodies, the living invisible feather-creating forces are not dispersed, but continue in life, with power to absorb new matter from the blood, and clothe themselves again, with visible matter, in the form of feathers? And this not once, by chance, but ten or twenty times and more, during the life-time of the animal. Not in man alone, then, but in the inferior

creatures, are immaterial and invisible forces of vitality perennial and indestructible.

Nor does it make any difference to this question to say that the hairs which clothe animals, and the feathers which clothe birds, derive their external shapes from the forms of the secreting glandulæ, in which they are moulded as they come into existence; for the question then arises,—who gave different forms to these glandular pits or matrices?

Does the leg of a lobster when lost and reproduced, come out of a glandular pit, or mould in the external skin? Does a peach come out of a glandular pit, or a material mould in the rind of the tree? Does a chick in the egg come out of a physical mould already formed in the yolk, or in the vesicle before the egg was hatched? The question of a pre-existent organizing form and force lies deeper than that of a physical substratum for the living form, which is evolved by metamorphic processes. But, to return:

The development of experiential instincts and sensations varies with that of the material body in the lower animals. A caterpillar has one form of body and instinctual experiences in its early life, and another in the perfect state of butterfly; and yet the creature is one identical unit of life, endowed, from the beginning, with power to organize a series of phenomenal forms and instincts, in connexion with the surrounding conditions of experiential evolution.

Time, space, and substance, are necessary conditions of visible manifestation for all kinds of immaterial forces, but that does not imply the transitory nature of ontological as well as of phenomenal existence, in any given type of life and organization. All creatures are dependent on the external world, for the means of experiential life and motion, but when once acquired, these adjuncts

are under the control of the ontological soul, even in the lower animals. This is manifest in the case of a bird without feathers, which, if pursued, will instinctively try to fly, as if it had already organized the instruments it has the power to create. The bird should obtain from the blood material clothing for its invisible plumage, as part of its experiential body, but when from accidental causes, such as disease or moulting, the feathers have been lost, the instinct still remains entire, and can be manifested fully, when the material clothings have been reproduced. Ontological instincts are permanent therefore, where the experiential organism is incomplete or undeveloped; and as the feathers and the body of a bird are gradually organized, and its experiential instincts modified, in adaptation to external circumstances and conditions, so the body of man is gradually organized, and the ideas of his experiential mind, slowly derived from the external world, in which he lives and forms his mundane understanding. Whence it follows that a man or woman without a well developed body is a poor creature, and without a well developed mind is only half alive, just as a bird without its plumage is crippled in its life, however richly endowed with power to create new feathers, in a given time. With inferior and insufficient supplies of physical food, the body is ill formed and weak; with inferior and insufficient supplies of mental food, the experiential mind is ill formed and weak; but no one doubts that better food and education would give different results; and yet nobody believes that good food and education would develope any given human being into a Shakespere or a Newton, an Arkwright or a Watt; and therefore we infer that the ontological man is one thing, while the experiential mind and body are another, although intimately linked together in the web of natural life; and no two human

beings are alike, although developed under like conditions and resources of food and discipline.

Thus, while the natural body and the experiential mind are merely phenomenal and adventitious clothings of the ontological soul, the latter is immortal as a living unit of immaterial force in the creation. Experiential psychology and pure ontology are not to be confounded therefore in the unity of science.

The poet needs no argument to see at once, the difference between the ontological and the phenomenal aspect of existence; between the permanent and the transitory life of man. We have only to quote Wordsworth's "Ode to Immortality" to show the truth and beauty of the intuition:

"Our birth is but a sleeping and forgetting
"The soul that rises with us, our life's star
"Hath had elsewhere its setting
"And cometh from afar;
"Not in entire forgetfulness,
"And not in utter nakedness,
"But trailing clouds of glory do we come
"From God, who is our home."

FINAL CAUSES.—Final causes or designs are manifest in phenomenal existence. Thus:

Use.	1. Physical and industrial uses. 2. Instinctual and artistic uses. 3. Mental and scientific uses. 4. Moral and social uses.
Beauty.	1. Physical and industrial beauty. 2. Instinctual and artistic beauty. 3. Mental and scientific beauty. 4. Moral and social beauty.
Truth.	1. Physical and industrial truth. 2. Instinctual and artistic truth. 3. Mental and scientific truth. 4. Moral and social truth.
Goodness.	1. Physical and industrial goodness. 2. Instinctual and artistic goodness. 3. Mental and scientific goodness. 4. Moral and social goodness.

All cosmical creations have their life from the eternal, and in the eternal; all hypercosmic creations (or supernatural worlds) have their finite limits of being, from the infinite, and in the infinite. "In Him we live and move and have our being:" above and beyond our finite being, is the Infinite Creator of all finite organisms. And this is the main distinction between cosmic pantheism and theistic ontology.

MYSTICISM.—In Vaughan's "Hours with the Mystics," (vol. i. p. 337, note g), we find the following definition of mediæval mysticism:—

"All spirit (whether in so-called creature or creator) "is substantially one and the same. Our dividual "personal consciousness is, as it were, a temporary "accretion on the universal soul, with which we are "in contact. Escaping this consciousness, we merge "in,—that is, we become—the universal soul. We are "brought into the essence—the calm unknown oneness "beyond all (phenomenal) manifestation, above creation, "providence, or grace. This is Eckart's escape from "distinction,—lapse into the totality of spirit (by "means of mystic contemplation and loss of self-"hood). This doctrine, he teaches, not in opposition "to the current Christian doctrine, but as a something "above it, at once its higher interpretation and its "climax."

We hardly need observe that such a state of obliviscence, cannot be explained as a fact of rational or creaturely existence. We may suppose that God can exist, and think, and form plans of cosmic and hypercosmic worlds before He acts; but we cannot undo God's creation, by losing ourselves in the infinite. In the seventh book of the first volume, Vaughan institutes a parallel between "Persian Mysticism in the middle age" and American Transcendentalism in the

present age, from which we quote the following (p. 340 to 342):—

"Both with Emerson and Angelus Silesius (an un-
"known monk in the seventeenth century) he who truly
"apprehends God, becomes a part of the divine nature;
"is a son, a god in God, according to the latter; and,
"according to the former, grows into an organ of the
"universal soul. . . . The salvation of man is reduced
"with the German, very much to a process of divine
"development; with the American, every elevated
"thought merges man for a time, in the oversoul."

"Hear Emerson describe this transcendental devotion.
"'The simplest person, who, in his integrity, worships
"'God, becomes God; yet for ever and ever, the influx
"'of this better and universal self is new and unsearch-
"'able. I, the imperfect, adore my own perfect. I
"'am somehow receptive of the great soul, and thereby
"'I do overlook the sun and the stars, and feel them to
"'be but the fair accidents and effects which change
"'and pass.' . . . . I am part or particle of God, &c."

"Angelus says, in virtue of his ideal sonship,—

"'I am as great as God, and He as small as I;
"'He cannot me surpass, or I beneath Him lie.
"'God cannot, without me, endure a moment's space,
"'Were I to be destroyed, He must give up the Ghost.
"'Nought seemeth high to me, I am the highest thing,
"'Because e'en God Himself, is poor deprived of me.'"

EMANATION.—"The central idea of the Persian mysti-
"cism is *Emanation*. The soul is to escape from the
"manifold to the One. Its tendency is to confound
"man with the Father."

INCARNATION.—"The leading principle in the mysti-
"cism of Eckart and Angelus Silesius, is '*Incarnation*.'
"Angelus is never weary of reiterating the doctrine
"that God became man, that man might become God."

INSPIRATION.—"In that order of modern mysticism "represented by Emerson, the central idea is *Inspiration.* "In the creative efforts of the poet, in the generaliza- "tions of the philosopher, the man of genius speaks as "he is moved by the oversoul. An influx of the "universal spirit floods his being, and carries him "beyond himself. In intuition, the finite ego is identi- "fied with the absolute ego. Humanity is a divine "evolution, and each true man (to use Emerson's apt "illustration) a façade of Deity."

These are some of the leading definitions and doctrines of theosophy. To understand what is meant by an "influx of the universal spirit which floods the soul" through intuition, as distinct from reason, we may institute a parallel between the normal and the exceptional organs of the body, in uterine existence, since the faculties of intuition enable us to receive influx from the infinite spirit, as the annexes of the fœtus enable it to communicate with the body of the mother, during the period of incarnation. At birth into the outer world, these annexes are cast away. The transcendental mystics would lead us to infer that they receive an influx from the spirit of the infinite, by an exceptional faculty of intuition in the mind, analogous to the fœtal annexes of the intra-uterine organism. The ordinary mind, in dealing with logical induction, has no such influx of mediumistic intuition, and therefore, does not *know* of the communion of finite spirit with the infinite. We may, nevertheless, understand the spiritual faculty of intuition, in the experiential human mind, after its birth into the natural world, and the moulting of the fœtal annexes of the body, as easily as we understand the continuous existence of the ontological faculty of feather creation, in a bird which has often moulted its entire plumage, and reproduced it in a new and sometimes in

a different form. The body of the bird moults its feathers, but the soul of the animal does not lose the force which first produced them; the body of a man, at birth, casts off its uterine annexes, which are no longer useful, but the soul does not lose the organic faculty which first produced them, any more than it loses the organic force of a leg when the limb is amputated, although it cannot reproduce either the limb or the uterine annexes, under extra-uterine conditions. The spirit is, nevertheless, entire in all its original factors of connexion with the external conditions of existence, both natural and spiritual.

Before birth, the fœtus in the womb (or the chick in the egg) receives its nutriment already prepared, and through a special apparatus; after birth, the infant receives its mother's milk and other kinds of food, by the mouth, and this food has to be digested before it becomes blood, fit for the nutrition of the organism. There is a twofold system, then, of receiving food for the natural body, and a twofold means of receiving perceptions for the evolution and sustentation of the experiential mind; the one is commonly called "influx" or "intuition;" the other is known as "observation and reflection." Inspiration is given through one of these channels of reception, while the other is commended in the text which exhorts us to "read, mark, learn, and "inwardly digest." These different modes which succeed each other, in the physical organism, are simultaneous and continuous in the experiential soul.

This shows how necessary it is to distinguish ontological potentialities, from phenomenal mutations and privations, in the transitory states of evolution and development.

All men have the faculties of intuition, then, as well as those of observation, but are not equally "flooded"

with the "influx" of inspiration, or endowed with the same degree of energy in the faculties of genius.

The individual human soul exists successively in four distinct worlds or states—thus:

Spiritual world ...		invisible reminiscent state.
Lymbic worlds	{	decarnative reminiscent state.
	{	incarnative obliviscent state.
Natural world ...		visible obliviscent state.

And in all these states the preconscious potentialities are the same, while the experiential degrees of evolution may be very different.

The immaterial forces of life are absolutely indestructible, while the material and ethereal forms of experiential life are but relatively permanent or everlasting. This is clearly stated in Scripture. "Heaven and earth "shall pass away, but my words shall not pass away." (St. Luke xxi. 33.) Here it is intimated that natural and spiritual worlds may pass, while a new heavens and a new earth are frequently spoken of. It is necessary, then, to distinguish the mortal from the immortal forms and forces of life, and to bear in mind the analytical distinctions which are contrasted in the words immaterial, ethereal, and material; natural, supernatural, and Divine; mundane, supramundane, and absolute; cosmological, hypercosmological, and ontological. In simpler contrast, we use the words mortal and immortal; phenomenal and noumenal; relative and absolute; experiential and eternal; biological and ontological.

In Aristotle's Psychology there is a distinction between the ontological and the experiential soul, which has caused much difference of opinion with regard to the original signification of the word *entelecheia*. We believe it means the principle of immaterial force which

builds up the experiential organism, and continuously rebuilds and repairs it, during its phenomenal existence. This is the sense in which we understand the word, whatever may have been its meaning in the mind of Aristotle. The immortal soul is organic, instinctual, mental, and emotional, and each of these depths is manifested in the phenomenal unity of body, soul, mind and spirit, under the dominion of eternal laws of use, beauty, truth and goodness, in all possible phases of existence.

The ancient Greeks had clearer views of these distinctions than the modern schools of philosophy. Aristotle defines several aspects of the animating principle of life and organization; several *kinds* of ψυχη, namely, the *nutritive*, the *sensitive*, and the *intellective*. These are exactly what we mean by the words physiorganic, physio-instinctual, and physio-mental forces. The first kind of vital force is seen isolated in the life of plants; the first and second are combined in the life of insects; the three are united in the organisms of higher animals and man. Organization and nutrition, sensation and locomotion, perception and reflection, emotion and volition, are modes of life and motion, feeling and reaction peculiar to different kinds of forces, not in human nature only, but in animal and vegetable organisms.

We know that the morphological evolution of organic forms in the lymbic world of embryogenesis, differs from the physiological and sociological modes of action of the individual organism after birth, and during its life-history in the visible world. What may be the peculiar modes of morphological and sociological actions and reactions of the indestructible forces of human life, after they quit the mortal body on this earth, to begin a new career in the invisible world, is more than we can say, with certitude, but as revelations have been made and believed in all religious communities, we

refer the reader to these revelations for more definite information than we can give on all such questions.

It is necessary, however, to say a few words on the contrast between analytical distinction and synthetic unity. The human soul is an immortal, finite, synthetic unit, involving all the faculties of being, more or less in every feeling, or sensation, but in very different degrees of energy, from the lowest to the highest manifestations of life and organization. However much the ethereal organism and its surroundings may differ in the spiritual world from the material organism and its surroundings in the natural world, the immortal soul is ever the same unit of created being.

Experiential Psychology.—The definitions of body, soul, mind, and spirit, are only different aspects of one complex unit. All the forces of the soul are more or less involved in every action of body and mind. We can, however, exercise one part of the organism more than another, as the pianist uses his fingers more than his toes; or the dancing master may use his legs more than his arms; we may exercise the physical forces and organs of the industrial body, more than the instinctual forces of the artistic soul; these again, more than those of the scientific mind, and all or any of these, more than the moral forces and faculties of the spirit. A Blondin cultivates and develops the balancing powers of the muscles more than others who have the same bodily organs and forces much less developed by training, or neglect of training; a Raphael has the artistic instincts and faculties of the soul more improved by culture, than ordinary mortals; a Newton has the scientific forces and faculties more developed than many other persons; a Howard, a Clarkson, or a Wilberforce, has the moral forces and faculties of his nature more exercised and cultivated than the immoral and criminal

victims of ignorance and poverty, which are a trouble to themselves and to society.

The experiential school of psychologists has done much already to show the unity of soul and body, in all the phenomena of life, and much remains to be done yet, to constitute a perfect science of psychology. One of the best elementary works we have seen on this subject, is that of Doctor Henry Travis (a thin 8vo. on "Moral Freedom reconciled with Causation, by the analysis of the process of self-determination"). Dr. Travis shows very plainly that untrained bodies are clumsy and unskilful; untrained instincts are unartistic and ill-mannered; untrained minds ignorant and dull; untrained spirits wilful and immoral, not discerning right from wrong, or being unable to guide the will morally and pleasantly, as an untrained boor is unable to guide the body with dexterity and ease. It is an important contribution to science, not sufficiently explicit, however, in the primary distinction between ontology and psychology. The living man is the same person before he is born, and after the body and the mind have attained to experiential maturity; after he leaves this world as before he came into it; it is not so with the phenomenal organism. And hence it is that industrial, artistic, scientific, and moral training, may elicit a greater amount of experiential power and perfection from the preconscious soul, than neglect of education. No individual soul attains the utmost limits of perfection in this natural world. Its preconscious potentiality is ill-conditioned and obstructed in phenomenal development by all the poverties of nature that surround it. The physiorganic and industrial forces of use are stinted in allowance, and their evolution is impeded; the instinctual forces and artistic education are cramped and thwarted; the mental forces require

scientific training for development, and the spiritual forces, moral training. And hence it is that education is indispensable for complete experiential evolution, although the soul is an indestructible unit of potentiality in all time, and in all states of activity, or rest, culture or neglect. Were it not so, the criminal defects of experiential evolution in this world, could never be neutralised by severe discipline and experience in another life, and the preconscious soul would become eternally evil, instead of only "everlastingly" depraved; by which we mean, so deeply injured as to be incurable in one experiential lifetime, as we see in bodily injuries where a man loses an eye or a limb, which can never be regained, but are lost "for ever" in this world, although not ontologically lost or annihilated.

The moral freedom of the spirit is more or less limited by the laws and forces of phenomenal conditions, but it is ultimately free to quit its experiential organism in this world, and go where the incidents of causation may be very different, as well as the experiential forms and forces of existence.

"Free will" belongs to the ontological spirit; relative "necessity" to the experiential man. And although the one is thoroughly involved in the other, he is very far from being perfectly *evolved*, in any of the four kinds of preconscious energy during this natural life. Dr. Travis endeavours to reconcile the philosophy of the "necessitarians" with that of the "libertarians" by means of a purely psychological analysis (as he supposes), which ignores (while it really involves) the ontological factors of the problem. He observes that "there are four fundamental errors which are conspicuous in all writings upon psychology:"—1st, the error of supposing that there is "a distinct percipient being within the liv-" ing human organism; or of describing mental facts in

" such a manner as to imply this idea:—2nd, the error " of supposing that mental facts are states or movements " of a being or substance of any kind, immaterial or " material; or of describing them as such:—3rd, the " error of confounding with each other *entities*, *attributes*, " and *facts*; or of so describing mental facts as to appear " to confound these three very different objects of " thought with each other:—4th, the error of confound- " ing mental affections with mental acts."

The two first of these errors arise from the habit of confounding ontological with psychological definitions; and the manner in which Dr. Travis avoids confusion is by explaining the experiential unity of being, and ignoring altogether the ontological distinction. The third and fourth errors are the result of defective psychological analysis and synthesis, and chiefly with regard to the individual and the social aspects of human life and evolution. In dealing with the question of the " freedom of the will," he observes that " there are *two* funda- " mental questions involved in the controversy:—1st, " whether the law of *causation* extends to the formation " of man's volitions;—2nd, whether man has a power of " self-determination. And the correct answer to *both* " of these questions is the affirmative. 1st, the law " of causation *does* extend to the formation of man's " volitions; 2nd, man *has* a power of self-determi- " nation."

Dr. Travis shows plainly what the law of phenomenal causation is as he defines it, but he gives no account of the origin and nature of the *power* of self-determination, which is superior to the physical conditions of causation. He quotes the following statement from Dr. Carpenter, to show that the question cannot be answered:—

" We have now to inquire into the mode in which

" volition operates in determining the course of thought " and the regulation of conduct; a problem of extreme " difficulty, the entire solution of which may not lie " within the sphere of man's present capacity. The " chief subject of embarrassment, however, is rather the " nature and source of *the will* itself, than the conditions " of its operation." On which Dr. Travis remarks, " the " study of 'the will' is indeed embarrassing, if we " imagine that it is an *entity*, or even if we suppose that " it is a power belonging to a distinct entity within the " organism." Not so; the mistake arises from supposing that the ontological man is not thoroughly united with the experiential organism; and dependent on external conditions for the satisfaction of its wants.

From this it is clear that Dr. Travis confounds the data of two very different questions: *i. e.*, the power that builds the organism in the womb, and the training operations which develope all the faculties of soul and body during experiential life.

Free Will and Necessity.—There can be no doubt, however, that the soul of man is as much at one with the experiential body which it casts away at death, as the principle of life in a caterpillar is at one with the external skin and feet which it casts off during its transition states. In both cases there is intimate communion during one period, and separation at another.

Dr. Travis clearly shows that, in the controversy between "Necessitarians" and "Libertarians," each was right in its assertions, and wrong in its negations. The same may be said of the controversy between the ontological and the psychological schools of philosophy, which are often right in what they affirm, and wrong in what they deny. The experiential organism has nothing in it which is not thoroughly imbued with the immortal spirit, but the soul may have much in it, which is never

completely evolved in the natural world. Look at the deformed body of a poor scrofulous hunchback. Is that a perfect evolution of the organic forces and potentialities of a preconscious human soul?

The physical organism is an electrical battery with telegraphic nerves, but the inner man alone knows and understands the meaning of all the motions and commotions of the mechanism, by which he is affected. It is just as irrational to suppose that the body feels and understands its own commotions, as to suppose that an electric telegraph and battery put in motion by the contact of the parts, could read and understand the register of its own pulsations. As the man at either end of an electric telegraph, reads off the meaning of the registered vibrations, so the spirit reads off the meaning of every sensation and emotion in the organism. He feels the motion of the nerves in every part, and instantly reacts in answer to the physical excitement. This is plain enough to common sense; for when the immortal soul has left the mortal body, physical commotions are continuous; changes occur in every nerve and tissue of the dissolving frame, but no emotion is excited, no reactive thought produced; the motions of the atoms in the corpse are left to register, unheeded, all their molecular agitations and disruptions.

The question of free-will and necessity has been well explained by the late Joseph Henry Green, in his 'Spiritual Philosophy,' from which we quote the following remarks. "The idea, in which the apparent con-
" traries of liberty and necessity find their reconciliation
" and unity, and become veritable complements of each
" other, is that of *will enlightened by reason*, and reason
" is truth intuitive, self-evident, *necessary*. And it is in
" the identity and unity of *causative will* and *regulative*
" reason, that we contemplate *will* that is to itself a *law;*

" that is, freedom and necessity identified." (The spirit reconciled with the conditions of existence.)

The ontological and the experiential are distinct aspects of being. The spirit forms the body in utero by collecting and associating particles of matter from the blood of the mother, to form organs; and it sustains the physical organism during life, by a constant interchange of atoms with the external world. The preconscious spirit also forms an experiential mind by collecting and associating ideas, to form intellectual faculties analogous to the acquired organs of the mortal body; and it sustains these faculties by a constant flow of perceptions, and an interchange of ideas with the external world.

May we ask what are the inseparable associations of ideas which form the organs of the body in the womb; and more especially those which are not called into activity until the age of puberty? Who foresaw the future uses of the generative organs, during the period of embryonic evolution? and why were they sustained so long in a sort of hibernating state of life, during the long years of childhood, before they were required to act? Many questions of this nature may be asked which cannot possibly be answered by any of the theories which deny the immortality of the soul.

FAITH AND UNDERSTANDING.

Methodical science and cosmical knowledge are reflex creations of the rational mind, and are mainly applicable to the known facts and laws of phenomenal existence; faith and understanding are spontaneous inductions of the intuitive intellect, and are applicable to the transcendental forces of nature, commonly called " first principles, or final and efficient causes." We have to analyse

mental and spiritual forces, then, and moot questions of degrees of relative power and extension. Thus—

Kinds of Forces.	*Degrees of Extension.*
1. Physical organic forces.	1. In individual organisms. 2. In collective organisms. 3. In co-ordinate realms. 4. In ultimate globes and worlds.
2. Instinctual organic forces.	1. In individual organisms. 2. In collective organisms. 3. In co-ordinate realms. 4. In ultimate globes and worlds.
3. Mental organic forces.	1. In individual organisms. 2. In collective organisms. 3. In co-ordinate realms. 4. In ultimate globes and worlds.
4. Spiritual organic forces.	1. In individual organisms. 2. In collective organisms. 3. In co-ordinate realms. 4. In ultimate globes and worlds.

We are certain of the existence of physical, instinctual, mental, and spiritual forces, in three of the four degrees here mentioned. Individual man and collective humanity, along with the collective, animal, and vegetable kingdoms, on our globe, exhibit these degrees. Have we any reason to suppose that mental force transcends the limits of animal and vegetable life? We do not know of its extension beyond the surface of our globe. An acarus does not know of the extension of organic life and instinct beyond the limits of its own tribe, located in the epidermis of an animal, or the body of a cheese, and therefore, cannot speculate on the occult principles of life, beyond those narrow limits of experience. It is not the business of a mite to indulge in philosophical inquiries, and questions of religious faith; but it is, and always has been, the business of a man. The known persistency and indestructibility of forces,

laws, and motions, and the mutability of all phenomenal facts and appearances, enable the human mind to contrast at once, by spontaneous induction, the perfection of immutable being and creative laws of action, with the imperfection of mutable creations; and by the slower process of deliberate induction, we learn that evolution is a natural process of formation, by which all created beings pass through different stages of development, from chaotic imperfection to relative perfection.

The beginning of evolution in the midst of chaos, is the origin of imperfectly realised order; and the end or aim of the Creator, is the realisation of perfect use, beauty, truth, and goodness in creation. The commencement of evolution in the homogeneous, passing through successive morphological mutations to arrive at an unstable state of equilibrium in the heterogeneous, exhibits one kind of imperfection in the world; and this idea applied to all possible creations, gives a simple view of the great question with regard to the actual existence of evil, and its final absorption in perfective regeneration. We may observe that the egg of a bird is a first step out of chaos into organic form; that the evolution of the chick in the egg is an intermediate state; and the birth of the chick into the open world, a different state of being from the embryonic. All these phenomena occur in the natural world; but how can sober reason know of the existence of a supernatural world? She must consult the faculties of faith and intuition, and investigate the facts and revelations of religious history.

As we can only know forces by their modes of action, and as the faculties of understanding are immaterial energies, we name them by their modes of action, as we do those of physical forces. Thus heat, light, electricity, and gravitation are modes of motion, in what are called immaterial forces; and all these modes of motion

in matter, are contrasted with mechanical or vibratory modes of motion. This contrast will afford us the means of comparing spontaneous with deliberate modes of induction, in the human mind. Physical excitement or enthusiasm, corresponds to heat; artistic or poetic inspiration corresponds to electricity; intellectual intuition or spontaneous induction corresponds to light; religious faith or trust corresponds to gravitation. Zeal, inspiration, intuition, and faith, then, travel as much more swiftly than deliberate concatenation in the human mind, as heat, electricity, light, and gravitation, flash more instantaneously through space and matter than the gradual progression of material bodies, moving from place to place, by mechanical vibrations or translations. Imagination, wit, and judgment; imitation, simulation, and taste; hope, charity, and conscientiousness, are other faculties of instinct, mind, and spirit, belonging to the connective faculties of life, contrasted with the systemic; but these are questions of psychology, to be dealt with in another place. We merely call attention to the legitimacy of spontaneous induction as a function of faith and understanding, in association with that of logical reason and ratiocination. The abuse of intuition, in dealing with "final causes," as a ground of constructive speculation, before a solid foundation has been laid in rational experience, is not a sufficient reason for disparaging the use of a most essential faculty of understanding. The opposite abuse of logical reason, to deny the rationality of faith, is not less hurtful to the interests of truth and the advancement of science.

The faculties of intuition have been predominant in the mystical schools of theosophy. The faculties of reason have been predominant in the schools of rational philosophy. Theophrastus Paralcelsus, and Jacob Bœhme, have assumed too much in supposing that

spontaneous conceptions of final causes could enable them to discern the laws of creation, and construct a corresponding science of organic theosophy, cosmogony, and psychogony, or soul genesis. The so-called positive philosophers have assumed too much in supposing that physical nature alone could enable them to discern the laws of life. All the faculties of intuitive understanding, and all the resources of rational induction, are necessary to create a sound and positive philosophy, as the crown of human faith and science. Reason, properly so-called, runs parallel with the physical organism after birth; intuition in the mind corresponds to the deciduous annexes of the body during uterine existence. The organic forces of the spirit which formed the umbilical vessels, along with the chorion and amnion of the fœtal organism, are not lost by the severance of these annexes at birth, any more than the organic forces of the soul which organised the limbs in utero, are lost when one or all of these are severed by accident or by surgical amputation. The intuitive faculties of the spirit correspond, then, to the forces of deciduous organs in the lymbic world, as the mystic faculties of faith correspond to the invisible world of spiritual life, from which they draw their inspirations.

PSYCHOLOGICAL DEFINITIONS.

As in the body we find systemic organs and connective tissues, so in the mind, we have systemic faculties of analytic reason, and connective faculties of synthetic intellect or understanding. The predetermined systems of the body are the limitative skin, the alternative muscles, the ordinative bones, the telegraphic nerves; the generative, the digestive, and the vascular systems, together with the special senses of the organism; the

connective tissues are the areolar, the adipous, and the glandular; not forgetting the deciduous annexes of fœtal life. In parallel with these systems and connective tissues of the mortal body, we find a predetermined complex organism of analytic and synthetic faculties of thought in the transitory experiential mind. Their modes of action are *perceptive*, *limitative*, *discursive* (comparison), *discriminative*, *coordinative*, and *perspicative* (penetration); and these, combined with *attention* and *receptivity*, *observation* and *reflection*, *memory* and *recollection*, are the main factors of analytical reason. The connective faculties of synthetic intellect are those of *judgment* ("sens intime,") *wit*, *imagination*, and *intuition*. Spontaneous induction is mainly the work of the connective faculties of intellect, while deliberate induction is the work of the analytical faculties. Logical reason is the generator of true science, intuitive intellect the main creator of philosophy. They work together, nevertheless, in every act of thought, just as the organs of the body and their connective tissues act together, in every movement of a part.

In these definitions the words reason and understanding are convertible. Intuitive reason and deliberative reason, are synonymous with intuitive understanding and deliberative understanding. Transcendental philosophers, however, distinguish ontological reason from experiential understanding.

Spontaneous Induction.—In a simple metal, such as gold, the individual particles are held together in community by an occult force of cohesion, in a manner somewhat similar to that in which the planetary bodies of our solar system are held together in associative union, by an occult force called gravitation. The particles of a rod of metal are separated from each other by intermediate spaces, and suspended in a sort of

invisible medium, just as cosmic orbs are separated and suspended in our solar system; and by causing a general vibration in a rod or plate of metal, the oscillation of the particles can be detected by various methods of experiment, which we need not here describe. All we wish to note is, the individual separation of each particle of metal in the cohesive unity of the whole rod or plate. This fact is a type of the cohesive unity of all individual masses of matter, great or small, in a stone, or in a mountain; in a bottle full of water, or in the sea; in a room full of air, or in the atmosphere of our planet; in any part of our own earth, or in the whole globe; in any group of planets, or in the whole solar system; in any solar system of our visible world, or in the whole universe. From which we infer, that the parts of the whole cosmic world of matter are relatively as closely united in collective oneness and community, as the separate particles of a plate of gold are closely connected in cohesive unity, during the most violent oscillations we can witness, in a general vibration of the aggregated mass. Or again, that all the solar systems of the sidereal universe are as intimately bound together in one complex organism, as the heart and lungs, stomach and liver, muscles, bones, and nerves, of the human body, are associated and connected in one complex individual unity.

A flock of sheep is composed of separate individuals, young and old, male and female; sometimes we see them more or less apart; sometimes huddled together in a flock, and when they are alarmed by dogs or wolves, they move in masses, oscillating in a crowd, but drawn to one another by an occult force of cohesion, (here called fright,) very much as particles of inorganic matter are drawn together by cohesion or by gravitation. What, then, are the occult forces of organic cohesion or

association, in a flock of sheep? a flock of birds? a herd of swine? a troop of horses? a regiment of soldiers? a human family? a nation? a federation of nations? Is there an occult force of attraction in organic nature, as strong, and as universal, as that of material attraction in the inorganic world? Are individual sheep and birds, horses and men, as indissolubly united by the occult force of natural attraction as individual particles and globes of matter are united in collective oneness, by the occult forces of physical attraction and repulsion?

We know that all forces are indestructible, and therefore eternal in duration; we know that all forces generate motions, and that all motions are governed by eternal laws. These known facts of finite existence may be generalised as infinite creative forces, infinite creative motions, and infinite creative or regulative laws, without any definite organic views of phenomenal organization—they are ontological factors of existence. To give them limitations of personality, we must descend into theological forms of thought, in which absolute creative forces are personified as God the Father; the laws of religious truth are personified in the word of life, incarnate in God the Son; the principle of perfective regeneration, proceeding from the Father and the Son, as continuous inspiration from the Holy Ghost.

Life is a mystery, in every possible aspect, and therefore, we make no attempt to understand the mystery of creation, by which finite beings are involved within the infinite. We may nevertheless observe, that different degrees of life and power are manifest in different realms of nature, and that all are sufficiently endowed with energy to perform special uses in the general economy. All creatures are not equally endowed; but we feel assured by faith in the eternal principles of wisdom, or by spontaneous induction from known laws of order

applied to unknown causes, that God gives life enough to every creature, be it animal or human, be it a lizard, a bird, or a dog, to perform ends of use in the creation; and light enough to man, for the time and place in which he lives, be he Pagan, Jew, or Christian, Roman Catholic, Greek, or Anglican, to do his duty as a rational progressive being, in the perfective evolution of humanity.

SUMMARY OF DISCURSIVE ANALYSIS.

What are the results of our investigation?

We have shown that it is necessary to distinguish eternal laws and forces from the incidental factors of experiential life and organization; the processes of evolution from the predetermined scheme of faculties and functions in the living organism; the secondary causes of adaptation to external forces and conditions from the primary causes of principiation and design. We have also shown that the convertibility of physical forces does not involve spiritual forces, and that if different *kinds* of forces could be evolved from each other in the microcosm of human nature, it would imply the same principle in the macrocosm of universal nature. And thus materialism would refute itself on the ground of the possible convertibility of all kinds of forces.

What do we mean by immaterial forces, laws, aims, and modes of action, the causes of all *forms* of phenomenal existence? By *efficient causes*, we mean the principiant forces which give form to matter and experiential organisms. We do not mean what is commonly understood by the word *causation*, or the mere detection of antecedent links, in a general chain of phenomenal effects or sequences.

What do we look for in mutations and concatenations? Do we look merely for the changeable and evanescent

forms of life and substance? or do we look for the immutable forces, which underlie phenomenal mutations? Do we want to know the dissolving facts which come and go within the limits of experience? or do we wish to ascertain and understand the laws which rule the whole range of phenomenal appearances and disappearances? Is science, the knowledge of a constant and invariable law, or the cognizance of a flitting series of variable facts?

We investigate concatenations of events, to find, if possible, the laws which govern them, in their mutations and relations. The rational experientialist can have no other aim than this, in all his observations and statistics; the rational ontologist can have no other aim. Why do physical and metaphysical philosophers dispute then, about principles and methods?

We cannot explain the nature of any kind of immaterial force, but we can discern different *kinds* of force and motion, principles and laws, forms and designs; and these are the fundamental factors of all science.

In distinguishing different ranks of any kind of force, or combination of forces, we must discriminate the creative from the incarnative, and the procreative from the subcreative. God creates the soul of man; the soul forms its own body in utero; parents procreate children; and man, as a subcreator, invents and constructs a locomotive or a watch. We have, then, transcendent creation, immanent incarnation, generative procreation, and perficient subcreation, as different ranks of causative power and operation. We have also *relative degrees* of extension or comprehension in every kind of principle, and in all ranks of every kind. We have the *infinite*, including the *indefinite;* this again, including the *finite;* and the integral finite including the *fractional*, as the human body includes special organs. The transcendent

is co-extensive with the infinite; the immanent with the indefinite; the generative with the finite; and the perficient with the fractional: but humanly speaking, we have all possible degrees of extension in perficient causation, generative causation, immanent causation, and in transcendent creation. Transcendent causation includes physical, instinctual, mental, and spiritual forces; immanent incarnation includes all these forces; procreative generation calls forth these forces, as far as occasional causes co-operate with incarnative causes, in transitional migrations from the supernatural to the natural world. Perficient causation involves all kinds of forces in the subcreation of industrial, artistic, scientific, and social methods and mechanisms; for man employs the forces of his mind to construct machines and control dynamic forces.

Divine intervention is manifest in the revelations of regenerative principles, as the foundation of society, without which human progress seems to be impossible. The prophets of religion precede discoverers of science, creators of art, and inventors of all kinds of mechanism. Inventors, poets, philosophers, and prophets, receive different kinds of inspiration from a higher source, no doubt, but direct influx from the spiritual world appears more evident in religious revelations than in discoveries and inventions. Subcreative modes of social and religious evolution are therefore manifestly under the direct influence of providential inspiration and direction.

If we pass from different kinds of efficient forces to different kinds of regulative laws, we shall find various numbers, for the inorganic, the organic, the mixt, and the connective realms of nature. The numbers which regulate the constituent parts of a mineral, are not, in all respects, the same as those which regulate the constituent parts of an animal; and although general num-

bers may be alike, in every realm, special numbers are widely different. The regulative laws of order are also very similar in general distinctions, but different in special forms. Physical order, instinctual order, mental order, and moral order, have each their own peculiarities of form and fitness. The connective laws of weight are subject to the same diversity. Physical weight or gravitation, is one thing, instinctual attraction or gravitation is another; mental attraction or proclivity is different again; and spiritual gravitation or faith, is a peculiar kind of universal attraction. Physical cohesion and gravitation follow the same general laws of order and equilibrium as mental and spiritual gravitation and cohesion.

Final causes are not only of different kinds, but each kind is various in ranks, and in degrees. Industrial are not the same as artistic uses, beauties, truths, and beneficences. Scientific are not the same as moral and religious uses, beauties, truths, and goodnesses. And all these ranks and kinds of final causes exist in all degrees, infinite, indefinite, finite, and fractional. They exist with a difference, no doubt, in each degree; if we could only learn to understand the fitnesses of each, and their apparent contradictions, in real harmony. To man it is forbidden to deprive his fellow man of life, but God, who is the giver of all good, can take away the life he gives, at all times, and in all phases of existence. To us it seems cruel that animals should prey upon each other, and that we should feel obliged to prey upon them also; but God, who knows what the uses and beneficences of a higher order and degree must be, and are, and who can place all creatures in conditions to enjoy great pleasures and great benefits in every world; He can regulate the laws of birth and death, appearance and disappearance in phenomenal existence, as he pleases,

in accordance with the higher laws of harmony and progress. Fractional use and beauty are very differently manifested in a lamb and in a wolf, in a hawk, and in a dove; and in a finite point of view, we hardly know how to reconcile these violent contrasts of apparent discord in organic order; but God, who knows the infinite perfection of use and beauty, truth and goodness, can easily understand the uses of such fleeting discords in the higher modulations of universal happiness.

THE USE OF ONTOLOGY.—The people who denounce theological and metaphysical inquiry as useless, and even mischievous, may ask—What are the uses of Ontology? What have "first principles" to do with "positive science?" We may reply, they are eternal and immutable, and therefore *fixed principles*.

The experiential science of biology has its roots in efficient forces; its laws are those of constituent number, distributive order, connective weight, and proportional measure; its final aims are the realisation of use, beauty, truth and goodness. Its individual and collective developments are the progressive evolution of industrial, artistic, scientific, and social organization. The same may be said of experiential social science, and indeed of all the sciences. If principles were not immutable, science could have no positive existence.

The uses of ontology extend to all the branches of experiential science. But who looks for the laws of distributive *order*, constituent *number*, and rythmical *measure*, as well as for the laws of *weight*, for instance, in the experiential science of astronomy? And again, in biology, who looks for the regulative laws of order, number, weight, and measure, in each of the four kinds of forces observed in human nature? What is religious faith but the gravitation of the human spirit to the eternal spirit? What is the yearning of philosophy but

the gravitation of the human mind towards eternal truth? What is the attraction of art and beauty, poetry and music, but the yearning of human instinct for eternal harmony and holiness? What is the gravitation of the body, but the physical alliance of the finite body with the cosmic universe? How narrowly and feebly has the science of biology been groping in the dark, for want of a more luminous acquaintance with first principles? These can be of no use, however, to those who do not want them; to those who do, we may speak of such questions with the candour which an earnest yearning of the mind for truth calls forth, and from a simply discursive view, we may venture on a more systematic analysis of eternal laws and forces.

SUBSECTION II.—SYSTEMATIC ANALYSIS.

Science, properly so called, cannot go beyond the limits of immutable principles manifested in finite phenomena; faith and philosophy carry these principles by spontaneous induction, from the known finite to the infinite unknown; but there are different modes of conducting the inquiry from different points of view, to ultimate conclusions which may be conveniently classed under three heads, commonly termed Atheism, Pantheism, and Theism.

Atheism does not carry us beyond the distinction of a few principles:

1. Infinite substance visible and invisible.
2. Infinite physical force.
3. Infinite space.
4. Infinite time.
5. Fortuitous concourse of atoms in all worlds.

It does not believe that there are any evidences of design in nature; any proof of the existence of infinite intelligence or goodness, wisdom or benevolence.

Pantheism admits the existence of—

1. Infinite substance.
2. Infinite force.
3. Infinite space.
4. Infinite time.
5. Immutable laws of necessity.
6. Pantheistic unity of nature.

Theism proclaims a doctrine of infinite organic unity, intelligence, and hierarchal order in creation. The word infinite in this view, transcends the limits of all finite worlds, just as the word space transcends the limits of our solar system, and of all the stars in the sidereal heavens. And just as the sun is the centre of supernal power within the limits of our solar system, so Christ is the centre of supernal power in humanity; the "Son of God," and one with infinite supernal power.

With definite views of organic unity, we can enter into questions of transcendental philosophy without falling into the abyss of pantheistic unificity.

Physical forces are now deemed "immaterial," and it would be difficult to confound space and time with substance. Materialists have much in common, therefore, with spiritualists, in recognizing the necessary distinction between material substance and immaterial forces; but there are still many points of difference between them.

In our scale of the sciences we recognise four subdivisions of ontology, namely, constitutive philosophy, evolutive philosophy, perfective philosophy, and transcendental philosophy. The first deals with the organic structure of all organisms and worlds; the second with the evolution of organisms and worlds; the third with the regenerative perfectibility of individuals and socie-

ties; the fourth with eternal laws and principles, which transcend and govern all possible organisms and worlds.

It will not be practicable in a mere outline to enter into the details of all the aspects and leading factors of these different branches of philosophy, nor to indulge beyond measure in spontaneous inductions; for a strict adherence to the lowest degrees of analysis, within the limits of positive observation and verification, will be sufficiently complex and voluminous.

Within the limits of our own globe, we have individual organisms, collective realms, and the co-ordinate unity of these, in the natural phases of existence; not to mention their occult relations with the invisible world, from which they are supposed to come. To analyse the constituent laws of number, the regulative laws of order, the connective laws of weight, and the rythmical laws of measure and proportion, in all these, will be sufficient to establish the principles of constitutive philosophy, without attempting to apply them to the higher cosmic organisms of the natural world, or to the possible order of existence, in a supernatural world.

The organic constitutions of known realms and organisms will only reveal the *schematismus corporum*; and however much we may indulge in spontaneous induction from this one point of view, we shall gain no insight into the laws of evolutive progress and development. The metamorphic evolution of many individual organisms, and their whole life history in this world, however, are within the reach of observation and analysis, and to some extent, the history of the human race, and even that of the organic and the inorganic realms of the globe are more or less accessible, so that we have some important data to enable us to analyse the principles of evolutive science and philosophy within these limits.

The history of religion is also within our reach, and from the data thus afforded, we can obtain some knowledge of the principles of perfective philosophy, in connection with a future state of evolution and advancement for the human soul.

The eternal laws and forces, which are necessarily inherent in all phenomenal existence, being prior and superior to all transient forms of life and organization, are easily distinguished from any special manifestation in a mortal body, and, therefore, within certain limits we can have no difficulty with the data and the principles of transcendental philosophy.

The leading factors of organic science are found in biology, sociology, and epicosmology; and in connection with the organization of society, we have to form a systematic classification of all the industries, arts, sciences, and institutions of humanity. The laws of order are the same in all these modes of human thought, and therefore we may give our classification of the sciences as an abstract type of the factors of constitutive philosophy. In other branches, we shall give definite outlines of the data and the principles peculiar to each, observing merely that we sometimes use the words theosophy and theology, to designate two of the leading branches of ontology.

After the analysis already given, we need do little more than form systematic tables with a running explanation of such words and definitions as require elucidation. It is not our intention to make any theories with regard to the possible application of eternal principles and forces to unknown worlds, nor even to the utmost limits of the known world. We believe in the existence of a spiritual universe, and that the principles of natural organic science and philosophy agree with

those of religion, but our readers will form their own conjectures with regard to all such questions; and after analysing and defining fixed principles in the present volume, we shall endeavour, in other volumes, to explain their presence and their influence in the phenomena and the sciences of biology, sociology, and methodics. It is, in fact, mainly as an introduction to these experiential sciences, that we investigate the factors of ontology, which are the necessary basis of all truth and knowledge.

DIVISION I.—TRANSCENDENTAL PHILOSOPHY.

If immortal forces be the root of all mortal existence, and ontological science the foundation of all experiential sciences, the plan of all immaterial being must correspond to the superstructure of all phenomenal forms of life, as the abstract principles of grammar correspond to all the actual forms of language. We have seen, in the first volume, that the human body contains different systems and organs, in accordance with organic laws of number, order, and proportion; and in our psychology, we shall show that the experiential mind of man is formed on the same pattern, by a similar process of formative evolution and ulterior growth; the ontological mind, clothing itself with ideas of this world, as the "spiritual body" clothes itself with material elements. What, then, is the natural order and arrangement of eternal principles, according to this pattern of organic unity? The answer to this question is a complex table of general factors, which we have reserved for the present chapter, not to perplex the reader, at the outset, with a grammar of ontology. As the principles of grammar are the same eternally, whatever may have been the transient forms of experiential language,

ancient or modern, oriental or occidental, Latin or Greek, German or French, English or Welsh—so the ontological principles of being are eternally the same, whatever may have been, in former times, or may be in future ages, the transient forms of cosmic organisms in our sidereal universe, or the still more transient forms of experiential science and philosophy, during the phenomenal evolution of humanity. The everlasting and the never lasting, form a perfect contrast, but the mutable in nature is for ever kept in order by the immutable in principle. The uncreate is not created; the "causeless" is not caused.

Eternal Principles of Life and Form.

Connective Principles.	Z.	Almighty being.
	Y.	Eternal conditions.
	X.	Created worlds.
	W.	Subcreative beings.
Organic Principles.	VII.	ORGANIC AUTHORITIES.
	7.	*Hierarchal ranks.*
	VI.	ORGANIC LAWS.
	6.	*Final aims or designs.*
	V.	ORGANIC FORCES.
	5.	*Genetic Motions.*
Relational Principles.	IV.	SYNTHETIC CONCENTRALITY.
	III.	ANALYTICAL DIVIDUALITY.
	2.	*Relational mobility.*
	II.	EQUILIBRIAL STABILITY.
	1.	*Integral community.*
	I.	INTEGRAL TOTALITY.

All the known elements of force and motion, form and substance, space and time, are combined in man. They concur in the personal unity of man; in the social unity of mankind; in the coordinate unity of cosmic worlds; and in the infinite unity of being. Without unity of organization, infinite time, space, and substance, would be infinite chaos; and no fractional scale of organic and relational distinctions need be thought of. For without

life there could be no principles of life and organization. But organic factors are manifest in all the realms of nature. Creative forces and incessant motions; regulative laws and definite aims; organic authority and hierarchal order, are manifest in universal nature; relational concentrality, dividuality, mobility, stability, community, and integrality, are also manifest in every known organism. There are, then, principles of nature which are eternal, and these are the factors of science and philosophy.

The following table contains a synoptic view of the primary and secondary distinctions of these organic forms of thought:—

Eternal Principles and Forms of Thought.

Unitary Factors.	Z.	Transcendent Deity.	1. Omnipresent immanence. 2. Omnificient operance. 3. Omniscient wisdom. 4. Omnipotent love.
	Y.	Eternal conditions.	1. Connective substance. 2. Connective force. 3. Connective space. 4. Connective time.
	X.	Created worlds.	1. Natural worlds. 2. Lymbic worlds. 3. Spiritual worlds. 4. Ontological unity.
	W.	Subcreative beings.	1. Personal beings. 2. Social beings. 3. Coordinate beings. 4. Ultimate beings.
Organic Factors.	VII.	Organic authorities.	4. Transcendent authority. 3. Organic authorities. 2. Mixt authorities. 1. Relational authorities.
	7.	*Hierarchal ranks.*	4. Supernal ranks. 3. Central ranks. 2. Medial ranks. 1. Peripheral ranks.

Eternal Principles and Forms of Thought—continued.

Organic Factors.

- **VI. Regulative laws.**
  1. Constituent laws of number.
  2. Distributive laws of order.
  3. Rythmic laws of measure.
  4. Connective laws of weight.
- **6. *Perfectional ends.***
  1. Final ends of use.
  2. Final ends of beauty.
  3. Final ends of truth.
  4. Final ends of goodness.
- **V. Organic forces.**
  1. Physio-organic forces.
  2. Physio-instinctual forces.
  3. Physio-mental forces.
  4. Physio-spiritual forces.
- **5. *Genetic motions.***
  1. Physical industrial action and reaction.
  2. Instinctual artistic sensation and propensity.
  3. Mental scientific perception and reflection.
  4. Spiritual social emotion and volition

Relational Factors.

- **IV. Relational concentrality.**
  1. Natural
  2. Medial
  3. Supernatural
  4. Ontological

  (1. Personal. 2. Social. 3. Coordinate. 4. Ultimate.)
- **III. Relational dividuality.**
  1. Natural
  2. Medial
  3. Supernatural
  4. Ontological

  (1. Personal. 2. Social. 3. Coordinate. 4. Ultimate.)
- **2. Relational *mobility.***
  1. Natural.
  2. Medial.
  3. Supernatural.
  4. Ontological.
- **II. Relational stability.**
  1. Natural.
  2. Medial.
  3. Supernatural.
  4. Ontological.
- **1. Relational *community.***
  1. Natural.
  2. Medial.
  3. Supernatural.
  4. Ontological.
- **I. Relational integrality.**
  1. Natural.
  2. Medial.
  3. Supernatural.
  4. Ontological.

How shall we explain this table without a previous dissertation on the laws of organic method? We must do the best we can under the disadvantage.

Principles of *connective* unity are distinguished from those of *organic* unity, and these again, from the *factors* of relational unity. Let us review these sections of our synoptic table consecutively.

Section 1.—*Connective Factors.*

In the first place transcendent Deity being omnipresent, omnificient, omniscient, and omnipotent, as the Almighty sustainer, creator, regenerator and director of created worlds and beings, is above all creatures and conditions of finite life and form. Subcreative finite beings are individual, collective, coordinate, and ultimate in ascending degrees of complexity of organism. These beings are immortal in their ontological unity, but live in distinct worlds, and pass from one world to another, in perpetual alternations of existence.

Time, space, force, and substance are eternal conditions of existence in the natural and lymbic worlds, and we cannot conceive them to be non-existent in the supernatural world. We cannot imagine any breach of continuity in time; any solution of continuity in space; any void of substance in nature; nor any substance without force, although, in a relative sense, we are told that, "In the beginning, the earth was without form and void;" by which we understand that nebular substance was not formed into land, sea, and atmosphere; and was void of animal and vegetable creations. Absolute time, space, substance, and physical force, are one connected unity, the relative degrees in which are marked by the pulsations and limitations of life and motion. These are transcendental conditions of existence, the creation,

sustentation, direction, and regeneration of *organic worlds*, are recognized forms of human thought, in accordance with the common sense of all mankind; supernatural, intermediate, and natural worlds, are definite distinctions. In the latter we recognize individual and collective organisms, such as that of man, and of society. And besides these, we see coordinate realms and classes of animal and vegetable organisms, upon the surface of the globe; as well as innumerable solar systems in the visible universe; which is itself an ultimate organic unity, in contrast with the supernatural universe.

We need not discuss the idea of a future state of life for man, because the facts of conscious or unconscious existence make no difference to this question. We may observe, however, that as far as organic forms of thought are concerned, the natural, the intermediate, and the spiritual worlds are necessarily distinct from each other; and that they are not only intimately united in relative mutations and communications, but are contained in the ontological or transcendental aspect of unity.

Time and space are eternal conditions of life and form. The existence of created worlds is, in fact, a necessary form of thought; infinite, creative, and destructive will and understanding are necessary factors of an intelligible creation; and providential government is not less necessary to explain the laws of order in the human mind. Eternal conditions of life and form; distinct worlds of life and form; definite organizations of life and form; an Almighty creator of life and form; these are necessary forms of thought. The conditions of existence are self-evident factors of ontology: the existence of the natural universe is a positive fact; the existence of finite creatures in the world, will not be denied; and that of an Almighty creator and regenerator, in whom are centred all the perfections of controlling WILL and per-

fective WISDOM is only questioned by those who have but tremulous powers of faith and understanding. Infinite love and wisdom, perfection and power, are nevertheless absolutely necessary for the human mind to form a rational conception of creation and destruction, direction and control, in the unfathomable universe.

Creative will and wisdom in the Deity are not to be confounded with the connective forces of heat, light, electricity, and gravitation. All forces are immaterial and indestructible, but living organic forces in the Creator and in man, are not convertible with the inorganic forces of heat and light in a burning gas. The organic forces which give life and form to a plant are distinct from the chemical forces which unite the atoms of matter in its roots and branches. The instinct of an animal is an organic principle of life, distinct from the physical forces of its body.

Living organic forces of all kinds, then, are distinct from the connective forces of heat, light, electricity, and gravitation. Substance, cohesive force, space, and time, are only conditions of existence; not organic principles of life and form, will and understanding.

UNITY OF TIME.—Time is only known by a perpetual succession of states; states of physical motion, instinctual sensation, mental thought, and spiritual emotion. We measure time on our globe by the diurnal rotation, and the annual revolution of the planet round the sun; in other cosmic bodies the physical motions of rotation and revolution form rythmic cycles of different degrees. The days and nights of Jupiter are shorter than those of the earth, while the years are longer.

Physical cycles of motion and succession are different in cosmic bodies, then; and instinctual cycles of sensation and succession are various in different animal

organisms: mental thoughts and successions of ideas are of various degrees of rapidity and continuity in different human beings, and spiritual emotions are equally various in rapidity, intensity, and continuity, at different epochs of life, and in different individuals. A hundred years of animal life may not contain as many successive states of sensation as one year's life of a human being; and one man may have as many thoughts pass through his mind in a month, as another in a year. We need not dwell, however, on these characteristics of time, measured by different degrees of rapidity, intensity, and continuity of succession, beyond observing that language and symbols may vary in different worlds, in accordance with different modes and standards of motion, sensation, thought, and emotion, peculiar to the beings of each world, and the various states of being in each organism.

Physical states and modes of succession give rise to the science of mathematics; instinctual states and sensational modes of succession, are not less mathematical; mental states and ideational modes of succession are equally definite, though different; spiritual states and emotional modes of succession, are not less various and positive. Pure mathematics then, embrace a wider field of thought, and a much deeper ground of living motion and succession than that of physical rotation, oscillation, and revolution. These phenomena and their laws are, nevertheless, the mathematical factors of time, as the factors of geometry are the necessary principles of order in space. Motion, sensation, thought, and emotion, in measured periods or,

1. Cycles of rotation.
2. Cycles of oscillation.
3. Cycles of circulation.
4. Cycles of perturbation.

These, with their relative proportions, are the abstract factors of time, as a necessary mode of thought.

UNITY OF SPACE.—The unity of space is defined by position, and positions are relatively either *central, radial, peripheral,* or *tangential.* As the science of *number,* or pure mathematics, originates in time and motion, so the science of *measure* or pure geometry pertains to relative forms and positions in space. The axioms of geometry are necessary forms of truth in parallel with those of pure mathematics, and their simplest definitions may be thus compared :—

Factors of Time.	*Factors of Space.*
1. Periods of rotation.	1. Central positions and relations.
2. Periods of oscillation.	2. Radial positions and relations.
3. Periods of circulation.	3. Peripheral positions and relations.
4. Periods of perturbation.	4. Tangential positions and relations.

Do the same principles of co-existence and succession govern finite limits of space and infinite extensions; finite periods of time, and infinite durations? The human mind is fain to think they do; and experience as far as it can reach, corroborates this form of thought.

UNITY OF SUBSTANCE.—We cannot conceive any kind of organism without substance, visible or invisible, material or ethereal. We know that physical elements properly so called, are visible in some of their solid and liquid shapes, and invisible in many of their gaseous states. If all forms of being are necessarily connected with some kind of elemental essence, we can only connect these essences with different states of being, natural, lymbic, supernatural, and ontological. Physical force and substance, instinctual force and essence, mental force and essence, spiritual force and essence, are equally natural distinctions, but as these are manifestly connected in the natural, and the lymbic worlds of existence,

they do not cover the whole ground of distinction between visible and invisible worlds. Solid, liquid, gaseous, and ethereal forms of elemental substance may be sufficient to define all possible degrees of combination, as far as we can conceive different states of substance, from that which is material and visible, down to that which is invisible, imponderable, and commonly called ethereal. Physical matter, properly so called, is so subtile and divisible in its elementary constitution, that "A drop of "water containing the millionth part of grain of a cer- "tain substance, is tinged with a blue colour. One "hundred million parts of sea water contain only one "part of silver, the presence of which can be detected "by chemical tests; and the gold on the surface of "gilt wire is so thin, that a grain of the metal may "be divided in 95,000 millions of parts, visible under the "microscope."

We cannot conceive force of any kind divorced from substance, the primary distinctions of which are those of condensation and diffusion, commonly denominated solid, liquid, gaseous and ethereal. One or other of these forms of substance occupies all space.

THE UNITY OF FORCE.—Physical force is necessarily co-extensive with space and substance. What of vital forces? How many kinds of organic force in parallel with different states of matter can we recognise in nature? The unity of physical force is manifested in the natural world, by four kinds of action and reaction, known as heat, light, electricity, and gravitation. The unity of organic force is manifest in physical, instinctual, mental, and spiritual modes of action and reaction. The first is conspicuous in the mineral kingdom; the second in the animal; and the two others in man and in society. Mental and spiritual forces in man are governed by the human will and understanding.

In a universal sense, we can define the operations of these forces, under the control of infinite will and wisdom, as creative, sustentative, directive, and perfective modes of action, as far as we can understand them.

The results of all these operations are supposed to be the creation and perfectibility of natural, intermediate, and supernatural worlds; no other distinctions of existence being common to the human mind in all ages and all nations. But what are the distinctions of vital force within the reach of human observation?

In the natural world best known to us, we are obliged to distinguish individual from collective organisms, and these again from organic realms and ultimate organic unity. These are involved in the connective conditions of time and space, force and substance; not organic living force, but inorganic physical force, which is acknowledged to be immaterial and indestructible. What then is the difference between organic living forces and connective physical forces? We can only judge of this by their respective modes of action.

Chemical affinity, molecular cohesion, cosmic gravitation, and sidereal coherency, are the main characteristics of barological forces, and these are known to be convertible with light, heat, and electricity, none of which are vital, in the common acceptation of the word, however indispensable to life and organization in plants and animals. Besides the physical forces of matter manifest in elemental substances, we find organic vital forces manifest in plants; instinctual vital forces in insects; mental and emotional forces in animals and man. These are always associated with the connective physical forces of light, heat, electricity and gravitation, but are not to be confounded with them, by any theory of convertibility. In order to avoid such confusion, we establish the following definitions, which imply the al-

liance of all kinds of immaterial forces in mutable connection with matter, thus—

1. Physi-organic forces in planets.
2. Physio-instinctual forces in insects.
3. Physio-mental forces in animals and man.
4. Physio-moral forces in man.

It is somewhat inconvenient to denote living principles or causes, by the word force, as well as the immaterial physical forces of heat, light, electricity, and gravitation, but no other word in our language would do as well; for *energy* is synonymous with *force*, in all kinds of action and reaction. The energy of vegetative growth, instinctual propensity, mental concentration, and emotional volition, may be contrasted with the intensity of physical force, and the velocity of motion, but still we are obliged to use the word force to denote all kinds of energy, physical and moral, supposed to be immaterial, eternal in duration, and infinite in extension.

We need not dwell on the existence of God, as the Creator and Ruler of all worlds, nor on the existence of the natural and the spiritual worlds, but the existence of complex organisms or beings will require general and special definitions as different factors of creation.

Personal Unity of Being.—This is not a difficult word to define. Every human being, man, woman, or child, is a person, and this personal being may exist in this world; in the lymbic world of gestation, before it is born; and in the spiritual world, after it has left this sphere of existence. As an immortal being, its personality is ontological; as a mortal being, its personality is experiential and transitory. In the lymbic or intermediate world, its existence is temporary, and in a certain automatic sense, experiential. In the supernatural

sphere, it must pass through successive cycles of experience, with some kind of an ethereal organism, in the human form, analogous to that of the material body. What the varieties and alternations of experience may be in the ethereal state, we do not know, but that life and motion, use and beauty, are principles of experiential life in all worlds, we cannot doubt; and therefore, we contrast an ever varying experiential state of existence in natural, lymbic, and ethereal worlds, with the eternal, ontological soul of every person.

The potentialities of the immortal soul transcend the experiential acquirements of the personality, just as the potentialities of the infinite Creator transcend the immanent degrees of life imparted by God to every creature. No amount of education can develope to the highest pitch, the capabilities of any human soul; and the constant evolution of experiential life, is but a striving to attain to that perfection of potentiality which is the root of each personal existence. In the sphere of uterine gestation, we can follow the successive stages of metamorphic evolution, through which the soul passes, in collecting matter, and weaving tissues, to form a physical organism, as near to the perfection of human beauty and fitness for a life of natural uses, as the conditions of experiential circumstances will permit; and this we find is often very far from realising an ideal type. How many human bodies are ill formed and sickly, all through life? How few are truly beautiful and strong?

The physiorganic forces and forms of life, then, are never perfectly realised in mortal bodies; artistic, scientific, and religious imperfections are still more common in experiential minds. And yet the ontological soul is always yearning to realise a perfectly beautiful body, and an equally beautiful mind, even in this world, and only reconciles itself to temporary failure, by the hope

of acquiring a less imperfect form of mind and body in another world.

But will it be able at once to realise ideal perfection in the next state? Will it not have to work through many successive phases of experiential progress, before it can realise a perfect form of ethereal organism, and a perfect unfolding of spiritual being? Nothing can be perfect in heaven or in earth; all experiential worlds must necessarily be more or less imperfect realizations of the absolute perfection of ontological being. God alone is perfect. He is the perfection of all creatures. Experiential life is a constant effort to unfold the ontological potentiality of being in the midst of mutable conditions, just as God is always transforming chaos into order, by perpetual creation and regeneration. Organization and disorganization are parallel factors in phenomenal existence, and absolute perfection is eternally above and beyond the reach of experiential life. All intelligent creatures yearning for happiness, cling to God as the very centre of perfection. And we are enjoined to "be perfect, even as our Father which is in Heaven is perfect;" this we should for ever aim to be, and find our happiness in the becoming.

In the personal existence of man we recognise four aspects of life and organization; not four unities, but one personal unity of will and understanding; and a corresponding four-fold aspect is manifest in the complex social unity of mankind. In all degrees of being, from the finite to the infinite, we recognise the unity of will and understanding as a necessary form of thought.

Social Unity of Being.—Personality is the lowest degree of existence; a human being is but a fraction of a social community. Parents and children form a complex social unit; a city or a nation forms a larger social unit; and all the races of mankind on earth form a

definite, or limited community; a finite sociality of human beings. Collective humanity in the natural world, forms a complex experiential being; collective humanity in the spiritual world, forms another complex being; and all the human beings who are not yet born into this world, but are on the way to it, in the lymbo of gestation, form another collective unit. Three distinct collective units of humanity, inhabit three different worlds; belong to the same order of creation, and form one complex unity of being in connection with our planet earth. Terrestrial humanity, lymbic humanity, and celestial humanity are one collective human being, in the sight of God. An individual human soul, and an integral humanity are different degrees in the scale of being. The one is a personal, the other a social integrality. Will and understanding are ruling powers in both of these images of the creator. Personality, moreover, pertains to all ranks of being, human and divine.

The number of human beings in the natural world is computed to average about a thousand millions, and as the life of individuals does not probably average more than twenty years in the great majority of uncivilized tribes, some fifty millions are born every year, while as many die. One hundred millions, or thereabouts, are always coming and going through the lymbic worlds of incarnation and decarnation. How many human beings may exist in the spiritual world of our planet, we cannot surmise; but as some philosophers who accept the hypothesis of human metempsychosis, have speculated on this question, we may without attaching undue importance to their theories, explain the facts and relations on which they base their calculations. They first contrast the natural term of life with the average duration of existence, and then compare the present numbers of the

population on the globe, in its uncultivated state, with what the numbers might be, if the whole earth were cultivated and the races civilized.

1st.—The natural term of life, under favourable circumstances, is sometimes nearly one hundred years.

2ndly.—The average duration under the present very unfavorable conditions of civilization and cultivation is less than one third, probably not more than a quarter of a century.

3rdly.—The present population of the globe is said to be about a thousand millions; and as these are renewed about four times instead of only once in the century, it is presumed that about four thousand millions will be the full complement of human beings in this world, when the whole earth is under scientific culture and wise human government.

4thly.—It is presumed by this hypothesis, that the natural existence of the obliviscent human soul in this world is sluggish and inactive, compared with the ethereal existence of the reminiscent spirit in the invisible world; and that these contrasted states of obliviscence and reminiscence are analogous to the alternate states of obliviscent sleep and reminiscent wakefulness, during the nights and days of natural life. And

5thly.—That as sleep absorbs about eight hours of the twenty-four in our diurnal alternations of existence, so the obliviscent phase of natural life is but half as long as the reminiscent phase of spiritual life; whence it follows:

6thly.—That the perfect cycle of existence in the spiritual world, is about 200 years; while the

present average cannot be more than one fourth of that cycle.

7thly.—That the present number of human spirits inhabiting the invisible world of our planet, is about eleven thousand millions, in addition to the one thousand millions in the natural world; making together twelve thousand millions, two-thirds of which (eight thousand millions) will ultimately be in the invisible world, while one-third (four thousand millions) will be usefully and happily occupied in this: the average of natural life being then about four times as long as it is now.

It is hardly necessary to discuss the rationality of this hypothesis. On this question, we know that we know nothing.

Terrestrial humanity is not perhaps the only truine collective unity of the same grade of being in the universe. Other planets in our solar system may be inhabited by human spirits of like nature, in three distinct worlds analogous to our own natural, lymbic, and spiritual spheres of existence. And if all the orbs of our system be thus inhabited by human beings, they would form a federality, if not a federation of humanities. If other solar systems be inhabited, there are innumerable humanities in the universe, thus forming an indefinite extension of societies, subject to the distinction of ontological unity, and truine experiential existence; involving all the known kinds of immaterial organic forces, governed by the supernal powers of will and understanding.

This indefinite extension of living beings does not exhaust all forms of thought; for the idea of infinite totality transcends all possible degrees of limitation; and, therefore, we must still advance in the definition of

ontological conceptions. Before we ascend to the infinite, we note co-ordinate degrees of unity, such as that of our planet, with its epicosmic realms, animal and human. We must first observe, however, that the unity of mankind presents four aspects, in parallel with the four-fold view of individual humanity; namely, physical industrial life and organization; instinctual-artistic, mental-scientific, and spiritual-social life and organization. These are the fundamental data of the experiential science of sociology.

We have thus a definite view of personal and collective unity of being; but not of co-ordinate unity.

Co-ordinate Unity of Being.—We view this under the same aspects as other degrees of unity, although we have not the same evidence of mutational diversity for all. We postulate the primary aspects of ontological and phenomenal existence, for co-ordinate unities of organism in parallel with those of personal, social, and infinite unities of being. We need, however, only dwell on the natural world of co-ordinate unity, as manifested on our own globe. In this we have a cosmic orb inhabited by human beings, and by inferior animals, not to mention vegetable organisms. Whether the planet be itself an organism superior to man, or inferior to a vegetable, it is not for us to say, as we have no proof to give on either side; but we must admit that even the physical forces of the earth are indestructible, while the forms of matter are mutational. The same may be said of animal and vegetable organisms, co-ordinate with human nature. The whole of this cosmic and epicosmic association exists as a complex unit of our solar system. Animals and human beings exist in a lymbic state before they are born into this world: human beings continue to exist after they quit the mortal body; but what becomes of animal souls we do not know; nor do we know much

about the evolutions of cosmic orbs and sidereal systems. We are nevertheless obliged to recognize the co-ordination of planetary and epicosmic realms in our natural world; as well as embryonic states of formation for all experiential organisms; and therefore we have cosmical co-ordinates, as planets and systems; monocosmic, polycosmic, zodiacosmic, galactocosmic, nebulocosmic, and pancosmic; not to mention infinite numbers of pancosmic realms, classes, orders, families, genera, and species of such co-ordinate unities. If the two focal centres of the elliptical orbits of our planets and our satellites are occupied by cosmic forces, the one natural and visible, the other invisible and immaterial, we can understand the parallels of unity in all degrees of being, which organic theory suggests; but in the absence of all proof of such a postulate we leave the mystery as we find it, and proceed to ultimate distinctions. The triune natural, lymbic, and supernatural worlds of infinite extension, must be subordinate to the transcendent unity of ontological being.

Without speculating on invisible worlds, we have positive evidence of epicosmic realms, co-ordinate with each other and with the earth; orbicosmic unity of our planet co-ordinate with the animal, vegetable, and mineral kingdoms on its surface; pericosmic unity, in the associated planets and satellites of our solar system; cosmic unity in the association of suns and systems in the sidereal universe. Epicosmic, pericosmic, and cosmic examples of co-ordinate unity, then, are within the reach of experiential observation and analysis, and need no further illustration; beyond that already given in our volume of epicosmology, in which the co-ordinate rank and functions of humanity at the head of all the realms on our planet, are explained in outline, on the principles of hierarchal order and community.

ULTIMATE UNITY OF COMPLEX ORGANISMS.—Co-ordinate degrees of complex unity are seen in the organic realms of our globe, and similar aspects of distinction may be recognised in cosmic nature, but do not exhaust the scale of ascending definitions. If we take our globe as an example, we see that the co-ordinate realms of life and organization upon its surface, are subordinate to the planet, as an ultimate unit of analysis. The solar system is an ultimate unit of co-ordinate orbs, and every system which involves personal, social, and co-ordinate degrees, is an ultimate degree of complex organism. Planets, suns, and sidereal systems are ultimate units of creation.

It has been said that the word infinity excludes all definitions of totality, though not of unity. The human mind cannot measure infinite space, but it can understand that God is conscious of His own existence; that His will is not unknown to itself, in any kind of infinity. Omnipotence, omniscience, omnipresence, omnificience, must mean total power, total science, total presence, and total action. As Mr. Joseph Henry Green observes, in his Spiritual Philosophy (vol. ii., p. 47), "God is a will, "*se finiens*, not infinite to Himself." The personality of God, as a conscious will, transcends our ideas of power and extension, but cannot transcend His own powers of thought and action. Infinite totality, therefore, means that which transcends all human ideas of finite personality, collective sociality, co-ordinate federality, and ultimate unity in any world. Cosmic orbs, suns and systems, may be defined and measured in degrees of extension, as easily as human beings and societies; similar degrees of natural delimitation are applicable to both small and great bodies: individual stars, collective sidereal systems, and federalities of systems, to an indefinite extent, in the natural universe, do but lead the mind of

man to the ultimate of thought, transcending all comparative degrees of physical extension.

By the very constitution of our nature, we are obliged to think of an infinite totality of natural worlds, an infinite totality of spiritual worlds, an infinite totality of intermediate worlds, and above all, within all, and beyond all, an ontological totality, in which all creatures, in all worlds, live, and move, and have their being.

From these definitions of degrees of unity, we may proceed to the next section of the synoptic table, and explain our definitions of organic principles.

Section 2.—Organic Principles and Forms of Thought.

ORGANIC FORCES.—The radical, genetic forces of life and motion in all worlds, as far as the human mind can penetrate, are of four kinds, namely, physical, instinctual, mental, and spiritual. We need not analyse these kinds of force in human nature, nor trace their footsteps in universal nature, as they are sufficiently evident to speak for themselves, and will be analysed more fully in our work on biology. In this world we see physiorganic forces conspicuously manifest apart from other kinds of force in vegetable organisms; in the lower animals and insects we see instinctual energies in connection with organic and physical forces; in man we find mental and spiritual principles in connection with instinctual and organic energies, and human thought can trace these principles without being able to distinguish any other kind of force, if other kinds do really exist and operate.

All these kinds of immaterial forces are manifested by various modes of action and reaction, of which they are the efficient causes.

Genetic Motions.—The motions of principiant forces are perpetually manifested in all physical and industrial

creations; instinctual and artistic creations; mental and scientific creations; spiritual and social creations. Human industry, art, science, and social organization, exemplify the action of these forces in our natural world, and regeneration, incarnation, and sub-creation are different manifestations of genetic forces in all possible dgrees, from the finite to the infinite.

Organic motions are eternal possibilities, inherent in creative forces, and for ought we know, they may be eternal necessities of being. Experiential worlds are the result of principiant action; the word and works of God are the result of His creative energy and will. Motion, sensation, thought, and emotion, are inherent in the physical, instinctual, mental, and spiritual forces of human personality, and we have every reason to believe that each kind of motion or of tension, is eternally correlative with each kind of indestructible force, not only in mankind, but in universal nature. Organic motion is a necessary concomitant of organic forces, in every world, in every type of organism, and in every mutation from one state to another.

Regulative Laws.—The sacred numbers seven and twelve, with their connective links and multiples, are constituent factors of the human body; and with certain variations, they are manifest in all known physical organisms, as very marked examples of the organic *laws of number*. The *distributive laws of order* are equally manifest and varied in the animal, vegetable, and mineral kingdoms; and in the different types of structure in each realm; *rythmic laws of measure* are manifest in various modes of respiration, pulsation, progression, and evolution, in animal organisms; and in different times and modes of rotation, revolution, oscillation, and perturbation, in heavenly bodies.

The first and third satellites of Jupiter have synchro-

nous times of revolution and rotation, the first performing two complete cycles round the planet, while the third is doing one; the second and fourth satellites have similar relations of periodicity, and the whole group of moons may be compared to a key-board or clavier, of something more than two octaves. Laws of rythmic measure and proportion have not been much investigated and compared in relative degrees of form and motion, volume and extension; but astronomers tell us that, "Any mass may be in any orbit, times and periods "only being changed *in proportion* with the mass." We are told that "The planet Venus travels in its orbit, at "the rate of 60,000 miles an hour; and the earth 68,040 "miles an hour." Now the dimensions of the earth being nearly 8,000 miles in diameter, the globe travels a distance equal to about eight and a half times its own length of body in an hour, and if a man could only run ten times the length of his own body, or 60 feet, in 60 minutes, he would not be ranked among the swiftest animals on our planet. The velocity of the sun's motion in space is only one-fourth that of the earth's motion in its orbit, but then the mass of the sun is immense, compared with that of a planet, and that of a planet is immense compared with the tiny body of a man.

Relative proportions decrease in one direction, as fast as they increase in another, and the difference is almost incredible in widely distant degrees of mass and motion. "The termite ant," for instance, "begins to swell imme- "diately after impregnation, so that by the time she is "ready to lay her eggs, her abdomen has been distended "to fifteen hundred times the ordinary size of her "body."

The laws of measure and proportion, then, are very important factors of regulative action and re-action in

the cosmic and epicosmic realms of nature, and widely different in comparative degrees of illustration, although one in function, as a fundamental principle. From the laws of rythmic measure and proportion we pass to the connective laws of weight manifest in sidereal coherency, solar gravitation, molecular cohesion, and atomic combination, which have been partially explained by mathematical, physical, mechanical, and chemical science, and therefore need no special illustration.

The Final Aims of Being.—Use, beauty, truth, and goodness, are eternal principles of perfection. They are "*final causes*" never fully realised in any creaturely existence. They are to phenomenal experience as mathematical asymptotes to hyperbolic curves, always approached more and more closely, by progressive stages, but never to be actually identified one with the other. The degrees of relative perfection in all the aims of life, are very numerous, no doubt, and almost infinite in modulations of diversity, but absolute perfection can only be one and immutable. God is perfect. His creations are not endowed at once with all the fulness of His perfection. How far it is possible that they ever may be so, we cannot tell; the Word exhorts us to "be perfect, as our Father in Heaven is perfect."

As far as human intellect can understand the evidences of design in the creation, wherever we turn our thoughts we see illustrations of comparatively perfect adaptations; and the more we understand the laws of nature, the more vividly we perceive principles of use, beauty, truth, and goodness, measureably realized in every kind of organism.

ORGANIC AUTHORITIES.—Besides creative FORCES and *motions*, regulative LAWS and *aims*, we must look for ruling AUTHORITIES and *hierarchal ranks*, to guide the

worlds, and teach intelligent creatures, to know the laws they must obey in the progressive evolutions of phenomenal experience; and this principle must ascend from the lowest depths of chaos, towards the utmost heights of ontological perfection. Without authority there could be no guidance for the ignorant and the weak, by the enlightened and the strong. The authority of parents is providential for children: that of governments, for nations: that of the sun is providential for our solar system: that of God is providential for all worlds. Many parents are imperfect guides; many human governments are poor authorities; the sun has many spots, and may, for ought we know, be more or less imperfect, as a controlling centre of our solar system; but God is perfect as a Ruling Providence for every world; and all subordinate authorities in the creation, are more or less proximately perfect, from the lowest to the highest degrees of life and organization. Whatever the degrees of complex organism may be, in the co-ordinate gradations and associations of cosmic and epicosmic communities, the principle of authority and guidance is as definite and indestructible as that of regulative laws and final causes.

We have not mentioned this principle in our discursive analysis, but we must now complete the survey of first principles in all their bearings; and, first of all, in that of systematic analysis and synthesis. Organic authority is manifestly one of the leading necessities of organization. There can be no orderly society without it, neither in cosmic nor in epicosmic worlds; neither in heaven nor on earth. Children will never be able to live without parents; societies can never dispense with government; and heavenly societies must always look to God for guidance and authority. This seems to us self-evident, requiring no further explanation to be recognised at

once, as an eternal principle, a necessary factor of organic unity in all societies and worlds.

But then the question arises: what are the *means* of guidance in all worlds? These are what may fitly be called hierarchal ranks. Correlative authorities, however, include their own hierarchal ranks, and we must show how many kinds of authority there are in a collective organism.

Correlative authorities, are easily observed in human society. Executive, judicial, legislative, and constitutive authorities exist in a well organized community. The citizens select and elect, or otherwise constitute by acceptance, a legislative authority, to make laws and regulations for the nation. They also elect, select, or accept a judicial authority, to administer justice according to the written laws, or the accepted customs of the country. They accept, select, or elect, an executive authority, to organize forces for the protection and defence of the community against internal and external foes.

These authorities are parallel, correlative, and partly independent of each other in relation to their own internal hierarchal organization. The central rank of any one of these may be central in all, as the Queen of England, in the political, social, and established religious corporations of the empire: as the sun is the centre of heat, light, electricity, and gravitation in our solar system; but in different communities of stars or human races, correlative authorities, and hierarchal ranks may be variously combined, in accordance with peculiar characteristics of collective organism in different worlds and systems. Organic authority is, nevertheless, a necessary principle of unity which must be recognized in a systematic view of ontological science.

Corporate, domestic, parochial, municipal, national,

and federal authorities and degrees of hierarchy, belong to the organic principle of *gradation;* but these details would interfere with our general outline, and will be more conveniently dealt with in a special chapter.

Hierarchal Ranks.—In our solar system the sun is evidently the controlling head of the community; the lunigery planets hold secondary rank as centres and rulers of minor groups; and all the smaller planets, satellites, and comets are subordinate members of the collective body. The sun, however, is but one of a numerous host of stars, and holds central rank in its own system only, the whole of which is but a comparatively insignificant member of our sidereal universe. We have then inferior ranks of cosmic bodies; intermediate ranks of lunigery planets; and the central sun in hierarchal co-ordination; while the sun, with all its train, is under the control of the galactic heavens, as a complex unity.

In human society we find similar distinctions. A commander-in-chief to rule the army; officers to command large and small divisions; and privates who form the powerful mass. The army is nevertheless under the control of the nation, the government of which forms a supernal authority over the commander-in-chief of the military corporation, which it has called into existence.

Industrial, artistic, scientific, and religious corporations are not necessarily formed on the same plan as that of a military body, but they can only be well organized in powerful associations, by a principle of co-ordination, in which peripheral, radial, central, and tangential ranks are recognized, in due proportions and efficient functions, according to the natural forms of law and liberty. Hierarchal relations are indispensable in associations; and, as organization is a necessary process of creation, hierarchal ranks are eternal factors of organism in every world. The idea cannot be eliminated from the mind of

man; it cannot be annihilated as a principle of order. As a factor of experiential sociology, it will require most careful investigation, in connection with the law of liberty, essential in the evolution of human society. The abuse of hierarchal rank and authority is not the use of organic co-ordination and supervision. Satan is not a saint, although a person of exalted rank in his own satanic dominion.

This completes our survey of *organic* principles; hardly sufficient to explain them fully, but the reader can easily extend their application to all the known limits of life and thought.

Section 3.—*Relational Principles.*

Having obtained a running view of *unitary* and *organic* principles, we have now to give an outline of the *relational* factors of ontology. What do we mean by relational concentrality, dividuality, mobility, stability, community, and integrality, in all worlds, and all organic forms of thought? We need not speak of any but the natural world, in these outlines of definition, and therefore we shall give such illustrations as are most simple and conspicuous.

Relational Unity and Integrality.—Personal unity, social unity, co-ordinate unity, and ultimate unity are primary distinctions of organic integrality in the natural world; and the principles remain the same as forms of thought, applied to supernatural worlds, and to the ontological totality of being.

We cannot regard substance alone as the entire data of ontology; we must include immaterial principles and forces. Space and time, force and law, are not substantial things. Even physical forces are now acknowledged to be immaterial. We must, then, view the infinite either as an organic or an inorganic totality; and we

need not look beyond living beings on our own planet, to know at once that infinite unity cannot be entirely inorganic; for that would exclude all finite living beings. This is one main fact already ascertained; but where are we to look for other facts? Are there not infinite revelations of organic principles and worlds which throw light on the disputed question of organic totality? There are, indeed, such revelations; and these may be interrogated everywhere, as far as the eye can reach; as far as the human mind can penetrate.

Transcendent totality is a form of expression which includes the natural, the lymbic, and the supernatural worlds, as three subordinate infinities of ontological unity. Without the word totality, we can have no definite idea of the word infinite. The natural universe is a totality, as far as we can observe it by means of the most powerful instruments. Beyond these limits it is also a totality. The word infinite, therefore, is only a form of thought which is tangential to the word limit, just as in mathematics, that which is beyond the peripheral limits of a sphere, is tangential to the sphere. Infinity is unfathomable; but not unknowable in its tangential and immanent relations to organic totalities of so-called infinite dimensions. Infinite totality, however, is but one aspect of organic and relational integrality. In a general analysis we find personal, social, co-ordinate, and ultimate integralities. The integrality of man, as a personal being, in which all parts of the organism are intimately related to each other, is a fact which is self-evident. The social integrality of mankind as a collective unit, requires no elaborate proof. The co-ordinate integrality of the epicosmic realms on our globe, and of the globe itself with all these realms, is equally manifest; and that of all the bodies in our solar system, and of all the cosmic worlds in the sidereal

heavens, is admitted by astronomers. The human mind cannot stop at these limits, but comes to rest in the necessary idea of ultimate supernal integrality. This is a necessary form of thought and a legitimate factor of ontological science.

Infinite Community.—As far as experiential science has been able to ascertain, all natural worlds are held together by the force of gravitation; and as far as the human eye can reach with instrumental aids, all stars, by means of light, communicate with one another. There is apparently an infinite community of gravitation and illumination in the natural universe, although there is manifestly an orderly gradation and arrangement of degrees of light, and heat, electric, and gravitative forces, not only in our solar system, but in all the heavens. Promiscuity is nowhere seen or felt in this vast connection, but as unity is evident in all individual organisms, so community is manifest in the collective systems of the universe. The most distant stars may be invisible to us; their light may not be strong enough to reach our system; but we have abundant evidence of the intercosmical community of light within the limits of our Milky Way; and, as the most distant stars, but dimly visible to us, extend their rays as far beyond our sidereal world as within it, the principle of photological communication and community is proved beyond the rational possibility of doubt. Community is therefore an eternal principle of finite integrality, and of infinite totality. How far it may extend to mental light as well as physical, is a question for ontological science to investigate, and the present pages are an effort in that direction. We know that the light of truth is immutable, indestructible, and infinite, while physical and mental darkness are only local and exceptional. The inspiration of the poet has already divined as much, for Shake-

speare says, "*there is no darkness but ignorance,*" (Clown to Malvolio in Twelfth Night); and as science dissipates this kind of darkness, we may hope that mental light will ultimately extend beyond the limits of physical light amongst the stars, and penetrate into the depths of spiritual as well as natural truth.

There is, then, a relational community of all the parts of personal organism with each other, and of all the forces of life, physical, mental, and spiritual, with each other. There is a similar community of influence and mutual relationship between the members of a social community; between the parts of a co-ordinate integrality; and also between the parts of an ultimate totality. Organic unity or integrality necessarily implies relational community of influence amongst the parts combined; and as there is abundant evidence of such community of action and reaction, motion, sensation, thought and emotion in the human organism, and in society, as well as in the physical influence of the sun and planets on each other, and on the co-ordinate realms of our globe, we have every reason to conclude that the principle is necessary and eternal, not only in personal and social organisms, but also in co-ordinate unity and ultimate integrality. We regard it, therefore, as a fundamental principle of nature, and a legitimate factor of ontology.

We hardly need explain the community of systems and series of organs in the human body. Every part co-operates with all the others, for the common good. The heart sends blood to every cell and tissue; and the stomach supplies new stores of food and water to the blood, as fast as they are wanted; the nerves communicate with every part of the organism, and there is intimate communion between the body and the mind.

Social community of interest and feeling is less con-

spicuously manifest, though not less real or important. When the body and the members of a state are at war amongst themselves, the collective organism suffers in proportion to the bickerings and strife. The whole human race has one common interest in this world's goods, and in a future life of happiness for all. Ignorance and poverty in the social body, may produce disorder and strife, as weakness and starvation produce disease in the individual body, but still there is community of suffering and danger in both cases.

Co-ordinate community of life is also manifest in the close relations and mutual dependency of all epicosmic organisms on the earth, and of all the planets on the sun which gives them heat and light in definite proportions, at all seasons of their periodic revolutions and mutations.

Personal community of systems and series of organs in the body, and of immaterial forces in the mind; social community of food and habitation, thought and intercourse upon the earth; co-ordinate community of animal and vegetable life within the inorganic realms of the globe, and cosmical community of all sublunary creations in the life-giving heat and light of the sun, are self-evident facts; and all the heavenly bodies are united in a common bond of hierarchal concentrality and mutual relationship.

Infinite Equilibrium.—Newton has explained some of the laws of equilibrium in the physical forces and motions of cosmic bodies, in our solar system; and it is easy to perceive that unless the principle of stability were an organic necessity of being, there could be no eternal harmony of any kind, in any world. There must be a law of equilibrium, therefore, or the world could not subsist as an infinite totality of harmonic force and motion.

There must not only be a balance of action and reaction in the natural, the lymbic, and the supernatural worlds; but also in the alternations of movement from one state of being to another; from one world of existence to another. Natural world equilibrium, lymbic world equilibrium, supernatural world equilibrium, and transcendental equilibrium, are illustrations of one eternal principle of order. The laws of physical gravitation and illumination in our solar system, have been discovered, but the laws of instinctual, mental, and spiritual gravitation and illumination, are not sufficiently explained; the laws which regulate the oscillations and transitions of existence in the visible and the invisible worlds, are still less known and understood; the facts of stable and unstable equilibrium in nature, are nevertheless manifest; and the principle must be recognized as eternal and immutable.

What are the laws of equilibrium between population and the means of subsistence, on the surface of our globe? in the sea and on the land? between the increase of numbers in each species, and the powers of destruction? between the multitudinous swarmings and the length of days, or the lease of life to individuals of each species? What are the relative proportions of individual and collective beings in the natural and the supernatural worlds? Experiential science has not yet penetrated far into these mysteries; but time and perseverance will unfold to human reason many things unknown to us.

The laws of equilibrium in mutational actions and reactions, are eternally the same. In the natural world, births and deaths form a kind of balance; where they are equal, in a given age of the race, they form a stable equilibrium; when unequal, they form an unstable equilibrium, between the visible and the invisible worlds.

The lymbic world is subject to the same fluctuations of stable and unstable equilibrium. Where incarnations are relatively more numerous than decarnations, the equilibrium is modified; and such a state of action will call for an equal amount of balancing reaction, in a given length of time.

The invisible world must gain and lose by alternations of existence with the visible, in the same ratio of exchanges, as that which affects the lymbic worlds, but in the opposite direction. An excess of gains in the natural world must correspond to an excess of loss in the supernatural, and *vice versâ*. Time is, however, an essential element of balance in such cases; more births with shorter lives, being only equal to fewer births with relatively longer leases of existence. Creations must be balanced by disorganizations of some kind in every world. The formation and the disorganization of worlds, we can understand, in parallel with the organization and dissolution of human corporations and societies; but the creation and the disorganization of individual souls, is a mystery which we cannot understand. It is, indeed, a paradox; for, if the immaterial forces of the soul be eternal, and immutable, they cannot be destroyed and recreated. It is not the principles of being, then, which are created and disorganized, but the phenomenal forms and modes of manifestation. Man is, ontologically, an eternal portion of the indestructible; phenomenally and experientially, he is a mutational atom of creation.

Without fixed laws of equilibrium there could be no personal stability of organism; no social stability; co-ordinate stability; ultimate stability; no uniformity of any kind; no positive science.

The balance of waste and repair in the human body is a necessary principle of health, growth, and life; the balance of births and deaths is a necessary element of

collective social life and progress; the balance of population and the means of subsistence on the earth is a necessary fact of co-ordinate life and progress; the balance of coexistent numbers and proportions of inhabitants, in each of the three worlds of human life, is a necessary form of thought, whatever be the laws of equilibrium between the relative proportions of celestial, terrestrial, and intermediate totalities in the complex unity of mankind; the balance of creation and dissolution is a necessary fact in the eternal unity of the absolute.

The oscillations of mutational equilibrium in all experiential worlds depend upon creations and disorganizations in the hands of God; all mutations in phenonomenal worlds are controlled by the transcendent operations of the Deity, in accordance with eternal laws of equilibrium.

Man may think that he can call into this world as many human beings as he likes, within the limits of the physical resources of food and climate on our globe; but this is only an opinion. And when the globe is cultivated to the utmost of its capabilities in every region, the conditions of longevity, prolification, and sterility will doubtless have attained the limits of an equilibrium, which will be stable or unstable, in accordance with the will and the activities of higher powers. We need not dwell, however, on these questions; as the principle of alternation and mutational equilibrium is self-evident in every field of observation and experiment; and needs no elaborate arguments to prove both its necessity and its universality as an eternal factor of existence.

Organic modulations are numerous and various in the phases of experiential life as well as in the alternating changes, from one world into another. Infancy, youth, manhood, maturity, and decline, are different modula-

tions of being, within the limits of a natural career; and alternating states of activity and rest, sleep and wakefulness, are the daily experience of organic modulation, in each phase of our terrestrial career, health and sickness, hunger and satisfaction, fatigue and vigour, joy and sorrow, anger and placidity, are daily and hourly modulations of experience; and numerous other illustrations may be found to warrant our definition of the principle of equilibrial stability and modulation, as an ontological factor of organic science.

INFINITE MOBILITY AND FREEDOM.—Wherever there is force there must be either tension or motion; and as forces are indestructible, mobility must be perpetual. This is an admitted principle, as far as physical forces are concerned; and if other forces are indestructible, their mobility must be corelative. Eternal motion, sensation, thought, and emotion, are involved in all personal unity of organism, and relational mobility is necessary in all social organisms, co-ordinate organisms, and ultimate organic unity.

Individual organisms circulate freely round our globe in all directions; their natural liberty of movement is thus ample although definitely circumscribed. All the planets revolve upon their axes and circulate in their respective orbits. The sun with all its secondary bodies moves in our galactacosmic universe; and other sidereal systems are known to be in motion, although apparently at rest, as fixed stars in the firmament. Organic motion is known then to exist in the internal organisms of individual bodies, and relational mobility is manifest in personal, social, and coordinate bodies; and, therefore, in ultimate organic unity. It is a necessary principle of nature and a fundamental factor of ontology.

The relational freedom of the will is equally circumscribed by definite limitations and conditions within

which, however, it is free to move in all directions of volition.

Relational Dividuality.—Analytical distinctions are everywhere manifest in nature. Personal individuality in man, social individuality in humanity, coordinate individuality in our planet; in the solar system, in the different solar systems of the world, are well known facts; and ultimate unity of being is a necessary form of thought. Analytical separation and gradation of parts are just as manifest as the synthetic unity of organism, in all degrees of extension, from the finite to the infinite. The human body contains seven distinct systems or parts of a complex organism, and every collective unit contains individual members; separate individuality, and the gradation of parts form an element of progression in all degrees of extension; an element of independency and freedom, mobility and harmony within the limits of organic integrality.

On the earth we see individual forms and gradations from the smallest atoms of matter up to minute organisms and enormous animals. In the heavens, individual cosmic bodies of all sizes and degrees of splendour. Vegetable organisms are of all sizes and gradations of development; animal organisms of all sizes and all grades of instinct; men of different grades of physical strength, artistic endowments, intellectual power, and spiritual elevation.

We see different classes of society in all civilized communities; hierarchal ranks of authority in all military and industrial, political and ecclesiastical corporations. Different ranks of individual power and splendour in all heavenly bodies; satellites inferior to planets; these again inferior to the sun; and in the heavens, one sun is found to be superior to another in colour, brightness, and immensity of volume. The separation and grada-

tion of organs, individuals, and collective groups, is a necessary principle of unity in all complex bodies. Relational individuality is, therefore, a necessary principle of organic unity. Personal individuality, and rank of power, social dividuality, and degree of evolution, co-ordinate realms, and ultimate unity, are fundamental distinctions in nature, necessary forms of thought. Individual units and fractions are easily observed. In the human body we have *organic*, *relational*, *medial*, and *connective* systems. In the human soul we find parallel systems and series of faculties. Our solar system displays *organic orbs* of different kinds: *relational orbits* in which they move; *medial* and *connective* factors which belong to the same complex unity of heavenly bodies. We find a like distinction of systems and series of individual types in the inorganic and organic realms of our planet; and the reader will perceive that in our scale of ontological principles we recognize the same analytical distinctions of *unitary*, *organic*, and *relational* factors, as the ground work of ontology. Our classification of the methodological, cosmological, and ontological sciences offers another illustration; and, therefore, we need hardly explain further what is meant by the words systems and series of individualities in infinite gradation, as one of the primary factors of ontology.

Synthetic Concentrality.—In the personal unity of human nature there are four concentric kinds of experiential organism, commonly called body, soul, mind, and spirit. In each of these, again, seven distinct systems in concentric parallels. Those of the body are known as the cutaneous, the muscular, the osseous, the nervous, the generative, the digestive, and the vascular systems, with their respective organs of sense, and their connective tissues and secretions. In each of these we have

bilateral divisions or hemialities, recognized as the right and left sides of the body; not to mention the quasi analogous similarity of the upper and the lower limbs.

The twelve realms of our globe form a co-ordinate concentrality; while each class of types in each realm runs parallel with the others, in natural gradation. The atmosphere, the ocean, and the land form three concentric parallels: the vertebrate, the articulate, and the molluscan realms are equally distinct and parallel in distribution.

The epicosmic realms occupy the crust of the globe, in concentric parallel with the internal core; so that we find organic parallels in the human body, in epicosmic realms, in the crust and the internal core of the earth, and the planets move in concentric orbits round the sun. Our sidereal universe offers illustrations of the same principle. Central and circumferential distinctions are manifest as far as the eye can reach in all directions.

"Worlds within worlds; worlds beyond worlds, *ad infinitum*;" these are forms of human thought which correspond to what are deemed self-evident truths. Our planet with its moon forms a little world; Jupiter, Saturn, Uranus, and Neptune, with their attendant satellites, form other planetary worlds within our solar system. This again forms a part of the sidereal heavens; so that in cosmological science, we have the natural distinctions of monocosmic, polycosmic, zodiacosmic, galactocosmic, and nebulocosmic worlds, one involved within another, in progressive extension and concentric arrangement within the limits of pancosmic unity. This again is but another complex world within the limits of infinity; so that worlds within worlds, and worlds beyond worlds are phenomenal manifestations of a positive principle of synthetic concentrality in creation.

An individual human being is a minute human world

within a family; the family is a tiny world within a city; the city is a complex world within a nation; and a nation is a larger world within the limits of terrestrial humanity. Beyond the natural world of humanity we have the lymbic; beyond the lymbic, the supernatural; and beyond all human worlds, the superhuman. From the finite degrees of being to the infinite, therefore, we trace an organic principle of concentric unity. Natural worlds are thus arranged in order, as far as the eye can reach, with the additional aids of telescopic vision; lymbic worlds are necessarily combined with these; supernatural worlds, as far as the human intellect can ascertain, are thus arranged in parallel with invariable laws of order in natural and lymbic worlds, while ontological forces involve experiential worlds, as the eternal and immutable involve the transitory and phenomenal in every possible aspect of creation.

In human nature the physical forces of the body occupy the lowest plane of life; instinctual forces hold a higher rank; mental forces are still higher, while spiritual forces are the highest. And these occupy an inferior plane of experiential life in this world, compared with the plane of life in the supernatural world, while all planes of experiential existence are very much below the absolute perfection of being, human or divine. Synthetic concentrality is therefore a legitimate factor of systematic ontology; and this terminates our definitions of the principles enumerated in the general synopsis.

We have now a definite idea of "*unitary, organic,* and *relational* factors of ontology," and these are the groundwork of all human knowledge, for no science is definitive until it rests on one or more of these foundations. We have thus an outlined chart of the utmost limits of human understanding. Whatever depths of learning

and minuteness of detail, in any branch of knowledge may be acquired by man, in any sphere of his existence, they can never penetrate above, below, or beyond the principles here defined in outline. The infinite diversity of the creation will never probably be known to any finite creature; and we can easily perceive that countless ages of progress on this earth, would not enable the human race to fathom a millionth part of the mysteries of the natural and spiritual universe. It is, however, a matter of some importance to possess a compass by which we may be safely guided on the ocean of unexplored phenomena.

A correct view of general principles is, to some extent, a safeguard against the influence of erroneous doctrines in religion and philosophy, but it cannot dispense with an accurate knowledge of details, in every branch of cosmological and methodological science, as a guide to human reason. Although perfect science is one and the same in all branches of knowledge, we look to co-ordinate eternal principles for guidance, in dealing with doctrines derived from spontaneous induction.

We have now to analyse the physiological *characteristics* of first principles, in contrast with their anatomical description, (if we may use these words,) by which it will be seen how vast is the domain of every great factor of ontology, and how necessary it is to have definite views of primary distinctions, before we enter into the endless maze of secondary and minute details.

TRANSCENDENTAL CHARACTERISTICS.

The organs of the human body, and the functions of these organs, are different factors in the same organism,

giving origin to anatomy and physiology as distinct branches of physical biology. The immaterial forces and laws of nature, with their characteristic *functions* and vocations, give us in like manner a twofold view of theosophic or transcendental ontology.

Genius and vocation are inborn characteristics of human nature, and the special modes of action of these factors are equally worthy of investigation.

If man has been created in the image and likeness of his Maker, the copy should be something like the pattern. This can be easily conceived on the ground of perfect similarity between a finite form of any kind, and infinite extension of the same form, such as a drop of sea water and an ocean: a measure of space and any extension of measure: an individual human spirit, and an infinity of human spirits. A finite type of complex integrality and ultimate unity or totality.

Forces and laws are definite and indestructible, they are ultimate forms of thought, and the uniform relationships and modes of action of these laws and forces are self-evident factors of ontology. On these grounds alone, are they deemed necessary truths in all worlds, known and unknown. No special science can be true in contradiction with a principle; no ontological definition can be accurate in contradiction with any known law of nature.

In a systematic definition of principles, we do not intend to propound any *doctrine* of the knowable or the unknowable; of creation or of providence; but merely to give an outline of eternal causes, manifest in all the known phenomena of nature. Tables of laws and forces have been already given. The following synopsis will give a similar view of the main characteristics of organic laws and forces, in all degrees of extension.

Characteristics of Eternal Principles.

Unitary Characteristics.

- **Z. Characteristics of Deity.**
  1. Sustentative immanence.
  2. Creative and destructive operance.
  3. Perfective providence.
  4. Directive control.
- **Y. Characteristics of Eternal conditions.**
  1. Indestructibility of substance.
  2. Immateriality of force.
  3. Infinity of space.
  4. Eternity of time.
- **X. Characteristics of Created worlds.**
  1. Evolutive phenomena.
  2. Metamorphic phenomena.
  3. Perfective progression.
  4. Ontological immortality.
- **W. Characteristics of Created beings.**
  1. Incarnative transition.
  2. Procreative perpetuation.
  3. Subcreative ingenuity.
  4. Perfective improvement.

Organic Characteristics.

- **VII. Organic aptitudes.**
  4. Relational aptitudes.
  3. Mixt aptitudes.
  2. Organic aptitudes.
  1. Connective aptitudes.
- **7. *Hierarchal modes of action.***
  4. Assent and obedience.
  3. Supervision and discipline.
  2. Direction and command.
  1. Selection and control.
- **VI. Sustentative constitutions.**
  4. Physical constitutions.
  3. Instinctual constitutions.
  2. Mental constitutions.
  1. Spiritual constitutions.
- **6. *Perfective vocations.***
  4. Industrial vocations.
  3. Artistic vocations.
  2. Scientific vocations.
  1. Social vocations.
- **V. Genetic sex and genius.**
  4. Procreative sexes.
  3. Incarnative sexes.
  2. Natural subcreative genius.
  1. Celestial inspirative genius.
- **5. *Genetic modes of action.***
  4. Procreative impregnation, gestation, lactation, &c.
  3. Incarnative inception, metamorphosis, nativity, &c.
  2. Subcreative invention, construction, improvement, &c.
  1. Celestial design and inspiration.

Characteristics of Eternal Principles—continued.

Relational Characteristics.

IV. Dynamic depths of concentrality.	4. Personal depths of being. 3. Social depths of being. 2. Coordinate depths of being. 1. Ultimate depths of being.
III. Complexity of organism.	4. Personal complexity of organism. 3. Social complexity of organism. 2. Coordinate complexity of organism. 1. Ultimate complexity of organism.
2. *Vibrational modes of action.*	4. Personal liberty of movement. 3. Social liberty of movement. 2. Coordinate liberty of movement. 1. Ultimate liberty of movement.
II. Equivalent permutations.	4. Personal experiential permutations. 3. Social experiential permutations. 2. Coordinate experiential permutations. 1. Ultimate experiential permutations.
1. *Radiational modes of action.*	4. Personal irradiations. 3. Social communications. 2. Coordinate communications. 1. Ultimate communications.
I. Definite types of organism.	4. Individual types of organism. 3. Social types of organism. 2. Coordinate types of organism. 1. Ultimate types of organism.

These definitions require explanation, although a glance will show that they are natural, within the limits of experience, in the forces, motions, and relations of all known cosmic and epicosmic organisms. They are manifest in human society, and in the solar system; in lower animals and in sidereal associations. They are more fully illustrated in human nature than in cosmic nature, because we can sound the depths of all kinds of organic immaterial forces in the one, while connective physical forces are alone conspicuously manifested in the other. The laws of order being the same, however, in both physical and spiritual forces and phenomena, we can trace their parallelism as far as human thought can penetrate. Fixed principles can be defined and under-

stood, as mathematical principles are defined and understood, independently of any particular fact in nature. We will endeavour, nevertheless, to find both cosmic and epicosmic illustrations of all the factors of the table, beginning with those of the unitary section. By this means we hope the whole will be made easily intelligible to the thoughtful reader.

Section 1.—*Characteristics of Unitary Principles.*

The anthropomorphic characteristics of Deity are universally defined as omnipotent controlling love and will; omniscient perfective wisdom and understanding; omnipresent sustentative immanence; omnificient creative and destructive action. We cannot suppose a planet with organic realms, to be less complex than a locomotive engine, created and controlled by will and understanding.

The characteristics of created beings are those of predestined physical and industrial use and function; instinctual and artistic activity and beauty; mental and scientific evolutions of truth; spiritual and social realizations of goodness. They are also endowed with incarnative, procreative, subcreative, and perfective powers of action.

The characteristics of different worlds, are evolutive life and mortality in the natural world; metamorphic evolution and transition in the lymbic world; perfective progress in the natural and spiritual worlds; and ontological immortality in all worlds.

The characteristics of connective forces and conditions of life and form, are the eternity of duration in time; the infinite extension and plenitude of space; the permutability and indestructibility of substance, in space; the immateriality and indestructibility of physical connective forces in substance of every sort, solid, liquid, gaseous, or ethereal.

The main characteristics of *time*, are the phenomena of succession, limitation, revolution, and perpetuation; those of *space*, are extension, limitation, plenitude, and comprehensiveness; separation, combination, mutation, expansion and condensation, are the leading characteristics of *substance;* while connective *forces* are characterized by the phenomena of motion and tension, persistency and convertibility. All things are mortal in the natural world; all living beings come into this world, and migrate from it; the existence of a spiritual world is nevertheless involved in mystery; but all the sciences demonstrate the indestructibility of laws and immaterial forces, and consequently the immortality of the ontological soul, however changeable and transitory, may be the characteristic features of the experiential organism.

Personal characteristics differ in individuals and in races; social characteristics differ in nations and communities; coordinate characteristics are different in the animal, vegetable, and mineral kingdoms of our globe, and the different groups of stars in the sidereal universe, have been distinguished by astronomers from their leading characteristics being respectively peculiar and distinct. Suns and planets are easily distinguished. What the distinguishing characteristics of one ultimate organism, such as that of our pancosmic universe, from another natural world may be, we cannot know, but analogy may give us an idea of the possibility of different types of universes, in parallel with the different types of individual and collective organisms on earth.

Pure mathematics give us accurate ideas with regard to the characteristics of time and *number*. Geometry enables us to obtain definite ideas of volume and extension, form and *measure*. Atomic affinity, molecular cohesion, and bodily *weight*, are leading characteristics of substance and connective forces; chemistry, physics,

and mathematics, explain the laws of physical attraction and repulsion. *Order* and organization are the dominant characteristics of all kinds of immaterial forces; and biology, when duly constituted as a positive science, will explain the laws of use and beauty, truth and goodness, in all degrees and kinds of organism; in all possible worlds; in all operations, and principles of being. *Number* of pulsations in time; *measure* of volumes and positions in space; *weight* of attraction in substance; organic *order* of arrangement in forms of organism, are characteristics of connective unity; and these are mathematical as well as ontological. In cosmic bodies there are four kinds of physical motion; namely, oscillation, rotation, revolution, and translation. The earth rotates on its axis daily; revolves in its orbit once a year; oscillates in its position periodically; and is carried along with the whole solar system, in a certain direction in the heavens. Diurnal cycles of rythmic motion or nodation; annual cycles of revolution; periodic alternations of oscillatory movement; and definite directions of translation, are characteristic factors of time and motion in our planet; and these factors differ more or less, in all the planets of our system; in all the systems of the universe in accordance with invariable laws.

Physical motion, instinctual sensation, mental ideation, and spiritual emotion, in the natural, the lymbic, the supernatural, and the ontological depths and aspects of existence, are simultaneous concomitants of life and organization, time and motion.

The extension of lines, planes, spheres, and atmospheres, is one aspect of space; the limitation of these, is another; the occupation of space by solid, liquid, gaseous, or ethereal substance, or by all of these involved in each other, is an aspect of degrees of plenitude in different places, and at different times. Space is also

necessarily comprehensive, including all possible worlds and modes of existence, natural, lymbic, and supernatural.

Attraction and *repulsion* are leading characteristics of force and substance, and these may be viewed under the aspects of physical, instinctual, mental, and spiritual attraction and repulsion; in all degrees of *limitation*, or totality, finite, indefinite, infinite; in all states of *comprehension*, natural, lymbic, supernatural, ontological; and in all *mutations* of state, such as those of atomic affinity, molecular cohesion, cosmic gravitation, and elemental constitution. It seems not improbable that the simple elements of matter are themselves composed of the radical elements of ether, or whatever name we give to the most subtile invisible, and imponderable form of substance. Attraction, limitation, comprehension, and mutation, are primary characteristics of all kinds of organized force and substance; necessary forms of thought.

Physical mathematics deal with the connective forces of light, heat, electricity, and gravitation, as well as with the different states of solid, liquid, gaseous, and ethereal substance. Biological mathematics deal with the corresponding states, mutations, and modes of attraction and repulsion in instinctual, mental, and spiritual forces, necessarily, as we suppose, connected with ethereal or imponderable substances; and thence called physio-organic, physio-instinctual, physio-mental, and physio-moral forces.

Order and arrangement are the primary characteristics of all forms of being, personal, social, coordinate, and ultimate; in all degrees of *limitation*, or totality, finite, indefinite, and infinite; in all *dynamic depths* of physical, instinctual, mental, and spiritual organism; in all *worlds* of existence, natural, lymbic, supernatural, and ontological; in all phases of *mutation* in each world, and transitions from one world to another. All the sciences deal with prin-

ciples manifested in experiential nature, and organic philosophy is the culmination of organic science.

Characteristics of Personal Organisms. — The mortal existence of man requires no explanation, as a well-known fact. The transitive existence of the human fœtus in the womb, requires no comment. The progressive existence of man in the supernatural world is supposed, by some philosophers, to be a matter of opinion, and we have no wish to controvert opinions here. It will hardly be denied, however, that in some form or other, all forces exist for ever, since they are indestructible; and we need not discuss the question of conscious identity, during this eternity of being. We know, nevertheless, that loss of consciousness is not annihilation; for alternations of reminiscence and obliviscence, are not only facts of daily and nightly experience, but also of much longer periods of time, in our phenomenal career of life. The incarnative organization, in utero, is a known characteristic of individual existence, in all animals, as well as in man; and the same may be said of experiential evolution during the natural life of any individual organism. Death and the dissolution of the body are also well-known phenomena; the indestructibility of immaterial physical forces has been demonstrated, and the spiritual forces of the soul are not less real than the physical forces of nature. Individual spiritual forces disappear with one generation of beings, and reappear in another. They must, therefore, either go to nothing and come back from nothing, or be convertible with physical forces, which are immaterial and indestructible.

The experiential life of the human race is only mutational, in comparison with individual mortality. The individual passes, while the race remains; and therefore the collective life of humanity is continuous for a length-

ened period of time, notwithstanding the mortality of individuals. The vital forces of nature are not perishable, but mutable in phases of appearance and disappearance.

The immortality of the soul is not merely a question of conscious and unconscious states of existence, as some philosophers would imply; it is a question of personal identity in mutable conditions and alternating states of being. We cannot go into the details of psychological analysis here, but an outline of primary distinctions will be enough to show that consciousness is merely a partial characteristic of existence in experiential life.

1. *Physical Organism and Motions.*

H. Connective tissues—incarnative and nutritive involuntary motions.
O. Organic systems—involuntary motions in the body.
U. Organs of sense—mixt motions in the body.
∩. Relational systems—voluntary motions in the body.

2. *Instinctual Organism and Sensations.*

H. Connective instincts and preconscious sensations.
O. Organic instincts and unconscious sensations.
U. Mixt instincts and semiconscious sensations.
∩. Relational instincts and conscious sensations.

3. *Mental Organism and Thoughts.*

H. Connective mental faculties and preconscious intuitions.
O. Organic mental faculties and unconscious thoughts.
U. Mixt mental faculties and semiconscious thoughts.
∩. Relational mental faculties and conscious thoughts.

4. *Spiritual Organism and Emotions.*

H. Connective moral faculties and preconscious emotions.
O. Organic moral faculties and unconscious emotions.
U. Mixt moral faculties and semiconscious emotions.
∩. Relational moral faculties and conscious emotions.

The ontological unity of the human being is connected with the experiential body, soul, mind, and spirit,

by an evolutive process of incarnation and continuous assimilation. The organic principle assimilates matter from the external elements to form the body; the rational principle assimilates sensations, perceptions, and emotions from the surrounding world to form an experiential mind. The greater part of the motions of the body are quite as mystical as the sensations and emotions of the soul; *conscious* motion, sensation, thought and emotion only pertain to the relational mechanism of the complex unit.

If we calculate the relative proportions of conscious and unconscious motions and sensations in the experiential organism, we shall find. 1°. That the whole process of formation in the womb, and that of nutrition and secretion in all parts of the body during life, are performed unconsciously. 2°. That the mechanical motions of the vascular, the digestive, and the generative systems, are partly unconscious, and wholly involuntary (in all but the special organs of the senses) throughout life. 3°. That the motions of the external frame (nerves, muscles, bones, and skin; eyes, ears, nose, mouth, &c.,) are alone subject to the control of the conscious will; and this but partially; for the voluntary motions of the nose and ears are limited to the external parts. The whole movement of formation and nutrition, and nearly the whole of the organic movements of the body belong to unconscious physical life and motion; while some of the movements of the external frame (breathing, &c.,) are reflex and involuntary; so that at least two-thirds of the motions of the body are unconscious during the wakeful state; and as one third of life is past in sleep, the conscious life of man (body, soul, mind, and spirit) does not amount to more than a third part of his existence in this world; the rest belongs to the mystical preconscious part of his being.

Not only the spiritual part of man's experiential life belongs to the unconscious part of his existence, but most of the physical, mechanical, chemical, and physiological motions of the body are preconscious and unconscious modes of being; the preconscious forces of the organism are as necessary to life in this state, as they can possibly be in any other. Conscious identity of self-hood is but a small part of our self-cognizance during the recurring and relapsing intervals of daily reminiscence and nightly obliviscence. The mystical connection of the ontological soul with the experiential organism, is just as manifest and marvellous, therefore, during life, as the separation of the one from the other, is definite and strange at death; the visible life of man is hardly less mysterious than the invisible, in alternating states of memory and obliviscence, upon the immortal thread of preconscious and unconscious existence.

Characteristics of Social Being.—The uterine life of humanity is continuous in parallel with natural life; and as individual souls are constantly descending into this world, through the phase of incarnation, and returning to an invisible state, through the phase of death and decarnation, we have reason to infer that something does not come from nothing and return to nothing; souls ascend and descend constantly on the three great steps of experiential existence, described in Jacob's vision of the ladder, which reaches from earth to heaven, and from heaven to earth, in the triune ontological existence of humanity; one part of which is perpetuated in this world, while another is in the state of uterine existence, and a third in the invisible world. Celestial humanity is one collective unit; terrestrial humanity, another; lymbic humanity, another; and all three belong to one social integrality of being, which is not only immortal

as an ontological factor of creation, but perpetual as a phenomenal manifestation of existence.

From this point of view, the word mutational includes and explains the word mortal, in all worlds, and in all degrees of being; for, supposing mankind to be collectively mortal on this globe, the cycle of earthly natural existence would only be a mortal portion of some higher cycle of mutational being, in connection with some other planet of coordinate rank in sidereal unity.

We have traditional experience of national organization, evolution, and dissolution, in the histories of ancient Egypt and Assyria, Greece, and Rome; not to mention other nationalities which have appeared and disappeared during the continuous existence of the human race. Social organization, evolution, and final disorganization, are well-known characteristics of collective organism, therefore, as well as of individual organisms; and we have no reason to suppose that cosmic individuals and societies are not subject to the same characteristics of mutational organism in the eternal duration of immaterial laws and forces.

Characteristics of Coordinate Being. — Planets themselves are only mortal bodies, subject to transitions and mutations like all other experiential organisms. Whatever be their rank above or below human nature, they must have limits of duration, in a mutational sidereal world, and a transitional state of existence, in passing from a visible to an invisible form; or from an organic to a disorganic state of aggregation. As ontological forces, supposing them to be physical alone, they must be indestructible, and pass from one convertible state to another, through an intermediate state. These are necessary principles of change and permanency for all kinds of forces. Coordinate being, therefore, is subject to the same characteristics as personal and social

beings are; since planets, with their subordinate forms of epicosmic life, are necessarily subject to all the vicissitudes of phenomenal evolution, mutation, and dissolution. As far as the epicosmic realms of our globe are concerned we have abundant evidence of the successive appearance and disappearance of many species and varieties of animals and plants, before any traces can be found of the human race; to this extent creation, evolution, and dissolution, are manifest characteristics of coordinate life. How far the human race and the earth itself are subject to the same conditions of creation, evolution, and final dissolution, can only be surmised from that which is already known of their respective connections and mutations in the geological and paleontological history of the globe; but all the known phenomena of life and organization manifest these characteristics of change and progress; whence we conclude that as individual and social organisms form a most important part of coordinate existence, the whole of our globe, as an ultimate unit, is subject to the same laws of creation, evolution, and dissolution, as the epicosmic parts; although the immaterial forces of all kinds, physical and spiritual, manifested in this coordinate unity of nature, are known to be eternal and indestructible. The same may be said of all the coordinate organisms of each globe in the cosmic universe, and of all possible worlds.

The earth is but an individual planet in our solar system, while the epicosmic realms upon its surface, form a coordinate unity of subordinate organisms. And from this point of view the planet is an ultimate unity of organism.

CHARACTERISTICS OF ULTIMATE ORGANISMS.—These are as definitely below the transcendental aspect of being, as a coordinate, a social, or a personal organism in the same world—that is to say, the natural world is

but a part of the creation, since the supernatural world is another part, and the two are separated and connected by the intermediate world. We cannot fathom the limits of our pancosmic universe, and are therefore unable to describe this ultimate of natural unity; nor can we discern the characteristics of such an organism. The spiritual universe is still more unfathomable to the human mind, and can only be defined as a part of the creation; an ultimate organism in contrast with that of the natural universe. As man and woman are conjugial individual organisms, so the natural and the spiritual universes are conjugial ultimate organisms; and this is all we need say of the distinction between ultimate and infinite, relative and absolute, forms of thought and definition. We cannot predicate creation, evolution, and dissolution of absolute being, but we can predicate these characteristics of all created worlds, which, having a beginning, must have an end, and which live and move and have their being in the absolute. Transcendent indestructibility is characteristic of all kinds and degrees of immaterial forces, both physical and spiritual, finite and infinite; and as the ontological soul of man is to the experiential organism, which it animates, so the transcendent immateriality of the Creator is to the creation. He sustains and governs in all mutable and transitory worlds.

This is a necessary form of thought, based on the known principles of immutability, everywhere manifest in the phenomenal organisms of nature. As the ontological perfection of human nature is never thoroughly evolved in the experiential organism, so we may conceive that the absolute perfection of divine wisdom is never completely evolved in the progressive evolution of the universe from chaos towards perfection. Absolute perfection in the Creator must necessarily transcend evolu-

tive imperfection in the creation. The human mind cannot escape from these conclusions. To say we cannot know the nature and the characteristics of fundamental principles, is merely to refuse to think of the foundations of all science.

Section 2.—Organic Characteristics.

Organic Aptitudes.—In every community concentric authorities must be established, and as these are formed of individuals, there should be innate and experiential fitness for the duties and responsibilities of office, in those who are invested with authority, in any rank of hierarchal order. Executive aptitudes, in military and administrative corporations; judiciary aptitudes in judges, advocates, attorneys, &c; legislative aptitude in members of parliament and councils of state; constitutive fitness in elective and selective bodies. Minors, idiots, criminals, paupers, and utterly ignorant persons, are unfit for the exercise of selective and elective privileges in constituting legislative and executive authorities. Many persons are fit for executive duties and responsibilities, who are quite unfit for legislative or judicial functions of authority. Hereditary authorities having no certainty of special aptitudes, can never be securely invested with intellectual and moral functions of state, without responsible advisers.

In human society organic aptitudes are easily distinguished; and in cosmic nature, we may observe the characteristics of fitness for different degrees of power and influence in the sun, the lunigery planets, (with their satellites,) the simple planets, asteroids, comets, and meteoric bodies, of the solar system. As authority is a necessary factor of organic unity, so fitness in the different members of a complex organism is an essential factor elative of perfection. These characteristics are manifest,

as far as we can penetrate into the organic harmonies of nature, and are commonly recognized in the colloquial criticisms of unfitness where "round pegs are put into square holes, and square pegs into round holes."

Hierarchal Modes of Action.—Hierarchal modes of action may be briefly defined in a few words, without elaborate explanations, thus:

1. Peripheral submission, docility, obedience, attention, alacrity.
2. Medial supervision, discipline, punctuality, instruction, decorum.
3. Central direction, command, lucidity, regulation, dignity.
4. Supernal control, commission, impartiality, sustentation, gravity.

We might easily multiply the relations of duty and propriety in all ranks of hierarchal unity, but everybody knows that privates in the army should obey their officers; that these should instruct the soldiers and maintain habits of punctuality and discipline; that commanders should form regulations, and be lucid in directions; and that the government should sustain the army and control its operations. The same principles apply to every corporation in the body politic, and need no further explanation. That which is true in principle in one case, being true in all; with such varieties of modulation, as external conditions render necessary.

In human personality, physical nature is peripheral, and should be under the control of artistic instinct; both should be governed by intelligence, and this, again, controlled by spiritual integrity. In epicosmic unity, vegetable organisms are inferior to instinctual organisms; the lower animals are inferior to the higher; and

all are subordinate to man, who is the only spiritual or religious being on our globe. In personal, social, and coordinate unity, we find this characteristic of hierarchal subordination; whence we infer that the same principle exists in infinite totality; and that physical forces are measurably subordinate to instinctual forces; these, again, inferior to intellect; and all are subordinate to the infinite spirit of love and wisdom, law, and order.

6. *Sustentative vocations.*—These are very manifest in collective and individual organisms. Men and women have different vocations in society, and animals have different vocations in all realms. In a national community we have industrial and commercial vocations: artistic and scientific vocations; social, religious, and political vocations. And these are evidently natural distinctions, for some are born more fit for one of these vocations, and some for another, apart from the advantages of training in any one or all of them. Ants and bees, house flies and mosquitos have very different habits and vocations. Carnivorous mammals, birds, and fishes have different habits and vocations from herbivorous and frugivorous tribes in each of these classes. Wherever we observe organic beings on our globe, we recognise inherent vocations of life, and therefore we must recognise vocation as an inborn characteristic.

The vocation of the sun is different from that of planets, while that of planetary bodies differs from that of comets, in our solar system. The facts are manifest though little understood, but quite enough is known to warrant us in recognising the existence of the principle as a necessary factor of organic unity in every world. Not in organic realms alone are these characteristics manifest, but in the lower inorganic also. The atmosphere has one vocation, and the sea another; the solid

crust subserves one kind of use, and the incandescent realm of molten matter underneath, subserves another.

A man is vacant who has no vocation, and he or she whose natural bent has been undeveloped or perverted can neither feel content, nor render others happy. Individuals, societies, and epicosmic realms have each their special habits and vocations in the order of creation, and contribute in various proportions and degrees to the progressive development of industrial uses, artistic beauty, scientific truth, and social goodness. Each organ of the body has a special function: the heart circulates, the lungs aerate, and the kidneys depurate the blood. Each system in the body, each series and each organ, have their special functions and vocations. Each corporation in society, each nation on the globe, each class of animals and vegetables, each planet and each solar system in the heavens have special functions and vocations, with characteristic fitness for their work; and though we cannot easily determine what these functions are in every case, we can discern the principle which calls for their existence, as a necessary factor of organic science and philosophy.

Sustentative Constitutions.—Just as the alimentary constitution differs in herbivorous, frugivorous, carnivorous, and omnivorous animals, so the alimentary constitution of the mind of man differs in individuals of different vocations. Those who are born with natural aptitudes for industrial or commercial pursuits more or less exclusively, cannot easily digest the same intellectual food, as others who are born with innate aptitudes for artistic or purely scientific occupations, while others again are omnivorous in the experiential mind, as well as in the body. Some men have fine artistic instincts and educational constitutions, who cannot tolerate the study of abstract principles and mathematics.

Nor would such studies be of use to them in their vocations, any more than the vegetable food of a granivorous sparrow, to the insectivorous swallow, whose natural vocation is to clear the atmosphere of swarming gnats and flies, injurious at times to other creatures.

The knowledge and experience required for one kind of pursuit is not equally useful to another, and therefore it would be useless for an industrialist to spend much time and thought in the (to him) uncongenial study of abstract science and philosophy. He has, in fact, a natural distaste for all such studies, just as a carnivorous bird or fish has little relish for vegetable food. And this is so manifest in our experience of human nature, as well as in the alimentary constitutions of inferior creatures, that we deem it one of the most striking illustrations of design in the creation: a necessary principle of adaptation of means to ends, and a positive factor of ontological science.

We need not here discuss the various experiential constitutions peculiar to different vocations. It is known that some minds are born fit for one kind of life, and some for another; those who enjoy one vocation only, industrial, artistic, scientific, or social, have corresponding constitutions, and may be called monophagic, whichever one may be predominant. Those who enjoy two different kinds of vocation and education, may be termed diphagic; others again, polyphagic, while those who are omnivorous in mind, are generally more fit for theoretic speculation than for constant attention to practical business of any kind. An industrialist, an artist, or a man of special science, need not know everything, but a philosopher should feed and thrive on every kind of knowledge.

Minor divisions in each kind of constitution run parallel with special vocations in each class of industrial,

artistic, scientific, and social pursuits. Commerce, agriculture, and manufacture, require different sorts of training and vocation; painting, music, histrionics, poetry, and literature, are also very different species in this class; methodological, cosmological, and ontological sections of science are distinct and various; social, religious, political, and philosophical pursuits and tastes are different. Individuals and corporations of human beings, then, are markedly diversified in all these fundamental characteristics of experiential constitution. Nations differ from nations in different climates; one human race from another, in their physical, mental, moral, and artistic tastes; not by chance of circumstances and conditions only, but by innate principles of life and organization.

Industrial vocations and sustentative constitutions may be purely industrial and commercial, or they may be mainly applied to artistic, scientific, or social uses. Artistic vocations may be purely artistic, histrionic, poetical, or literary and esthetic; scientific vocations may be purely scientific, or mainly applied to industrial, artistic, or philosophical pursuits. Social vocations and organic constitutions may be mainly social or religious, or political, national or cosmopolitan.

Every national unity has a peculiar organic constitution, differing from that of other nations, in its political, social, religious, and philosophical organization and activity. Every class in each nation, and every corporate body in each class, has a peculiar organic temperament, and hence it is that the same system of political, social, religious, and philosophical liberty, is not suited to every race and nation, nor to every period of evolution in the same national unity. The social, political, religious, and philosophic temperaments of the French and English nations are different, and each one thinks highly

of its own; not that either the one or the other of these communities has realised its own ideal of perfection yet, either in a political, social, religious, or philosophical view of organic law and liberty.

Social classes, religious churches, political nationalities, and cosmopolitan universality form different centres of attraction and repulsion, and the distinctive constitutions of individuals impel them to select one or other of these centres of gravitation, as the leading focus of activity, during one or more phases of their lives. A Rothschild gives up the whole of his existence to accumulate wealth and obtain social distinction. His ambition can only be one of class distinction, for he has not that we know of, endeavoured to achieve religious, or political, or philosophical pre-eminence, and therefore we infer that his organic constitution is exactly suited to the predominant aim of his existence, and belongs to what we call the social class. John Wesley, Luther, Calvin, and John Knox, have been pre-eminent in the organization of religious sects and churches, and have not obtained distinction as philosophers or politicians, or the founders of rich families, and therefore we infer that they had what we call religious constitutions and vocations, exactly suited to the sphere of uses, to which their lives were devoted with so much success. Napoleon was a politician and a general whose whole existence was devoted to national conquest and reorganization. He was no doubt the founder of a dynasty, and hence obtained more than class distinction, but he was not content with riches and mere social rank, and finally lost his crown, by lust of conquest and political dominion. His vocation was suited to his constitution, neither of which was strictly social, religious, or philosophical. He was a military hero, an imperatore, but not a king by nature. His nephew has more royal aptitudes, being

abler to conciliate all interests, and live at peace with neighbouring communities. Socrates, Plato, Aristotle, were men of philosophic constitutions, devoted to the study of universal principles; they sought for no distinction as the founders of families, or nations, or religions. Organic constitutions are manifestly suited therefore, to one or other of these centres of activity, in human society, and similar characteristics of focal attraction and repulsion, adaptation and fitness may be observed in cosmic nature, when organic principles are better understood. A man may seek most ardently for social rank and distinction at one period of life, for religious distinction at another, political eminence at another, and philosophical understanding at another, with partial failure or success, according to his natural fitness for one or more of these pursuits. One or other is, however, mostly predominant in each phase of existence, if not through life.

Creative Genius.—Creative forces are embodied in organic forms, under different aspects of co-operative energy. In physical nature we have different sexes, and in mental nature, different characteristics of creative genius. In physical organisms there are male, female, bisexual, and asexual progenitors. In mental organisms we have suggestive, conceptive, inventive, and constructive characteristics of genius. If we generalise these characteristic distinctions, we have *procreative* sexes (male, female, bisexual, and asexual); *incarnative* sexes (male, female, bisexual, and asexual); *subcreative* genius (suggestive, inventive, constructive or institutive, and perfective), divine *creative* attributes of abstract design and celestial inspiration. The immanence of creative forces in all procreative and subcreative organisms is necessarily diversified in parallel with the varieties of sex and genius in finite creatures.

Procreative energies in physical organisms of all sexes, in all realms, animal or vegetal, on our globe, are manifestly governed by the influence of external nature, and the seasons of the year. This was fully recognised in the natural religions of the ancients, more especially in the worship of the sun, in which the names of Baal-zebub, Baal-berith, Baal-markos, Baal-peor, &c., signify the God of flies, God of the covenant, God of sports, God of the dead, &c. In Polytheism, olympic gods and goddesses were supposed to preside over the birth and destiny of all human beings and inferior organisms. Venus and Mars, Jupiter and Saturn, assumed the attributes formerly attributed to the sun, moon, and stars by priests of Baal. Poetic and inventive inspiration are supposed by modern nations, to be under the special influence of a spiritual Providence, which stimulates the faculties of intuition, as the sun affects the sexes of physical organisms. In a higher view of creative immanence, the prophets and law-givers of religion are supposed to be inspired by the angels of the Lord of heaven and earth, for the special guidance and perfective regeneration of the human race. These speculative views of co-ordinate subordination in procreative and subcreative energies need not detain us, but the characteristics of genius are positive facts which we can easily observe, and they illustrate an ontological principle in epicosmic nature, both inorganic and organic. In the simple elements of matter, we have to notice a certain difference of quality, commonly called acid, alkaline, and neutral, or basic, connective and amphigenic. In the inorganic realms we find atomic elements of different affinities and polarities united to produce air, water, earth, and organic substances; hydrogen and oxygen combine to form water; nitrogen and oxygen to form atmospheric air; metallic elements combine with oxygen or other

connective elements, to form neutral salts; and some of the elements maintain a neutral state under various conditions. The reproductive characteristics of animals and plants are of four distinctions—male, female, bisexual, and neutral or asexual; and those of the incarnative forces must be of like nature, or none of these organisms could be reproduced by the agency of different sexes.

Subcreative genius is analogous to procreative sexes, for we find that some minds are intuitive or suggestive, but cannot invent; others are inventive, if their minds are impregnated by suggestive intuitions. Some minds have both inventive and intuitive genius of a high degree: Shakespeare, for instance, had a rich inventive genius in the conception and construction of his dramas, and a highly suggestive vein of philosophic intuition in the sublime musings of some of his great characters, such as Hamlet and others. Many minds have a peculiar kind of genius which is neither suggestive nor inventive, nor constructive, but institutive or neutral, producing great works of organization, just as asexual plants or animals reproduce abundantly their own species. Such, for instance, was the mind of John Wesley, the great founder of the religious sect which bears his name. He did not invent a system of divinity, nor did he suggest new speculative ideas of philosophy. He instituted a new ecclesiastic system of religious discipline, which has been very successful amongst numerous classes who were not impressed by the polished but somewhat sterile efforts of the anglican clergy of his time.

Subcreative genius in the human species is not only of different sexes, but of different vocations. Industrial, inventive, and constructive genius are not of the same character as artistic and poetical inventive and con-

structive genius. Arkwright and Watt are men of very different genius from Moliere and Shakespeare. Men of scientific genius, again, properly so called, are very different from men of artistic or industrial genius. Newton and Leibnitz, Copernicus and Kepler, Dalton and Fraunhoffer, Cuvier, Ray, and De Jussien, are as different from Shakespeare and Watt, as these two are different from each other. The spiritual genius of the prophets and apostles are also not only different from each other in their own vocation, but different from the men of genius in other vocations. This is evident to all observers, and therefore we need only dwell on the facts as revelations of a necessary factor of organic unity in nature.

With regard to the divine characteristics of celestial inspiration, we have only to note that potential design is one aspect of creative thought, and actual creation is another; and to this extent we find a parallel between finite and infinite modalities of creative genius. Different characteristics of sex and genius in phenomenal organisms correspond necessarily with different modes of immanence in the infinite potentialities from which they are derived. There can be nothing in true creation but that which proceeds from the Creator. Procreative sexes, incarnative sexes, subcreative genius, and infinite creative influx and inspiration, are therefore concentric characteristics of being, and necessary factors of ontology.

Genetic Modes of Action.—We need not dwell on procreative, nor on incarnative modes of action, which are known to be exceedingly various in different species, and in all organic realms. Subcreative modes of action are not less various in the industrial, the artistic, the scientific, and the social spheres of human life and progress. Should not inspirative modes of influence be infinitely more diversified? Why should not regenerative modes

of revelation be different and various, in adaptation to peculiar states of being, and to different phases of perfective progress? just as different modes of reproduction, and invention, are natural and legitimate, in their respective spheres?

Finite beings are enabled to co-operate, to some extent, with infinite being, in the production and perpetuation of organic forms, animate and inanimate, on our planet; and possibly in every world. We can modify the forms and qualities of animals and plants, and we can organize society with powers a hundredfold superior to those of primitive creation. God improves the breed of horses through the aid of man; he makes a locomotive engine through the inspiration of the human mind. He regenerates the animal man, through the perfective agency of the word. His methods of creation are not all hidden from his creatures, then, since we can trace some of them by actual experience in this natural world. Creation is not absolutely an impenetrable mystery in every sphere; nor are the various modulations of creative energy, beyond the ken of human observation and analysis. Solar stimulation, instinctual fascination, mental intuition, and spiritual inspiration, are parallel modulations of creative influence from a higher to a lower world of life, within the limits of human observation and experience.

As the visible sun excites the sexes, causing the flowers to bloom with heavenly fragrance, and the birds to sing with rapturous delight, so the invisible sun of spiritual light and heat inspires the faculties of men of genius with thoughts of use and beauty, to form and realize creations of the mind; and these are as necessary as the reproduction of physical organisms, for the happiness and perfection of all creatures. Many physical organisms are barren under the influence of the sun;

many human minds are fruitless under the influence of the spirit. And just as rich living and excess render the body sterile, so irreligious dissipation of the mind renders creative genius barren and comparatively useless to society. Every mind is born with natural genius, just as the body is born with the attributes of sex; and few would be sterile all through life, if they sought the spirit of inspiration. "Ask, and it shall be given to "you; seek, and ye shall find; knock, and it shall be "opened unto you; for every one that asketh, receiveth; "and he that seeketh, findeth; and to him that knocketh, "it shall be opened." (Matt. vii. 7, &c.) "For there "is nothing covered that shall not be revealed; neither "hid, that shall not be known." (Luke xii. 2.) These are not vain words; nor are they applicable to those cases only which called them forth on the occasion; but those who have no faith, will neither work nor pray; and even faith itself, without works, is dead. Invention, however, is not the only mental work of man, nor is reproduction of the species, the only physical vocation of humanity. All men and women have duties to perform and work to do as useful and as necessary as those of procreation and invention. It is, nevertheless, evident that, as the generative system of the body, and the inventive faculties of the mind are necessary factors of finite being, so the creative forces of nature are ontological factors of infinite being; and as the characteristics of finite genesis are inseparable from genetic forces, so the characteristics of infinite creative, subcreative, incarnative, and procreative forces, are fundamental factors of organic being, and of ontological science.

The principles of causation are the immaterial forces of creation, physical and vital; their leading characteristics may be variously defined—thus:

1. Organic secretion and fruitfulness.
2. Instinctual causation or poetical inspiration and creation.
3. Mental or scientific inspiration and invention.
4. Spiritual or religious inspiration and revelation.

1. Procreative impregnation, ovulation, incubation.
2. Incarnative inception, formation, completion.
3. Subcreative conception, invention, construction.
4. Creative intention, design, creation, regeneration.

There are parallel contrasts of genetic forces and characteristics in very different planes of creation; namely, 1st., distinct affinities and polarities of elemental atoms, acid, alkaline, &c.; 2nd., different sexes of animal and vegetable organisms, male, female, &c.; 3rd., different forms of subcreative genius and celestial inspiration.

Procreative secretion, impregnation, ovulation, and incubation, are well-known phenomena in the breeding of poultry; and physiologists are familiar with the embryology of all types of organism. The incarnative *processus ad formam* begins with establishing the means of communication between the embryo and its pabulum, by the formation of deciduous organic scaffolding; the metamorphic evolution of the fœtus proceeds up to a certain point of incompleteness, which is sufficient for the crisis of parturition; after which the formative evolution is completed in a new sphere of existence. The chick is hatched, and leaves the shell before it is completely fledged; its feathers are gradually formed, and the process of incarnative investation is then complete. The young mammal comes into the world in a similarly incomplete condition; it is suckled by the mother until its first set of teeth appear, and the organism is so far perfected.

The subcreative processes of formation are analogous to those of procreation and incarnation; conception, invention, construction, and improvement correspond exactly with the phenomena of secretion, impregnation, gestation, and lactation, with their parallel processes of morphological evolution. Creative modes of action can only be understood in parallel with these, as successive acts of intention, design, creation, and perfective regeneration.

These characteristic processes of formation, however much diversified in any world, at any time, are necessary factors of creation, and therefore we class them as fundamental principles, in all degrees of being, from the finite to the infinite.

Section 3.—*Relational Characteristics.*

DEFINITE FORMS.—Motion generates form, but what is the kind of action which generates definite forms? Why are not all actions erratic, and all forms transient, like dissolving views? There must be a principle of limitation, to give and uphold a definite form in any kind of substance; and this must be a design, an archetypal form of thought, before it can become a created form of substance.

The force of gravitation maintains the planets in their orbits, and that of cohesion maintains molecules in their positions, but what is the principle of limitation, which gives definite form to a particular type of being, animal or vegetal, organic or inorganic, cosmic or epicosmic? How is it that comets have not the same forms as planets? lilies the same forms as roses? cows the same forms as horses, dogs, and bears? One fish the same form as another? one reptile as another? one bird as another? Is it the polarity of atoms? How is it, then, that these polarities assume such very different

general arrangements in fishes and birds? crustaceans and insects? oak trees and cabbages? ferns and fungi? crystals, air, and water? How is it that water has not the same elemental constitution as air, when it assumes the form of invisible vapour?

Is the phenomenon of limitation and of definite organic and inorganic forms, an accident of fate or an ontological design? If it be an accidental phase, in the fortuitous concourse of atoms, how can we depend upon its permanence of character? and if it have no permanence of character, how can it be subject to regulative laws? And if there be no law, to govern forms and forces in the eternal mobility of force and substance, how can we ever find a basis for positive science of any kind? It seems to us that there must be a limitative principle of form in nature. Time, space, and substance, have phenomenal limitations in all experiential worlds of thought, design, and motion. Definite limitation is an eternal principle of finite integrality. It is this which Plato has defined as "architypal forms of thought," in the mind of the Creator, and in the human mind, which necessarily precede physical motion, and give form to all phenomenal creations.

Without this principle the science of mathematics could not exist; the word geometry could have no meaning. In the human mind thought generates design, and motion realizes the idea. Geometrical forms are thus created, and the science of geometry evolved.

Individual forms are manifestly various in all the realms of nature; social forms of thought and organization are different in all the nations of the earth; different in all the forms of instinct and gregation amongst animals and insects, dogs and horses, cows and sheep, ants and bees, flies and spiders; co-ordinate forms differ in the planetary groupings of Jupiter and Saturn,

Uranus and Neptune; in monocosmic and polycosmic solar systems; and so-called ultimate organisms must differ to some extent, and in some degrees of mutability, in natural and supernatural worlds. Dividuality and form are inseparable concomitants in all degrees of complex organism; and whatever "natural selection" may be able to accomplish in modifying living shapes, it is but a mode of action dependent on a principle of form, in motion, sensation, thought, and emotion.

The principle of definite forms and limitations resides in a power to control motion and direction; it is therefore a necessary factor of creation, and of ontological science. Physical force and motion may generate some combinations of matter, but intellectual design is necessary to combine simple forms and motions in a complex living organism, with definite aims and functions.

Revelational characteristics of attraction and repulsion. —All parts of nature are mutually related and interdependent. The planets are united with each other by the force of gravitation; but this is not the only principle of sidereal connection. Light, heat, electricity, and gravitation are correlative, and more or less convertible modes of motion and communication. Light reveals to us the existence of innumerable worlds; many facts of motion and relation amongst the so-called fixed stars have convinced astronomers that physical attraction and repulsion are connective modes of action in the distant heavens.

There is no doubt that light and gravitation are universal agents of association, while heat and electricity are everywhere, as far as we can follow them, concomitant modes of action and reaction in the universe. What then are the chief characteristics of these modes of motion? Do they not reveal to us at once, both the existence of these distant worlds and the means by

which they are linked together in community? *Physical revelation*, therefore, is one of the main characteristics of these forces, and their modes of motion. Is it an eternal characteristic of all kinds of forces that they should reveal themselves to intelligent beings by their modes of action? We believe it is, and therefore we have only to learn how to observe the phenomena of physical and mental modes of action, to ascertain their characteristic modes of revelation. But how can we interpret the mental and spiritual revelations of immaterial forces, as we interpret the revelations of light, heat, electricity and gravitation? How can we ascertain that the spiritual light and heat of the eternal logos are not identical with the reflected forms of light and enthusiasm in the opaque minds of ignorant human beings? What are the analogues of physical light and colour with their respective modes of radiation, reflection, refraction, and polarization, in the instinctual, the mental, and the spiritual forces of nature? Are not all these modes of motion revelations of the forces and conditions which give them birth? This is one of the problems of ontology which has a direct bearing on the principle of universal communication and revelation.

In the human soul there is an intimate connection and communication between the phenomena of motion, sensation, thought, and emotion in every part of the organism. In human society, and even amongst herds of animals, there are numerous modes of communicating motion, sensation, thought and emotion from one individual to another, and from one herd to another. Gravitation and illumination are physical modes of communication between heavenly bodies, and also between these and the subordinate creatures living on their surfaces. We can easily observe these various modes of action, and the laws of gravitation and illumination

being the same in physical and mental nature, and in all degrees of personal, social, co-ordinate, and ultimate integrality, we have, in any one of these, a key to the interpretation of the others, and this key is that of organic law and order, truth and beauty, manifested in the human soul and body. The laws revealed in these, not only enable us to read and understand many of the revelations of the visible world, but also to test the truth of revelations from invisible worlds. We know that there are means of communication between rulers and their subjects in this world, and if there be means of communication between the spiritual and the natural worlds of human beings; between the Prince of Peace and his subjects in celestial societies, as between kings and their subjects in terrestrial societies, we have the keys of organic law to test the truths of spiritual revelation, and distinguish them from the mythical voice of poetry and fancy, just as easily in one case as the other.

What then is worthy of the name of revelation in the natural world? in any world? Does not the word of life include several meanings, some of which are very doubtful and misleading? Are not vague traditions and conflicting statements often called revelations by Jews and Christians, Heathens, Mormons, and Mahomedans? Just so; but we are not to be deceived by the uses and abuses of a word; the facts we have to deal with are the phenomena of spiritual gravitation and illumination.

We may ask what there is to be revealed? where it is to be revealed? and how it is to be revealed? How are laws and plans to be known to human beings, otherwise than by words and deeds? The works of God in nature are legitimate revelations of His laws

and power in the universe; the words of God in scripture are received as legitimate revelations of His spiritual laws and power in Heaven and on earth.

In the natural world different kinds of forces are known to man, in his own personality, namely, physical industrial force, instinctual artistic force, mental scientific force, and spiritual social force. We also find, by actual experience, when we choose to seek for it, that the very same kinds of human forces are manifested by spirits, inhabiting the invisible world. The *facts* of natural and spiritual revelation are therefore ascertained, but these facts are questioned. Human words and deeds are obvious, at all times and in all places; divine words and deeds are of a higher order as authoritative revelations.

It is not our present business to discuss the question of verbal revelation, apart from that of natural creation; as we only want to show that man is constrained to depend upon revelation as a guide to knowledge and to conduct, in all spheres of being. The sceptic and the atheist depend on natural phenomena, as the language of authority in science; the principle of revelation is therefore a principle of legitimate authority in nature.

The intrinsic evidence and weight of religious revelations in comparison with human fiction and tradition, are just as easily discerned as the intrinsic value of nuts containing kernels, in comparison with empty shells, before the nuts are cracked. Organic laws of number, biological distinctions, and analogical illustrations abound in the Word, beyond the power of human science or imagination to formulate, even now, with all our knowledge of the laws of nature.

We have already given explanations of this fact with regard to sacred numbers and definitions, analogies and illustrations. When the Scriptures were first given to

the world, men of science did not know what definite organic numbers were, in natural phenomena; nor do they know at present why the numbers 7 and 12, so often mentioned in the Bible, are *sacred* numbers, not only in spiritual, but in natural organisms, individual, and collective, although theologians had long ago discovered that these numbers denoted fulness and completeness of organic constitution. Anatomists and physiologists had not discerned these numbers in the human body. Psychologists had not conceived definite ideas of the four concentric depths of forces in the human soul, though both these factors of organic unity are distinctly mentioned in the Scriptures. The numbers 7 and 12 are often noticed, and in answering the Pharisee, who asked him "Which is the great command-" ment in the law? Jesus said unto him, thou shalt " love the Lord thy God, with all thy heart, and with " all thy soul, and with all thy mind." (Matt. xxii. 36, 37). And again, "Hear O Israel, the Lord our God is " one Lord; and thou shalt love the Lord thy God, " with all thy *heart*, and with all thy *soul*, and with all " thy *mind*, and with all thy *strength*. This is the first " commandment, and the second is like unto the first." (Mark xii. 29, 30). These four aspects of human nature had not then been analysed by men of science, nor have they yet been clearly defined and explained by psychologists and physiologists, as we shall see in our biology.

We mention this to show that spiritual illumination extends from one world to another, as well as natural illumination, and that spiritual gravitation (or attraction and repulsion) is as positive a link of individual and collective being in the universe, as natural gravitation, cohesion and affinity.

The laws of number, order, weight, and measure, are not limited to physical phenomena alone; they rule in

spiritual phenomena just as uniformly; and the interpretation of these laws will enable us to discern truth from fiction, order from chaos, in all parts of the creation in which the perfect forms of law and truth are manifest in the revelations of creative thought and will.

Natural and spiritual gravitation and illumination, are, then, necessary characteristics of infinite and finite community; fundamental principles of nature, and primary factors of ontology.

Equivalent Permutations.—Equivalent permutation is a necessary characteristic of the principle of equilibrium; and the main distinctions of physical organic permutation are those of *versatility, permiscibility, permutability,* and *convertibility.* We need not explain the meaning of the word versatility, or mechanical change of motion and position. Permiscibility is seen in the solution of solid substances in liquids, such as that of salts in the sea, sugar in water, and in numerous other well-known instances. Permutability is manifest in water changed into the form of solid ice, soft snow, or invisible vapour, without undergoing any change of chemical composition. The word convertibility is applied to changes of heat, light, electricity, and gravitation, as correlative modes of motion.

Permutability is, then, characteristic of unstable states of equilibrium in physical phenomena. Composition and decomposition would be impossible, without change; creation and destruction, incarnation and decarnation, would be impossible. Alternations of existence from the visible to the invisible world, could not occur. Animals could not draw subsistence from vegetables, and these, again, could not draw nutriment from inorganic elements, if permutation were merely an accidental, and not a permanent possibility of being.

There are, however, limits to this principle, as well as

to all others, or they could not co-exist together in organic unity and harmony. By limits, we mean regulative laws and conditions.

The persistency and convertibility of forces are already recognized as principles of science. Heat, light, electricity, and gravitation, as *modes of motion*, have been proved to be convertible with one another. Physical force is not different from itself, in any sense of power, but varies in its modes of manifestation. It persists in the amount of work, in which its different modes of action are exact equivalents; just as arithmetical fractions are the same in amount, however much they may be modified in form, by rules of permutation.

Modes of motion are convertible in physical force. They are also convertible in other kinds of force; instinctual cannot be converted into physical force; but one mode of instinctual motion may be converted into another; one mode of mental motion may be converted into another; one mode of spiritual motion may be transformed into another; love may be converted into hatred; friendship into rivalry; anger into placidity; gladness into sorrow. Modes of thought may be changed from one to another. Opinions may be changed in the same mind; an erroneous view may give place to a true one; an arithmetical operation may be transformed into an algebraical operation; and numerous other modes of mental action may be converted one into another; but all the modes of motion in the mind, and all the permutations of these modes of motion, will still be mental force in action; and the same amounts of energy in any modes of motion, will be exact equivalents for one another, just as physical forces in all conversions are exact equivalents of working power.

Instinctual modes of action are equivalent in like degrees and forms of permutation. We have only to

look for proofs of this in the animal kingdom. The instinct of self-preservation is one of the strongest in nature, and yet we frequently see it transformed into very opposite modes of action. A hen, with her brood of chickens, will face a dog or a fox which threatens to destroy them; left to herself, at other times, she would run away from such an enemy with an equal amount of energy converted into fear, and manifested in the form of rapid flight. Maternal affection has transformed the instinctive impulse. Fear and courage, then, are opposite, and equally energetic modes of instinctual motion. One may be habitual in one tribe of animals, and the other in another; but they are evidently convertible in the case of a timid hen, made courageous by maternity, while it would probably require a flash of lightning or a thunderstorm, an earthquake or volcanic eruption, to convert the courage of a lion into fear. It is, however, said that disappointment in a first attempt to fell his prey, turns a tiger from his fierce destructive rage, into a state of cowardly retreat. Observe two hungry dogs of equal size and strength at play together, and throw a bone between them; you would probably see how rapidly the instinct of playfulness could be converted into a very different mode of action, by the instinct of self-interest or self-preservation. Many facts are patent, which show that instinctual modes of action may be converted one into another, but nothing that we know of, has ever proved that one kind of force could be transformed into another kind of force.

Different kinds of forces are not known to be convertible, but modes of action are convertible in every kind of force; and this is what we mean by permutation, in the modes of motion of all kinds of forces. This principle, as far as we can ascertain by observation and experiment, is universal. It must exist in all states

of being, natural, supernatural, intermediate, and ontological. In the latter, it is a potentiality, while in all experiential worlds it is a phenomenal reality. As an eternal factor, it accompanies all souls in their migrations from one world to another, as well as in their alternating states of being in each world.

Change of state, however, is not annihilation. Spirit cannot be transformed into matter; something cannot become nothing. Force cannot be destroyed. Water, ice, and invisible vapour, are still water; oxygen and hydrogen are still indestructible elements of matter; instinct, mind, and spirit, are still immortal forces, whatever be their modes of motion, and their states of being.

Rythmical Vibrations.—As infinite mobility is an eternal principle, so rythmic motion is a fundamental characteristic. The planets move in orbits round the sun; satellites move in orbits round their planets; the sun itself has limits of mobility in the universe, and all these limits are measured cycles of space, in rythmic periods of time. The rotation of the earth is a measured cycle of time, and that of every planet hitherto observed and analysed, is rythmic in its limits and proportions. Definite cycles of time and space, are therefore necessary characteristics of finite and of infinite mobility. And that which is evident in the cosmic universe, is also manifest in the epicosmic world; in the organic and the inorganic realms of nature. Although days and nights, winters and summers, months and years, are very different in the planets of our solar system, still the principle of motion which rules them all, is one of measure and proportion in every world, and in every correlative aspect of force and motion, space and time.

Rythmic cycles of existence are manifest in the natural career of every human being on this globe; the phase of embryonic life is regular and limited for every

animal, and the natural term of life is known to bear a definite proportion to the period of gestation. The embryonic and the natural terms of animal life are, therefore, measured periods of time, subject to variations and averages between extreme degrees.

These cycles are various for different forms of life; one insect is born to run its course and die, in a few hours; another runs a course of several days; others have weeks, or months, or years, as the allotted cycles of existence; but all are bound by limits which are regular for each species under favourable conditions. Embryonic cycles are relatively long in articulata, and short in vertebrata. Accidents of many kinds occur to interrupt this order, but averages, in the long run, reduce the interruptions to a measured scale of variation, retardation, or acceleration, as the case may be, and rythmic periods remain none the less, a constant factor of organic being, in the natural and lymbic worlds, whatever they may be in the invisible.

In the vibrational motions of our solar system, rythmic cycles are marked with a degree of regularity astonishing to all observers. The planets in their orbits travel through a given space, within a given time, with almost perfect uniformity. What their respective limits of existence may be, we cannot ascertain, but it is not irrational to suppose that they are designed and organized at first, to run a certain course of time, then fall into decay and be disorganized, as other finite organisms are known to be. It is also natural to suppose that large and small heavenly bodies, have different allotted times of existence, just as large and small organisms on our globe.

These periods are not within the limits of human observation, but the measured spaces of their orbits, and the volumes of their substances, are measurable quanti-

ties; and these are rythmical factors of sidereal order and association. On them astronomy is based, and no exact science can be grounded on any but immutable laws. We might bring numerous illustrations of organic rythms in nature, to warrant the present definition, but as every special branch of knowledge contains ample evidence of the fact, we need not dwell upon the legitimacy of the principle.

Many measured forms of rythm are modified by perturbations and by modulations which require attention, before their laws can be accurately ascertained. Rythmic motion is an element of being, but perturbation is a fact, and modulation is a principle of motion; so that limits and conditions co-exist with liberty of motions, and rythmic measure is coordinate with other factors of ontology.

The rotation and translation of heavenly bodies in their orbits, are quite distinct from gravitation and illumination, as modes of motion, in our solar system. The harmonies and discords of vibrational modes of motion are distinct from those of radiational modes of action; one is as different from the other, as the harmonies of music are from those of painting, in the principles of art. Physical modes of vibration have their harmonies and discords; instinctual modes of vibration have their harmonies and discords, as we have just now seen, in the instincts of animals; and the same may be said of mental and spiritual modes of action.

In dealing with questions of human biology and sociology, we shall have to analyse and systematise vibrational modes of motion in body, soul, mind, and spirit, but as these have not been thoroughly distinguished yet, by physiologists and psychologists, we have no familiar terms at our command to designate them here, without a previous analysis, and therefore

we confine our illustrations mainly to the limits of physical phenomena. Vibrational motions are known to extend to the utmost limits of our solar system, and we have every reason to believe that they occur in every system of the universe. In experiential human nature, music is one department of vibrational harmony and discord; linguistics is another; dramatics another; and methodics another. As these fixed laws of harmony and discord form the basis of the science of music, so there are laws of harmony and discord in the science of linguistics, in the science of dramatics, in the science of methodics. The characteristics of vibrational harmony and discord are necessarily absolute, and therefore we class them as a leading factor in the systematic scale of fixed principles, at the foundation of all knowledge.

In musical science this principle is already understood; in grammar logic and other branches of linguistics it is familiar to the scientific and the literary world; in dramatics it is less definitely recognised, and in methodics it is hardly thought of. We have already shown, however, that organic fractions are illustrated in the structure of the human body, and in all the realms of nature on our globe; and that organic method, evolutive method, statistical method, and experimental method, are based on principles of rythmical proportions and relations in cosmic forms and forces, as well as in epicosmic life and organization.

In physical nature, the forces and the laws of gravitation and illumination are acknowledged principles of science; attraction and repulsion are acknowledged factors of cosmological philosophy. In human nature, spiritual sympathy and antipathy, attraction and repulsion, are definite factors of psychological philosophy. The harmonies and the discords of nature are principles of being, just as laws and forces are principles. What

the laws of gravitation are to the forces of gravitation, the harmonies and discords of mobility are to the laws and forces by which they are produced and governed. Wherever there is force and motion amongst bodies or spirits of any kind, rank, or degree, in any world, there must of absolute necessity be either harmony or discord in the relationship. Relational harmony is therefore an eternal principle of nature. The experiential science of rythmical relations and revelations is mainly that of dialegmatics, including music, linguistics, dramatics, and methodics; and as the revelations of the word of life belong to this department of truth, we have a recognised means of testing the harmonies and discords of verbal communications, in all their depths of force and meaning. As far as we have been able to apply these tests, we find abundant evidence of ontological forms of thought beyond the limits of experiential science, when the word was given; and not only deeper than the science of those ages of evolution, but deeper than the knowledge which is now familiar to men of science, who are ignorant of the main laws of unity in nature. They could not think in the organic forms of thought revealed in scripture, nor clothe their views in natural symbols which convey at once concordant depths of meaning to four different *kinds* of understanding, namely, the natural, the poetical, the scientific, and the spiritual. Without a further evolution of the experiential sciences of biology and of dialegmatics, they could neither interpret the word in these four depths, nor understand the translation of meaning from one into another. This is manifest in many learned commentaries on sacred and profane literature. They do not understand as yet the ontological significance of organic numbers in the Word, nor the values of animal, vegetable, and mineral symbols of illustration. Nor can

these revelational factors of fundamental truth be thoroughly understood in all their fulness, until the principles of method and design in the creation and in revelation are more fully explained in the experiential sciences of methodics and biology.

The inspiration of secular poets is often but a reflex of revealed truths beyond the ken of the natural sciences of the period. In his "*Letters upon the Truths contained in Popular Superstitions*," Dr. Mayo makes the following observations: "In the tragedy of *Macbeth*, sensorial "illusions are made to play their part with curious "physiological correctness. The mind of Macbeth is "worn by the conflict between ambition and duty. At "last his better resolves give way, and his excited fancy "projects before him the fetch of his own dagger, which "marshals him the way that he shall go. The spectator is thus artistically prepared for the further working "of the same infirmity in the apparition of Banquo, "which, unseen by his guests, is visible to the conscience stricken murderer. With a scientific precision "no less admirable, the partner of his guilt, *a woman*, "is made to have attacks of trance *(to which women are "more liable than men)*, caused by her disturbed mind; "and in her trance the exact physiological character of "one form of that disorder is pourtrayed,—*she enacts a "dream*, which is the essence of somnambulism."

"One almost doubts whether Shakespeare was aware "of the philosophic truth displayed in these masterstrokes of his own art. The apparition conjured up "in the witch-scenes of the same play, and the ghost "of *Hamlet*, are moulded on the pattern of VULGAR "SUPERSTITION. He employs indifferently the *baser "metal*, and the truthful inspiration of his own genius, "realising Shelley's strange figure of 'A poet, hidden "in the light of thought,' as they say the sun is himself

" dark as a planet, and his atmosphere alone is the source " of light, through the gaps in which the common earth " is seen. I am tempted—but it would be idle, and I " refrain—to quote an expression or two, or a passage " from Shakespeare, exemplifying this wonderful turn " for approximating to truths of which he must have " been ignorant—where lines of admired and unaccount- " able beauty have *unexpectedly* acquired lucidity and " appositeness through modern science."

The "*baser metal*" of "*vulgar superstition*" is the part which in this case contained the "truths of which he must have been ignorant, where lines of admired and unaccountable beauty have unexpectedly acquired lucidity and appositeness through modern science;" and vulgar superstition is handed down to us by tradition from ancient religions, experience, and revelations. It is strange that Dr. Mayo did not perceive that the "truthful inspiration" of Shakespeare's own genius has acquired very little lucidity and appositeness through modern science, but a vast amount of obscuration from incompetent critics and commentators. It will be found that "vulgar superstitions," and "religious revelations," will acquire more and more "lucidity from modern science," as this advances in the physiological and the psychological branches of biology.

Laws of rythmical vibrations in the phenomena of motion, sensation, thought, and emotion are tests of harmony and discord, truth and falsehood, in all the modes of motion, of personal, social, co-ordinate, and ultimate dividualities of being; and a perfect knowledge of these laws will enable us to test the truths of all possible modes and degrees of revelation, in physical and spiritual modes of action. The sciences of biology and sociology, when properly developed, will thus be-

come important auxiliaries of theology in elaborate interpretations of divine revelation.

ORGANIC COMPLEXITY.—The very word organic implies complexity. Absolute unity of substance (unica substantia) is a mere negation of all difference and distinction between order and disorder, perfection and imperfection. It is chaos without God; matter without mathematical laws. We may conceive it as homogeneous substance in a passive state, but any kind of force and motion puts it into form at once, and different kinds of motion generate different kinds of combination and complexity. We need not dwell, however, on ideas of amorphic chaos, contrasted with organic unity and integrality. Whatever be the nature of ultimate atoms, we cannot detect them below the level of known substances, and these, at least, are very different from each other. More than sixty different simple elements have been already recognised, and this alone is one form of radical differentiation. There is complexity, then, at the experiential root of all matter.

The combination of these substances in all the realms of our globe, is another illustration of organic complexity in physical nature. Simple elements are diverse; proximate organic elements are diverse; complex elements of matter in milk, blood, eggs, and other substances are various in structure. Earth, air, and water, are compound unities of matter. Vegetable organisms are more complex than minerals; animal organisms more than vegetal, and human nature is more highly endowed than animal nature. Mathematical, physical, mechanical, dialegmatical, biological, and sociological, complexity, then, are manifest in phenomenal nature. Chaos may be conceived without complexity; structural combination cannot. Gradation and differentiation go hand in hand, as mathematical principles of order. What

then are the different degrees of complexity in physical, instinctual, mental, and spiritual nature? The atmosphere is less intimately compound than the water of the sea; both air and water are less compound than the geological strata of the earth; minerals are less complex than vegetables; these are less complex than instinctual organisms; the lowest types of animals and vegetables, less than the highest, and all are inferior to man in natural and spiritual complexity of organism.

Are there any beings more complex than human beings? more intelligent and powerful? We cannot doubt of this, when we reflect on the extent of our own ignorance and insignificance, feeling that the utmost we can get to know, by the persevering efforts and investigations of mankind, during successive ages, is merely a partial glimpse of those eternal principles of science, which have been known from all eternity, to God, and to His angels, in a higher world. The measure of our ignorance is that of our inferiority; the certainty of our inferiority is that of an unknown superiority of being, with power to know all that we do not know; do all that we cannot do, and which has been already done. Complexity is manifest in organic atoms of life, infinitely below that of humanity, and undeniable in organic beings infinitely above human intelligence; not in kind, perhaps, but certainly in degrees of power and comprehension. Our own globe as a complex unity of force, includes humanity with all its science; whether it be higher or lower in a certain sense, it is certainly more comprehensive and complex as an ultimate unit containing co-ordinate realms of vital organism.

We do not know how many kinds of force may exist above the order of humanity, but we can ascertain how many different degrees of power there are below

the rank of man. Mammals, birds, reptiles, and fishes, are inferior to man in the realm of vertebrata, and all the other realms on our globe are inferior to that. Different degrees of complexity are manifest in every kind of energy, and in every combination of different kinds, as far as we can ascertain, and therefore, we have every reason to believe that complexity is a necessary and essential characteristic of individual, social, co-ordinate, and ultimate organic unity.

Besides the fact of gradational complexity in each type of being, there is a question of dynamic depths of energy, or parallel kinds of force in unitary combination; and as this is obvious in numerous instances, it proclaims a principle of being, as definite as that of structural diversity.

Dynamic Depths of Being. — Are the forces of human nature different from those of universal nature? In man we find four kinds of immaterial forces, animating body, soul, mind, and spirit. These may exist in cosmic bodies, but they are not accessible to our experience. On our globe we have organic and physical forces embodied in vegetable organisms, apart from what is properly called instinct. In worms we see instinctual energies superadded to the physiorganic forces which alone were obvious in plants. The higher forms of animal life in dogs and monkeys, show us some degrees of mental and emotional depths of nature, added to the vegetable and instinctual degrees of life and organization. All the known *kinds* of organic forces are manifest in animals, but not in equal development, some being endowed with higher degrees of organization, instinct, intelligence, and affection, than others, while man is gifted with degrees of excellence in each kind of vital force, which far transcend those of all the higher animals. Immaterial forces, then, in animal and human

nature, are the same in parallel depths of kind, but not the same in comprehensive elevation of intensity.

In man we have an illustration of every known kind of force, and of every degree below the level of humanity. The hairs of our head, and the nails of our fingers, are parts of our body without feeling, just as stones and earth, grass and trees, are without feeling on the surface of the globe; and just as the whole earth is covered with a crust of inert matter, so the human form is clothed with a scarf-skin devoid of feeling. We know, however, that below the unfeeling matter on the surface of the human body, there are powers of sensation and of thought; but we do not know that there are parallel kinds of vital forces in the body of the planet. And if there be all kinds of vital energy in the cosmic orb, we do not know what degrees of intensity and power may be developed in these forces. Experiential methods cannot help us; our only hope lies in the assistance of organic and evolutive methods of investigation, if ever we are able to obtain conclusive evidence of the existence of organic, cosmic energies. We cannot converse with microscopic organisms infinitely below us in the scale of being; nor could we commune with beings immeasurably superior, if differently organised from ourselves. God Himself assumed the human form to speak to us. Nor is this principle incomprehensible; there may be consonant and dissonant degrees of life in nature; octaves in unison of communication, while intermediate degrees are not. Degrees of converse are very limited between different degrees of the same organic scale; between man and the inferior animals; between one human being and another in different states of development; between an infant and an adult; between one full grown human being and another; a man of much, and a man of no education;

an animal man of physical understanding only, and a human being of artistic, scientific, and spiritual understanding, not to mention the world of mystical experience and penetration.

The dynamic depths of life consist of different *kinds* of vital energy in each organism, and different *degrees* of intensity in each kind of vital force. And these are necessary characteristics of all superior forms of life.

In the personal unity of human nature, there are four kinds of immaterial forces, with different degrees of intensity in each; in the social unity of nations the same kinds are multiplied in power by collective organization and community, and as both personal and social humanity are parts of the co-ordinate realms, which are only subordinate parts of the globe, it is not absurd to imagine that depths of kind and intensity of degrees may be more complex in cosmic organisms than in epicosmic realms.

Distinct kinds and degrees of indestructible forces are obvious in minerals, vegetables, animals and men; in personal, social, and co-ordinate organisms, on our globe. The phenomenal existence of dynamic depths is certain then within these limits, and different degrees of force are manifest in the quantities and qualities, velocity and intensity of light, heat, electricity, and gravitation in the cosmic universe, as illustrations of a fundamental principle of life and motion.

We have now defined what we understand by the eternal principles and characteristics of all being, in contrast with the transient phenomenal manifestations of these principles and forces in experiential life.

Experiential science of all kinds can only become positive and accurate, axiomatic and certain, in so far as it distinguishes the absolute from the relative, the ideal from the practical. In mathematics, theory must ever

be distinguished from practice. A mathematical point, or line, plane, or solid, triangle, or sphere, are not to be confounded with practical constructions of these forms, which must always be imperfect approximations to the absolute truth of a mathematical axiom. The physical construction is necessarily imperfect; the metaphysical reality or ideality alone is perfect.

And so it is with the ontological and the cosmological aspects of biology. Experiential psychology is only an approximation to the ontological reality of being. The mortal is but the shadow of the immortal.

We know that forces are immaterial, and that all true science is ideal. From this there is but one step necessary to understand, that all eternal principles of cosmological existence are necessarily ontological. A glance at the following parallel of words will show that many of them could have no definite meaning on any principle of common sense and reason, but that of experiential imperfection, contrasted with ontological perfection.

Perfection.	*Imperfection.*
1. Immaterial ..	Material.
2. Immortal ..	Mortal.
3. Immutable ..	Mutable.
4. Metaphysical	Physical.
5. Noumenal ..	Phenomenal.
6. Absolute....	Relative.
7. Ideal	Real.
8. Real	Apparent.
9. Abstract	Concrete.
10. Theoretical..	Practical.
11. Positive	Empirical.
12. Axiomatic ..	Experiential.
13. Certain	Uncertain.
14. Science	Opinion.
15. Eternal	Temporary.
16. Ontological..	Cosmological.
17. Causes.....	Structures.
18. Principles ..	Things.
19. Laws	Facts.
20. Soul.....	Body.

Perfection.	*Imperfection.*
1. God.....	Devil.
2. Supernal....	Infernal.
3. Heaven	Hell.
4. Spirit	Matter.
5. Truth	Untruth.
6. Good	Evil.
7. Beauty	Deformity.
8. Use.....	Abuse.
9. Holiness....	Wickedness.
10. Wisdom	Folly.
11. Knowledge..	Ignorance.
12. Logical	Illogical.
13. Order	Disorder.
14. Regulative ..	Regulated.
15. Animating ..	Animated.
16. Living.....	Dead.
17. Creative	Created.
18. Creator	Creation.
19. Permanent ..	Transient.
20. Reason	Understanding

PRINCIPLE OF AUTHORITY.

In our general definition of first principles, we could only give an outline of the primary divisions of each factor; but the principle of authority deserves a little more attention, because it is an important element of social science, and should be duly recognized as a fundamental factor of organic unity.

We have only mentioned three distinctions of authority; namely, the relational, the organic, and the connective. These are subdivided in the following table:—

Analytic Synopsis of Organic Authority.

Connective authority.	Z. Controlling powers and influences. Y. Unitary institutions and constructions. X. Connective laws and regulations. W. Central authorities and privileges.
Organic authority.	VII. UNIVERSAL AUTHORITIES AND RIGHTS. 7. *Federal authorities and rights.* VI. NATIONAL AUTHORITIES AND RIGHTS. 6. *Municipal authorities and rights.* V. DOMESTIC AUTHORITIES AND RIGHTS. 5. *Corporate authorities and rights.*
Relational authority.	IV. LEGISLATIVE AUTHORITIES AND RIGHTS. III. POSSESSIVE AUTHORITIES AND RIGHTS. 2. *Personal liberties and rights.* II. EXECUTIVE AUTHORITIES AND RIGHTS. 1. *Protective authorities and rights.* I. CONSTITUTIVE AUTHORITIES AND RIGHTS.

To analyse these distinctions, would lead us too far into details, and therefore we must only notice some of them as exemplified in human society; neglecting altogether numerous other orders of organic unity in nature.

By *constitutive* authority and rights, we mean the authority of citizens to elect their legislative and other public representatives. This kind of authority resides in the steady adult population. Minors, paupers, idiots, and criminals, cannot be entrusted with electoral responsibility.

The *executive* authorities of government require no special definition to make them plain; and *protective* authorities, in the police, the army, and the navy, are equally definite and familiar. *Personal* liberty and responsibility involve the rights of activity, publicity, controversial independency, and private judgment, in all classes and conditions of life. *Possessive* authority involves, within due limits, the right to "do as you like with your own," with power to govern, improve, and dispose of your own personal and real property. *Legislative* authority needs no minute explanation here; and the limitations of *corporate*, *domestic*, *municipal*, and *national* authorities, are equally familiar to all civilised communities. *Federal* and *universal* authorities have never yet been properly constituted on our globe, but efforts have been made in this direction, and ultimately the religious, social, and political organization of the human race, will converge more and more towards universal intercourse and international community of law and order.

Universal, social, and religious unity is, at present, a utopian idea, practically useless, but not a theoretical absurdity. The present disunited state of all the races and the nations of mankind, is merely indicative of an embryonic stage of social evolution, analogous to that of the partially formed and disconnected organs of the individual body, in the womb, before they have been fully formed and brought together in cooperative unity. The human race collectively, may not be more advanced than an individual human fœtus, during the first months of its gestation; but the laws and principles of morphological evolution are just as positive and definite in one case, as in the other; and no philosophic mind, acquainted with the sciences of embryogenesis and sociogenesis, can question the rationality of the parallel, or the certainty of ultimate concerted unity, in the collec-

tive organism of humanity, as well as in the individual. We need not dwell on this point, however, to justify our distinctions of *relational*, *organic*, and *connective* authorities, as these are manifest in national communities.

Central authorities, *laws*, *institutions*, and *controlling powers*, are necessary factors of collective organism, in every community. A brief notice of these will be sufficient for our present purpose; but ordinary words and names are often insufficient to denote very comprehensive definitions; and that which cannot well be literally included in their common acceptation, must be so included by extension of the principles they represent.

Central authorities and influentials, properly so-called, are of four kinds, with four classes of each kind:

Social authorities	*Scientific.*	*Artistic.*	*Industrial.*
1. Prophets and seers.	1. Philosophers.	1. Poets, &c.	1. Inventors, &c.
2. Priests and healers.	2. Professors.	2. Actors, &c.	2. Engineers, &c.
3. Judges and lawyers.	3. Inspectors.	3. Critics.	3. Arbitrators.
4. Kings and rulers.	4. Governors.	4. Directors.	4. Managers.

The first class of distinction, in each of these four kinds, is that of the initiators of new laws and principles, which raise society from one phase into another, of metamorphic and perfective evolution. Prophets and lawgivers, seers and mediums, give new insights into social and religious principles, and bring about, in time, such changes in the constitution of political and ecclesiastical institutions, as are necessary for the progress of society. In all ages, those who are endowed with these peculiar gifts, profess to be the instruments of heaven,

and to receive their inspirations by direct communications from angels or spirits of a higher world, who are commissioned to make new revelations of religious truth, to our terrestrial humanity. The facts of history need not be controverted by those who believe that religious revelations are communicated, as the prophets say they are. No other explanation is equally simple and credible. There is abundant evidence, also, that such modes of communication are possible, even now, for those who truly wish for such experience.

The facts are otherwise with those who make discoveries and inventions of a lower order. These profess to be illuminated by a sort of intuition, or unconscious inspiration; and we have every reason to believe that this is true. Some kind of inspiration or intuition, is necessary for discovery and invention; and a special class of minds is endowed with the faculties of initiative revelation and illumination, in the religious, scientific, artistic, and industrial creations and evolutions of humanity.

When new discoveries and inventions have been made by the class of minds just mentioned, another class of minds diffuses and propagates the new discoveries. These are priests and healers for the social and religious duties of communities; professors and teachers for the diffusion of known principles and laws of science; actors and orators, literateurs and artists for the diffusion of new creations in the sphere of art; engineers and architects, mechanicians and constructors, for the generalization of new inventions, such as those of architecture and machinery, chronometers and instruments of precision, locomotives and steam engines, railways and telegraphic cables, implements of husbandry and manufacturing processes, not to mention thousands of useful inventions and contrivances, by which power is multiplied and

labour saved, in all the occupations and vocations of a social community.

When society is organised, and new inventions are generalised, collisions and misunderstandings happen daily amongst the different members of corporations, families and classes, and a distinct order of magistrates and judges, lawyers and jailors, are necessary to adjust these differences, and preserve the general peace of the community, by the administration of justice and discipline, for breach of duties and responsibilities.

Internal discords, however, are not the only perturbations which affect communities, for besides these internal commotions and continuous adaptations, there are external relations and collisions between national communities and independent governments, which require a still higher class of rulers to conduct the business of society, and regulate these international affairs. Kings and emperors, princes and presidents, consuls and pro-consuls, ministers and ambassadors, are the functionaries invested with the duties and responsibilities, rights and privileges, of this important factor of central authority, to which all others are in some degree subordinate, although necessarily distinct and measurably independent.

It is hardly necessary to dilate on the duties and responsibilities of these divisions of central authority, insomuch as they are known in history and every day experience; and new developments of perfection in each of these classes, will be noticed in a special treatise on sociology.

Religious revelations, new discoveries of science, new creations of poetry and art, new inventions of machines and instruments, are the providential gifts of God to man, through the instrumentality of prophets, philosophers, poets, and inventors; and when these are made known, they are applied to industrial uses by engineers,

architects, &c., to arts and recreations, by actors and orators, painters and musicians; to the scientific education of the masses (or to such classes of the community as have leisure and fitness for such studies), by professors and teachers in colleges and schools, of all descriptions and degrees of excellence; to morals and manners, health and sanitary purposes, by priests and physicians, nurses and visitors of the poor, inspectors of hospitals and prisons, cities and suburbs, roads and canals, rivers and marshes; and by all the officers of health and progress, in the social, religious, and political regulation of society. Laws and customs, canons of doctrine, æsthetics, and economy, are established as guides for judges and magistrates, inspectors, critics, and arbitrators, while questions of polity, scientific exploration, styles of art, and freedom of commercial intercourse, are the special business of kings and rulers, governors and universities, directors of theatres and academies, chambers of commerce, and arbitration, under the eye of public opinion and free discussion amongst all classes of the community.

The treasures of revelation, science, art, and invention are carefully preserved in scriptures and traditions, libraries and museums, galleries of art, and depôts of wealth and machinery; they are generalised and utilised in churches and colleges, theatres and marts of exchange; misunderstandings and jarrings of interest are adjusted in courts of justice, halls of discipline, academic committees, and committees of arbitration. Palaces, universities, academies, and boards of trade, represent the institutions of central authority. Above the duties and responsibilities, rights and privileges of prophets, priests, judges, and rulers, we recognise the transcendent influence of providential government, in giving or withholding inspiration, genius, prolification, and climatic conditions or vicissitudes, to any race or nation, in any

age or country, in the perfective evolution of humanity in its terrestrial career.

It is easy to perceive that the principles of authority are the same in every community, from the lowest to the highest degrees of organization. In the smallest family, the father is prophet, priest, and king; the secondary providence of his domestic kingdom; the mother is queen, healer, and consoler of her husband and her children. Parents are the natural oracles, teachers, judges, and rulers of the family, under the guidance of religious principles, and their own legislative understanding. Children without parents are desolate orphans, and a community without central authorities, courts of justice, churches and hospitals, theatres and concerts, schools and colleges, museums and galleries of art, markets and commercial intercourse, is a desolate community; whether it be limited to an inaccessible region, only, or extend to whole continents, such as Central Africa and Australia, at the present day, and formerly America.

Different forms of government, with the ranks and titles of established authorities in church and state, are secondary questions of organization and improvement, which we need not deal with here, since they vary with the progress of society. The institutions of a community vary with successive degrees of evolution, while the principles of unity and authority remain the same, in every stage of progress. Polygamy and promiscuity do not rank as perfect forms of marriage and domestic order, which is the simplest degree of social and religious unity; and numerous forms of imperfect, corporate, municipal, and national organization, precede the introduction of the highest types of social, religious, and political evolution.

DIVISION II.—PERFECTIVE PHILOSOPHY.

Besides the laws of number, order, weight, and measure, in the organisms of the natural world, and the metamorphic evolution of these organisms in the lymbic world, which give us respectively the factors of organic and evolutive philosophy, we have to look for the inner principles of cultural, perfective, educative, and regenerative processes, in the realms of nature. Have we any data within the reach of human experience which manifest these principles? We have abundant data, and the principles are very simple.

To cultivate unhealthy lands and make their climates healthy for man and beast; to cultivate wild plants and flowers, and make them beautiful or fit for food; to reclaim wild animals, and make them useful to mankind, as helps and regular supplies of food; to civilize ill-mannered and immoral human beings, and render them refined and moral members of society; these are the aims of regenerative culture, to be accomplished by the influence of perfective principles.

The culture of the earth, and of the animal and vegetable kingdoms, is the work of man, and ought to be his duty and his pleasure; but where are we to look for the culture of man himself, in his moral, mental, artistic, and industrial nature? Who is to show the ignorant and wilful savage that he ought to work and think, and "do unto others as he would that they should do unto

him?" How are the principles and operations of regenerative culture to descend through man into the realms of nature, under his control, unless they are implanted first into his own conscience, and become rooted in his will and understanding? And who but God can plant them in the human soul, with due authority?

Man is born ignorant and wilful, and where religious revelation and illumination do not reach him, he remains either a poor savage or a blind sceptic. We do not say unprincipled, because many sceptics form rules of conduct for themselves, by means of the reflected light of the society which surrounds them, and lead a steadier life in this reflected light, than some who may profess to be enlightened by religion. It is not, however, amongst sceptics that we are to look for the divine laws of regenerative culture and religion. We must consult the history of religious revelations and of civilized society; there we shall find that the principles of religion (not the doctrines) descend through the medium of inspiration, from the angels or messengers of Heaven to benighted mortals in the natural world. We shall find that sociogenesis is a distinct kind of metamorphic evolution, in parallel with that of embryogenesis, and that the history of inspiration and invention is the key to human progress and development, in every branch of social life and organization.

From the study of nature as we find it manifested in the *schematismus corporum* of complex organisms, we are led to track the evolution of these organisms from the beginning to the end of their terrestrial career; and from this investigation we are led to inquire whence came the internal factors of evolution? What is the invisible spirit of man? and what becomes of it when heard and felt no more? What is the object of man's life in this world? Is it a preparation for a better?

if so, what are the *principles* of spiritual evolution and perfective preparation for a home in the invisible world?

Are there any facts of history, which speak of regeneration, worthy of a serious investigation? We believe there are, and will give an outline of the known factors of human progress and perfectibility.

PRINCIPLES OF RELIGION.

> "Either make the tree and his fruit good; or else make the tree corrupt; for the tree is known by his fruit." (St. Matt. xii. 33).

That which is visible and mortal in man, (the body) corresponds to that which is visible and mutable in creation.

That which is invisible and indestructible in man, (the spirit,) corresponds to that which is invisible and immutable in the Creator. We cannot suppose it corresponds to nothing, comes from nothing, and returns to nothing. Anthromorphic theism, then, with perfective doctrine, and cosmic atheism, without perfective doctrine, are opposite views of religion and philosophy.

We need not dwell on negative views of God, which lead to moral anarchy and fear of death, but search the annals of religious faith and progress for the data and principles of perfective philosophy, which includes the sciences of physical and industrial perfectibility; instinctual and artistic perfectibility; mental and scientific perfectibility; spiritual and religious perfectibility.

The data and principles of religion include all known forms of faith and worship. We need not question the legitimacy of any form of faith, but try to understand the uses and abuses of religion, and the pro-

gress of the human understanding, in successive ages. The Gospel is undoubtedly the highest revelation of the Word of God. That is to say, the ultimate of spiritual truth, as mathematical science, is the final test of natural truth. In reviewing the history of natural and revealed religions, we do not place them on a footing of equality. We believe the Christian religion to be as much superior to others, as the divine humanity of Christ is superior to our common humanity. "Man is the measure of all things," and the perfect man is the perfect measure of all things. We have no difficulty, therefore, in believing that the Divine Logos, the perfect truth, the Word of God, was made flesh in the person of our Lord Jesus Christ; and the author of "Ecce Homo," will find no difficulty in this belief, when acquainted with the principles of perfect goodness, truth, beauty, and use, personified in the divine humanity. Moreover, the Divine Logos is made flesh in every living creature, as far as divine wisdom is manifested in the creation.

Physical nature is a revelation of eternal laws of order, and, as such, is a sufficient basis for natural religion. Instinctual nature and the phenomena of lymbic evolution, are revelations of mysterious forces and eternal laws of life, and as such, form a sufficient groundwork for the heathen religions, and their theurgic faith. Mental nature and the intuitions of the human mind, are a sufficient revelation for the religion of Deism, and the faith which recognizes the existence of divine intelligence, as the Creator of the universe. Spiritual nature and the revelations of the word of spiritual truth, are still higher and more satisfactory principles of faith and knowledge; and therefore we recognize four distinct kinds of revelation and religion in the world, equally legitimate, in fact; equally consistent, when

fully explained; but not equally luminous in the human mind.

Spiritual revelation and religion are higher than mental intuition and Deism; intuitive faith may be higher than delphic oracles and polytheism; while the so-called "spiritual manifestations and communications" reveal many forces and phenomena with regard to the mysterious existence of invisible beings, which are not revealed in the visible universe; and, therefore, theurgic faith and religion are superior to natural revelation, and the worship of sun, moon, and stars. It requires no profound reflection to understand that finite suns and stars are only physical revelations of omnipotence, to us, because we do not know whether they are endowed with life, or not; the living forces of animals and plants on our globe, reveal something more than physical aspects of omnipotence and design, in the creation, while human beings are still higher manifestations of intelligence; and the very highest comprehensible revelation of divine perfection, in all the known depths of spiritual nature and of Deity, are seen in the divinity of the "Son of Man." The magnitudes of suns and stars are only finite measures of physical splendour and magnificence; the magnitudes of men and angels are finite measures of spiritual splendour and divinity. The "Light of the Spiritual World" is much more gloriously luminous than the light of the natural sun.

All truth is one, however, in the mind of the Creator; and will ultimately become so, in the mind of man; meanwhile the human race has been gradually brought into the temple of religious truth, through the natural, the instinctual, the mental, and the spiritual portals of revelation. We must recognize all this in the data and principles of religion, natural and revealed.

Religion, however, as commonly defined, is but a part

of human nature, while the factors of perfective philosophy include all kinds of inspiration and invention, discipline and progress in society. We must therefore extend the meaning of the word, that it may comprehend all the leading factors of social, political, and religious evolution. The following synopsis will give a general idea of the leading factors of perfective evolution:—

Factors of Perfective Evolution.

Connective Factors.

Z.	Pre-existent factors.	1. God (transcendent deity.) 2. Angels in spiritual world. 3. Spirits in lymbic world. 4. Men in natural world.
Y.	Perfectible realms.	1. Inorganic realms. 2. Mixt realms. 3. Organic realms. 4. Human realms.
X.	Progressive revelations.	1. Inventions. 2. Poems, &c. 3. Sciences. 4. Revelations.
W.	Initiative revelators.	1. Inventors of mechanism. 2. Poets and artistic creators. 3. Philosophers & discoverers of science. 4. Prophets and lawgivers.

Organic Factors.

VII.	SUBCREATIVE SOCIETIES.	1. Industrial societies. 2. Artistic societies. 3. Scientific societies. 4. Social and religious societies.
7.	*Hierarchal classes.*	1. Industrial classes. 2. Artistic classes. 3. Scientific classes. 4. Social and religious classes.
VI.	EDUCATIVE SCHOOLS.	1. Industrial schools. 2. Artistic schools. 3. Scientific schools. 4. Social and religious schools.
6.	*Regulative disciplines.*	1. Industrial disciplines. 2. Artistic disciplines. 3. Scientific disciplines. 4. Social and religious disciplines.

Factors of Perfective Evolution—continued.

Relational Factors.

- V. PERFECTIVE PRINCIPLES.
  1. Economic principles.
  2. Æsthetic principles.
  3. Philosophic principles.
  4. Social and religious principles.
- 5. *Investive ordinances.*
  1. Industrial ordinances.
  2. Artistic ordinances.
  3. Scientific ordinances.
  4. Social and religious ordinances.

- IV. PENETRATIONS.
  1. Into natural facts and laws.
  2. Into lymbic facts and laws.
  3. Into spiritual facts and laws.
  4. Into ontological laws and forces.
- III. DISCRIMINATIONS.
  1. Of literal texts and meanings.
  2. Of poetic similes and sense.
  3. Of mystic correspondences.
  4. Of ontological principles.
- 2. *Doctrines.*
  1. Of political economy.
  2. Of Æsthetic taste, &c.
  3. Of philosophical induction.
  4. Of divine providence.
- II. MISSIONS.
  1. Of industrial propaganda.
  2. Of artistic propaganda.
  3. Of scientific propaganda.
  4. Of religious propaganda.
- 1. *Communions.*
  1. Of industrial intercourse.
  2. Of artistic intercourse.
  3. Of scientific intercourse.
  4. Of religious intercourse.
- I. LIMITATIONS.
  1. Of industrial communities.
  2. Of artistic communities.
  3. Of scientific communities.
  4. Of religious communities.

The pre-existent factors of perfective evolution need no elaborate explanation. Imperfect worlds must exist before they can be improved; and perfect principles must exist, to improve imperfect organisms. Men, spirits, and angels, are imperfect creatures: God is perfect. Perfectibility, therefore, consists in the gradual

approximation of the creature towards the perfection of the Creator; that is to say, creation is the first step out of chaos into order, and regeneration is the ascending process of perfective evolution, from original imperfection to final destiny, in relative perfection.

The perfectible realms of nature on our globe are easily defined, and man himself must be improved in all his faculties, before he can improve the climates and the lower animals entrusted to his care. Improvement is thus a work of gradual progression, in which the higher act upon the lower orders of creation. According to all probability, God inspires most powerfully the highest angels; these instruct good spirits, who in their turn, inspire men of genius with new thoughts and feelings, which elevate the human race on earth, and give it power to improve the realms below it, in the order of progressive evolution.

We need not dwell on the manner in which man improves animals, plants, and climates, by culture and breeding, but inquire into the means by which human nature and society are gradually refined and organised by religious revelations, scientific discoveries, artistic inspirations, and industrial inventions. Whence does man derive his new ideas? What are the meanings of the words invention, inspiration, intuition, revelation? Either directly or indirectly, God inspires man with new thoughts and feelings. Sun, moon, and stars speak visibly of the Creator, and according to religious traditions, angels and spirits are commissioned to inspire the prophets and law-givers of the race with new ideas of social, moral, and religious truth and discipline; according to philosophers, deity excites new thoughts in man, by the invisible means of direct intuition or inspiration; we believe both modes of inspiration not only possible, but real. Whichever mode of revelation is employed

at any given time, in any given case, it is clear that inventors, poets, philosophers, and prophets, are the instruments of providence in the successive creations of useful industrial mechanisms, beautiful artistic poems and works of art, new discoveries of truth in science, and progressive revelations of religious laws and disciplines. By these means human societies are gradually organised and civilised.

Societies are industrial, artistic, scientific, and unitary, and as these societies cannot be organised and civilised at once, they are gradually formed into different communities, and into different classes in each community. Perfective civilization thus descends from one class and generation to another in each nation, and spreads from one race to another on the globe.

The education of all classes is provided for in schools of industry, art, science, and religion, in which individuals are improved by disciplines of usefulness, refinement, truthfulness, and goodness.

The perfective principles of society are those of industrial economy, artistic æsthetics, scientific philosophy, and spiritual religion; and the consecrative ordinances of society, are those which recognise the fitness of certain persons for the habitual exercise of industrial, artistic, scientific, and religious functions, and invest them with the rights and dignities of their vocations or professions, in corporate, domestic, municipal, and national ranks and distinctions. Priests and doctors, professors and teachers, officers and soldiers, artisans and manufacturers, merchants and bankers, architects and engineers, lawyers and advocates, judges and magistrates, legislators and administrators, kings and rulers, are functionaries of society, requiring to be duly educated for their respective callings, and duly authorised to hold the ranks to which they are entitled. The religious

ordination of priests, and the consecration of marriage, are not the only social and religious consecrations of individuals to particular functions and responsibilities; for every state and calling is responsible to the community for the due performance of duties, and the due observance of laws, and should be publicly invested with the ranks and titles which naturally belong to them. This is recognised in fact, but only a few of the responsible vocations of life are consecrated by religious ordinances. Baptism and marriage, the ordination of priests and the consecration of kings, are thus established, while titles of nobility, military rank and university degrees, diplomas of artistic and scientific dignity, as well as the different grades of industrial vocation, are conferred by simpler modes of investation; the duties and responsibilities of life are noble in every useful rank and vocation, although the abuse of power, or neglect of duty, are not equally injurious in all cases, and therefore some duties and responsibilities are deemed more sacred than others.

The relational factors of perfective evolution are those of natural limitations, communications, missions, doctrines, discriminations, and penetrations into the depths and extensions of natural and spiritual laws and principles. In the history of successive ages, we find various degrees of limitation and extension of industrial communities and crafts, artistic vocations and creations, scientific relations and discoveries, religious creeds and communities; various degrees of industrial and commercial intercourse between different communities and races, not to mention artistic, scientific, and religious intercourse and mutual relationship; different degrees of zeal and energy, in sects and nations with regard to civilizing missions of propaganda, to spread the influence and beneficence of superior principles and practices of

art, industry, science, and religion; different degrees of doctrinal development with regard to the truths of economy, the principles of art, the inductions of philosophy, and the revelations of religious laws and principles. Various degrees of understanding and discrimination with regard to the interpretation of natural and spiritual phenomena; with regard to literal texts and meanings in the written word of revelation and tradition, poetic similes and parallels, mystic correspondences, and ontological principles; different degrees of penetration into the facts and laws of natural phenomena, lymbic phenomena, supernatural phenomena, and ontological perfection.

We need not dwell on the industrial, artistic, and scientific aspects of all these questions of perfective evolution, but the social and religious aspects are worthy of some further notice, for without religious faith, society can neither be well organised, nor steadily maintained in the paths of progressive civilization. Sceptical philosophers may make discoveries in experimental science, but they can neither organise nor civilise a race of human beings. In studying the history of humanity, we shall find that prophets and law-givers, apostles and evangelists, are the authors of traditional scriptures, which profess to be a sufficiently faithful transcript of revelations, given by the living prophets of the Word. We need not discuss the sacred books of heathen nations, as the Christian gospel is to us, the final revelation of regenerative principles; and all religious controversy worth attention, is, that which deals with spiritual truths, not that which turns the mind from the principles of redemption to the literal accuracy or inaccuracy of the original or translated texts of scripture. As far as science can interpret the laws of nature, these agree

with spiritual truths, and thus one divine revelation corroborates the other.

Perfective evolution must reach all the depths of human nature, or it cannot be integral. The eternal principles of use, beauty, truth, and goodness, are the ultimate authorities of all religion, and these are revealed in scripture and in nature. Spiritual revelation is no doubt pre-eminently religious, but the principles of scientific truth and revelation, artistic beauty and revelation, industrial uses and revelations, are also factors of religious integration and regeneration. And these are represented by classes and professions which are not ecclesiastical alone, but social and political, scientific and industrial.

Prophets, priests, judges, and rulers are the religious and social authorities of perfective evolution and regeneration. Philosophers, professors, governors, and censors, are the central authorities of perfective scientific evolution, with regard to truth; poets and artists, actors and orators, academicians and critics, are the natural authorities of perfective evolution and improvement, with regard to art and manners, taste and beauty, of all kinds; inventors, engineers, and architects, industrial and commercial managers and directors, referees and arbitrators, are the legitimate authorities of progress and perfectibility in the physical and industrial sphere of social thrift and comfort, cleanliness and comeliness, in all the classes, families, and individuals of a nation. Religious hierarchy is not simply spiritual, then, but integral, in regenerative faculty and function. It embraces all the depths of human nature, or it could not thoroughly regenerate the individual and social integrality of man.

Inventors, poets, and philosophers, may think they have nothing to do with religion, properly so-called, but

we hold it to be a mistaken view. Kings and rulers, professors and actors, may think that they are free from religious responsibility and duty in their callings, but they are not. Religion means collective unity and progressive regeneration, and this means integral perfective evolution for the human race collectively and individually. We need not discuss the point, however, beyond showing why these authorities and functions are central and co-operative factors of perfective evolution. The spiritual nature of man is, nevertheless, the deepest and the highest, and therefore it is better entitled, as a representative part, to stand for the whole, than any other part. Still it is but a part of social and religious duty and responsibility, authority and unity.

Bishops, priests, deacons, and elders, are leading grades of ecclesiastic hierarchy; doctors, masters, bachelors, and teachers, are recognized degrees of hierarchal order in the schools of science. Degrees of rank are recognized in art, but not with much consistent hierarchal order; different grades and orders are also practically known in trade and commerce, though not in systematic parallel with social and religious, scientific and artistic, ranks and titles.

The four kinds of central authority, and the four classes in each kind, are thus defined as connective and unitary or religious authorities.

Religious Discipline.—Perfective discipline should be able to generate social, scientific, artistic, and industrial sincerity, truthfulness, urbanity, and punctuality, in all the mutual relations of individuals, families, corporations, and communities; and this, by general consent, just as musical discipline begets willing obedience to the laws of musical precision, in all who agree to play a part in orchestral, or in choral harmony.

Religious worship consists mainly of prayer and praise,

instruction and exhortation. The forms of worship may vary in different congregations, while the fundamental principles remain ever and essentially the same.

Regenerative Principles.—These are mainly spiritual, and cannot be more simply or lucidly explained than in the words of our Lord: "A new commandment "I give unto you, that ye love one another; as I have "loved you, that ye also love one another. By this "shall all men know that ye are my disciples, if ye have "love one to another," (St. John xiii. 34, &c.); "there-"fore all things whatsoever ye would that men should "do to you, do ye even so to them, for this is the law "and the prophets." (Matt. vii. 12.) "Ye have heard "that it hath been said, thou shalt love thy neighbour "and hate thine enemy. But I say unto you, love your "enemies, bless them that curse you, do good to them "that hate you, and pray for them which despitefully "use you, and persecute you; that ye may be the chil-"dren of your Father which is in heaven; for he maketh "his sun to rise on the evil and on the good, and sendeth "rain on the just and on the unjust. . . . Be ye there-"fore perfect, even as your Father which is in heaven is "perfect." (Matt. v. 43, &c.) "Then one of them "which was a lawyer asked him a question, tempting "him, saying—Master, which is the great command-"ment in the law? Jesus said unto him, thou shalt "love the Lord thy God, with all thy heart, and with "all thy soul, and with all thy mind; this is the first "great commandment. And the second is like unto it; "thou shalt love thy neighbour as thyself. On these "two commandments hang all the law and all the pro-"phets." (Matt. xxii. 35, &c.)

These are the principles of spiritual regeneration, by which man is newly created and born again; his understanding being raised from the natural into the spiritual

world of life and wisdom. They need no explanation; but we may repeat, that experiential psychology has never yet been as completely known to man, as these words show that human nature was known to our Lord. The text, according to the Gospel of St. Mark, chap. xii. verse 29, &c., stands thus. "And Jesus answered him, "the first of all the commandments is, Hear, O Israel, "the Lord our God is one Lord. And thou shalt love "the Lord thy God with all thy *heart*, and with all thy "*soul*, and with all thy *mind*, and with all thy *strength*, "this is the first commandment. And the second is "like; namely, thou shalt love thy neighbour as thy-"self. There is none other commandment greater than "these." Here we have a systematic allusion to body, soul, mind, and spirit, as distinct energies of human nature, in each of which God must be recognized and loved, with all the *heart* of the spirit; with all the *soul* of the instinct; with all the *mind* of the intellect; and with all the *strength* of the body, or the energy of practical life in society. How comes it that these definitions are so accurate in the word of revelation, when even now, so many centuries later, they are beyond the ken of experiential science? Can psychologists point to a complete analysis of each of these kinds of energy in human nature? And will they not feel inclined to say that the words are merely pleonasms, used to impress the mind with one idea, in a variety of forms? We shall see in our biology, that no redundancy of any kind can be detected in these words, which show that revelation is, scientifically, very much in advance of human science. The laws of organic unity, so little known to science, are everywhere mentioned in the Scriptures, and proved to be identical with those of nature, as far as experiential science has been able to penetrate into the laws of order, number, weight, and

measure, in physical, instinctual, mental, and spiritual organisms. The text shows that integral human nature is involved in the principles of perfective regeneration; and that goodness, truth, beauty, and utility, are included in the commandments of the word. It is not without good authority, then, that we include the social, the scientific, the artistic, and the industrial vocations of life and progress in the definitions of religious duty and perfectibility.

It is easy to understand that the animal propensities of man lead him into all kinds of ignoble selfishness, and injustice to his fellow-creatures; and that, unless he can be regenerated, he cannot become fit for life in heaven. He must be "born again," to be redeemed from the original sin of imperfection. If a man lives as an animal, and dies as one, he must expect the future of an animal. If he cannot live a spiritual life in this world, what can he expect in the next? "As the tree falls, so it lies." But, as Christ descended into hell, to redeem lost spirits, we have no doubt that God can redeem lost spirits, in another world, where tribulations may be awful, though hope is not entirely lost. It is not a matter of indifference, then, to human beings; nor an obscure question, difficult to understand. We all know what is meant by the principle, "do unto others "as ye would they should do to you; do good to them "that hate you and despitefully use you; be ye perfect, "even as your Father which is in heaven is perfect." The spirit knows these words; the animal says, "wait, wait," and puts off the work of repentance; until some great calamity arises, to shake the soul to its innermost depths of consciousness, perhaps on the scaffold, or in the jaws of death.

Mistranslated texts of scripture, and the literal discrepancies of tradition, do not throw doubt on the abso-

lute certainty of regenerative principles. We all know that a human animal is not a man. The weakness of the soul in alliance with the animal nature, is nevertheless well known to God. What then are the means provided for the initiation and sustainment of the spirit in a new born life? These are what are called the sacraments, by which man is led into the church and sustained in his religious life.

But why should not the natural man have been created perfect without the intervention of regenerative principles? The social evolution of humanity as a collective organism, follows the same law of progression from an imperfect commencement to an ultimately perfect organization, as the embryonic evolution of an individual organism, from the imperfect homogeneous elemental structure of the ovum, to the perfect complex organic structure of the human body.

The beginning of all creative evolution, as far as we can observe, is from a simple chaotic state of imperfection to the final realization of a perfect and a predetermined plan. Revelation and regeneration are progressive in their unity. Shiloh, the "Prince of Peace," is promised in Genesis. The first law is given in the Ten Commandments; the second law is written in Deuteronomy; the third law is written in the Gospels: not three laws, but one law.

Regenerative sacraments are necessary to impress mankind with the consciousness of religious duty and integrity. By baptism we become members of the church, and are initiated by continuous education into the principles and disciplines of christian life. And it is worthy of note, that John the Baptist, the forerunner of our Lord, in the establishment of the new dispensation, was the institutor of this sacramental rite. Just as the final revelation was preceded by initiative dispensations,

and sacramental forms of religion in the world, so the Living Word was introduced by a forerunner, as a type of the whole course of divine government and providential education. "Repent, for the kingdom of heaven is at hand," is not an idle sound, or useless preparation for the coming of the Lord into the soul of man; for unless we repent, He cannot enter in. Violence is not an attribute of the Lamb of God. The kingdom of heaven is always at hand for those who repent of their sins, and wish to be redeemed. For those who do not wish to be redeemed, the other kingdom is always at hand, for death is certain, and may come at any moment.

The eucharist is a sacrament instituted by the Lord himself, as a bond of communion amongst His disciples, and is still continued as a symbol of communion in the churches, where not much else is held in common by the congregations. It will no doubt, in time, have a deeper and more universal influence in the christian world, than it has at present. The habit of frequently approaching the Lord's table *alone*, and without the living spirit of communion with God and with the neighbour, is not enough for christian life; and some refrain from demonstrative habits and appearances in public, which do not correspond to the inward reality. Much attending to the forms and ceremonies of religion is offensively conspicuous, where the spirit of christian brotherhood and sisterhood is not so manifest. "By this shall all men know that ye are my disciples, if ye have love one to another."

The marriage vows are necessary to sanctify the union of the sexes, without which sanctification, there is no difference between animal and human nature. Conjugal love is heavenly love; promiscuous intercourse is animal, not human. A healthy body is an important basis for the regeneration of the spirit, and parents who

bring children into the world should know that they undertake the sacred duties of guardians to their children. The vows of marriage are mutual promises, with solemn pledges to God and to society, that they will faithfully and religiously perform these duties.

The consecration of a life to religious work, is also a sacramental devotion to God and to the neighbour; a sacrifice of self, in a worldly sense, to gain a higher spiritual life, as enjoined in the commandment: "Be ye perfect, even as your Father which is in heaven is perfect." All Christians who devote their lives and fortunes to works of charity and benevolence, consecrate themselves to religion, whatever be the work they undertake to do. Work is prayer, and the best kind of "prayer and fasting," is that which does good works, and abstains from useless and impure animal and worldly pleasures. All men and women who learn a useful art or trade to earn their daily bread, should understand that they devote themselves to daily labour, not for the good of themselves alone, but for that of their family and their neighbour. They are endowed by the Creator with natural vocations for work, and should consecrate their faculties to purposes of use, beauty, truth, and goodness. Ordination consecrates the priest, and pledges him to this religious duty to God and to humanity.

From this review of the leading principles of religion and perfective philosophy, we may proceed to notice some of their important applications. The characteristics of religious evolution are those of different revelations and degrees of influence in the world; propagative activity or indifference; progress or stagnation of doctrines and disciplines; tolerance and intolerance, persecution or non-interference in the spirit of controversy; comprehensiveness or narrowness of religious feelings and opinions; depth or shallowness of religious

penetration into the natural, theurgic, intuitional, and spiritual revelations and interpretations of religion; various standards of morality in different religions and communities; different laws and customs with regard to polygamy and monogamy; various degrees of religious discipline, and different forms of worship; strict or lax habits of integrity and truthfulness; honesty and dishonesty; piety and impiety; docility and indocility; authority and anarchy. Peculiar religious idiosyncracies in different individuals, races, and nations, in the manner of recognizing God, in nature and in revelation, and the consequent modes of organizing churches, and of civilizing populations. We need not dwell on the details of all these general characteristics of religion and theology, as a simple indication of their nature and diversity is all we need for present purposes, and the following table will show us at a glance, what are the main topics of investigation.

Characteristics of Perfective Evolution.

Unitary Characteristics.

Z.	God recognized.	1. In natural phenomena. 2. In lymbic phenomena. 3. In spiritual beings. 4. In ontological being.
Y.	Realms and species harmonized.	1. By culture of inorganic realms. 2. By culture of mixt realms. 3. By culture of organic realms. 4. By culture of human beings.
X.	Races and nations civilized.	1. In physical industrial qualities. 2. In instinctual artistic qualities. 3. In mental scientific qualities. 4. In social and religious qualities.
W.	Churches and societies organized.	1. Industrial organization. 2. Artistic organization. 3. Scientific organization. 4. Social and religious organization.

Characteristics of Perfective Evolution—continued.

Organic Characteristics.

- VII. POLITY OF SOCIETIES.
  1. Industrial polity.
  2. Artistic polity.
  3. Scientific polity.
  4. Social and religious polity.
- 7. *Modes of class distinction.*
  1. Industrial distinctions.
  2. Artistic distinctions.
  3. Scientific distinctions.
  4. Social and religious distinctions.
- VI. CONSTITUTION OF SCHOOLS.
  1. Of industrial schools.
  2. Of artistic schools.
  3. Of scientific schools.
  4. Of social and religious schools.
- 6. *Modes of discipline.*
  1. Of industrial discipline, &c.
  2. Of artistic education, &c.
  3. Of scientific education.
  4. Of social and religious education.
- V. GENIUS OF REVELATORS.
  1. Genius of inventors.
  2. Genius of poets and artists.
  3. Genius of philosophers.
  4. Genius of prophets.
- 5. *Modes of revelation.*
  1. Modes of invention.
  2. Modes of poetic inspiration.
  3. Modes of scientific discovery.
  4. Modes of religious revelation.

Relational Characteristics.

- IV. DEPTHS OF PENETRATIONS.
  1. Natural understanding.
  2. Poetical understanding.
  3. Mystical understanding.
  4. Ontological understanding.
- III. COMPLEXITY OF DISCRIMINATIONS.
  1. Natural complexity.
  2. Poetical complexity.
  3. Mystical complexity.
  4. Ontological complexity.
- 2. *Controversies of doctrine.*
  1. Economic controversies.
  2. Æsthetic controversies.
  3. Philosophic controversy.
  4. Religious controversy.
- II. PERMUTATIONS OF OPINION.
  1. Changes of economic opinions.
  2. Changes of æsthetical opinions.
  3. Changes of philosophical opinions.
  4. Changes of religious opinions.

Characteristics of Perfective Evolution—continued.

1.	*Modes of intercourse.*	1. Commercial and industrial. 2. Literary and artistic. 3. Scientific and experimental. 4. Social, political, and religious.
I.	Types of society.	1. Hunting tribes of savages. 2. Pastoral tribes of nomads. 3. Agricultural clans. 4. Industrial communities.

A few words of explanation for each of the definitions in this table, will suffice for our present purpose. God has been recognized in physical nature by the votaries of Baal, who worshipped the sun, the moon, and the stars. The Creator has been recognized in instinctual nature by the ancient Egyptians, who worshipped animals. Supreme intelligence is recognized by the Eastern nations, and by Deists, who adopt the principle of reason as the only trustworthy kind of religious revelation. The Chinese and the Japanese are examples of this kind. God is recognized in spiritual nature by anthromorphic monotheists, such as Jews, Christians, Mahometans, but the christian revelation is by far the highest dispensation of religion.

By the light of Christianity, all races of men will be fraternised; all heathen rituals purified; all religious doctrines reconciled, and all religious revelations harmonized.

There can be no doubt that churches are organized to convert all races which are capable of being civilized, and that these will take the place of those inferior races destined to die out, and disappear in time. The special work of churches is to humanize the instinct, rationalize the mind, and christianize the spirit of mankind. The christian nations cannot be said to be truly civilized, until all classes have been fairly

converted to a life of uses; the manners of all classes humanized; the opinions of all classes rationalized; and their morals christianized. Religion has, therefore, much to do before the churches can be fully organized, and the nations civilized.

The social, political, and religious polities of nations and communities, in past ages, and in different quarters of the globe, are factors of perfective evolution, variously unfolded and improved, as civilization and religion advance from a lower to a higher phase of understanding and refinement. We need not compare eastern with western nations to make this evident, nor dwell upon the contrast between Catholic and Protestant communities in Europe, at the present day. Nor is it necessary to notice at great length the significance of different modes of class distinction as manifested in the permanence of different castes, in India, and the accessibility of ranks and titles, to all kinds of useful energy, in England and in other western nations. Perfective progress is arrested by the one, and much facilitated by the other system.

Different constitutions and modes of discipline in schools of industry, art, science, and religion, are also most important characteristics of general education and perfective progress, in a nation, and only need be mentioned to be recognized at once, as leading factors of regenerative evolution.

The different kinds of genius in revelators of new modes of thought and feeling, are also leading factors of perfective evolution. The inventors of chronometers and weaving looms, steam engines and electric telegraphs, fire-arms and fishing nets, musical instruments and implements of husbandry, have different types of

intellect, which contribute to the general progress of society. Poets and painters, architects and sculptors, musicians and acrobats, actors and orators, also present various types of genius in their creations, which enrich humanity, and civilize society. Scientific discoveries of the laws of physical and biological phenomena, exhibit different types of mind in those who make them for the benefit of human progress; and the different kinds of genius which characterise prophets and law-givers in the history of the human race, are not less evident than those of inventors, poets, and philosophers. Moses and the prophets are different types of humanity in the same continuous dispensation, leading to the Gospel; Pagans and Mahomedans, again, have been led by different revelations in the progressive phases of social and religious evolution, showing us how much depends upon the nature and degrees of truth, revealed by different kinds of genius in the prophets and law-givers of a given race or nation, under the regenerative care of Providence.

We need not attempt to distinguish superior from inferior prophets, nor true from false heralds of religious progress; it is enough to observe that different kinds of intellect have influenced the race in this, and other departments of perfective evolution; and discriminate perfect principles of religion, from those which are imperfect, as we discriminate the truth of the Newtonian astronomy, from the errors and mistakes of the Ptolomaic system.

It would carry us too far to inquire minutely into the different modes of industrial invention, poetic inspiration, scientific discovery, and religious revelation, but a careful study of the question will show that these are very various, in different races and individuals. God works in a mysterious way, upon the hearts and minds

of men, and there are evidently "more things in heaven and earth, than are dreamt of in our philosophy."

Having glanced over the *unitary* and the *organic* characteristics of religion, we have still to notice those of perfective evolution in a sense which includes all countries, and all ages of the world.

Social and Religious Distinctions. — The most important distinctions are those of different denominations of revelation and religion. These we have defined in parallel with the different depths of human nature, to which God has appealed in each religion. The first is manifested in history, by the ancient worshippers of Baal, that is, the worship of the sun, the moon, and the stars, as revelations of God's laws and power, in the physical universe. The untutored races of mankind in Africa and in other parts of the world are still impressed mainly by this kind of revelation, and it is not yet practicable to give them much knowledge of a higher dispensation. It cannot be useless to such races, although it is mere idolatry for those who are more advanced.

The Parsees of India, who are perhaps the most civilized class of merchants and traders in some of the large cities (numbering from sixty to seventy thousand of the most wealthy citizens of Bombay), are still worshippers of the sun, as their ancestors were in Persia, before the Mahomedans conquered the country, and introduced a new religion. These Parsees, we are told, may be seen any morning (or on particular days) prostrate in thousands, on the beach, before sunrise, waiting to welcome and adore the rising sun.

Social and religious progress do not always proceed together; some of the earliest forms of religion survive long after the ruder forms of social and industrial habits have entirely disappeared. This is obvious, not only

amongst the highly civilized Parsees, who still adhere to the religion of Zoroaster, but amongst the equally intelligent race of Jews, who still adhere to the Mosaic law, in its pristine forms of rituals and cabalism. And why is this? Is it not because there is a real meed of truth in the religion, however much that truth may be obscured or undeveloped in its ancient rituals, and doctrinal degrees of evolution? Hunting tribes may become pastoral, or slightly agricultural and industrial, but they often remain savages, until they are supplanted by superior races. Pastoral tribes of nomads are not easily transformed into agricultural communities, nor easily converted from their primitive religions. Agricultural communities more easily become industrial and commercial, as we see amongst the Jews, but are not always easily converted to a new religion. Still, we may observe that, where the social progress of the race is not accompanied by a parallel religious evolution, there is a certain kind of "arrested development" which prevents the races who adhere to pristine forms of ritual and doctrine, from keeping pace with those nations which adopt the purest and most perfect forms of religion. Witness the Christians amongst all the nations of the earth, and the protestant nations amongst Christians.

Where untutored savages die out and disappear, along with their vile social habits and superstitions, supplanted by superior races, we have some perception of the laws of progress, and the plan of providential government, but where ancient forms of religion still persist, along with the most advanced forms of social progress, we are struck with the apparent strangeness of the fact, and are induced to ask, what can be the providential meaning of such a phase of human evolution? Can it be that the measure of truth

revealed in the religion of Zoroaster has been lost sight of, and confounded with idolatry, in the worship of the sun? We are very much inclined to believe that Mahomedans, Jews, and Christians, have made this mistake, and that Providence upholds this ancient form of religion, for the sake of final reconciliation and perfection; just as the Mahomedans continue some of the ancient laws of the patriarchs, lost sight of by the Jews; these again, some of the laws of Moses, ill understood by Christians; and in the christian world, the Roman Catholics uphold some forms of truth, but little understood, and more or less, completely overlooked and disregarded, by enlightened Protestants. As in the natural world, we find relics of extinct races of animals, so in the spiritual world there are traditions of extinct religions; and, moreover, some extant types, such as the elephant and the rhinoceros, seem more akin to certain extinct species, than to their living congeners, just as the Mosaic and Mahomedan religions seem more akin to extinct traditions than to living revelations. Extinct animals and religions, however, were no doubt useful in their day, and are still interesting facts of history and persistency of unprogressive forms of vitality.

As faith and wonder precede reason and science in the evolution of human understanding, it is perfectly natural that heavenly bodies, in their most sublime manifestations, should be regarded as exponents of supernal power. They are a divine revelation of eternal truth and beauty, but not sufficiently understood as such by Christians. And that is no doubt the providential reason of the persistence of sun worship amongst the otherwise civilized Parsees at the present day.

The sun, the moon, and the stars, however, are not the only revelations of divine power and wisdom in creation, and therefore other forms of revelation and

religion have been necessary for the perfective evolution of the human heart and mind.

The next step of progress has been shown in the religion of the ancient Egyptians, who recognized the will and power of the Creator in the instincts of animals, which they are said to have worshipped, as manifestations of creative design and intelligence, showing man the use of many things in nature, which otherwise he would not have known. The Greeks and Romans raised this idea of divine omnipotence, from the animal to the human altitude of creative power, and substituted hero worship for animal worship, in the polytheistic system of religion. Both the Egyptians and the Greeks had theurgic incantations in the mysteries of their religion; they had some kind of "manifestations," as oracles of authority. We need not puzzle ourselves to guess what kind of revelations they obtained from the lymbic world of departed human spirits, since we have a repetition of the same kind of phenomena, in the "spiritual manifestations" of American and European "mediums." And strange to say, some of the American spiritualists believe that they have obtained a new religion from the spirits, not only more or less in advance of sectarian theology, but of christianity itself; although nothing has been revealed to them to warrant such a view of their "communications." The only use of the modern manifestations, has been to bring to many minds a belief in the existence of a supernatural world, and thus to renew the ground-work of belief in the truth of the miraculous christian dispensation.

The next degree of revelation is that of *intuition*, by which human reason recognizes God in the nature of the mind. In some nations of the east, in China and Japan, for instance, the philosophical elucubrations of Confucius have been added to the mysteries of theurgic

manifestations, as the ground-work of religion. In Europe it is commonly called deism. It may be feebly manifested in some minds, and very strongly in others, who reflect more deeply on the marvels of creation, and are led to give expression to their thoughts in some such words as these: "When we think how wonderfully man has been adapted for his place, not only by material organization, but also as gifted with that *unseen* power of mind which enables him to think of the *Great Invisible*." Such reflections lead the mind to form spontaneous inductions with regard to the existence of a Supreme Creator and ruler of the universe, although unable to see the truths of revelation, as divinely inspired laws and precepts of religion. Deists may believe in the existence of an unknown God, while they are not believers in Christian divinity.

Monotheism is the most elaborate of revelations and religions, as handed down to us in the Old and New Testaments. Jews, Christians, and Mahomedans are anthropomorphic monotheists, recognizing God in spiritual nature, but the principles of regeneration are much more luminously revealed in the Gospel, than in the Bible and the Koran. We need not discuss the merits of the latter, any more than those of the polygamous institutions of the ancient patriarchs, since the christian Word is perfect, while other dispensations are transitory and imperfect, being given to imperfectly developed races, as a preparation for a higher aspect of the law, which is the Gospel.

Different races are unequally developed, and cannot penetrate the mysteries of nature with equal facility. All can recognize God in the physical splendour of the universe; a few can recognize designs of the Creator in the animal creation; others again recognize creative wisdom in mental nature, and the most advanced can

penetrate into the mystery of spiritual being and perfection. Not only different races are thus variously gifted with religious insight, but different individuals of the same race; and the same individuals, in passing from infancy to youth and maturity, obtain wider and deeper degrees of insight into spiritual truth.

Images and symbols of divinity are necessary to impress the minds of children before they can understand the abstract principles of being; and some adults, like children, want plastic symbols as aids to reflection. The abuse of such means of religious education, however, is apt to become injurious to the progress of the understanding, especially where ignorant populations, generation after generation, are without the Bible, and are not sufficiently taught the difference between internal sense, and mere external symbolism.

Religious Opinions and Discriminations.—With regard to questions of natural existence, lymbic existence, supernatural existence, and the ontological principles of being, opinions often differ widely, not only in different religions, but also amongst different sects of Christians. It is not our purpose to discuss these questions, beyond observing that they will have to be reconciled by the progress of enlightenment, as society advances towards a thorough understanding of scientific and religious truth; and that different degrees of education and of understanding in adults, as well as different phases of infancy, youth, and maturity, will always give some diversity of feeling and opinion on religious questions. The power of discrimination is not equally developed in children and adults, nor in different individuals of mature age, and therefore, difference of opinion may be always expected to exist where the powers of discrimination are so various.

The faculty of penetration obtains unequal degrees of

insight into the four depths of nature, and of revelation, while unequal degrees of discrimination cause difference of opinion, with regard to the interpretation of involved texts of scripture, and complex phenomena of nature. Absolute uniformity of doctrine and opinion on social, political, religious, and philosophical questions, therefore, is neither actually possible, nor perhaps desirable, as long as science is but partially developed, in all departments of knowledge, and the human understanding but imperfectly enlightened.

Religious controversies naturally flow from differences of opinion, and therefore we class them as necessary means of progress; for without controversy, opinions might remain for ever stagnant, and religious penetration in many minds would hardly descend below the surface of natural phenomena. Experiential philosophers of great logical acuteness, often refuse to investigate not only lymbic and supernatural phenomena, but even the ontological principles of being, which they confound with the abuses of metaphysical and theological speculation.

The discrimination of omnipotence, omniscience, omnificence, and omnipresence in Deity, and the necessary consequences of this discrimination, are often neglected by controversialists. The discrimination of ontological, supernatural, lymbic, and natural worlds, or aspects of existence, are also very often neglected or ignored. Different kinds of revelation in natural, lymbic, and supernatural phenomena, are overlooked; and different modes and states of being with their necessary concomitants of presentation and interpretation from a subjective or an objective point of view, are very often overlooked by controversialists and commentators on particular texts of scripture, or on different planes of revelation.

Modes of communication by voice or vision, intuition or inspiration; in dreams or in the waking state, in states of trance, or in the normal state; are not sufficiently discriminated. The permutations and vicissitudes of language and tradition, translations and interpretations, alterations and perversions, are not always thoroughly discriminated in religious controversies; not to mention the more simple contrasts between literal and figurative language and description; nor the complexity of mystical and symbolical allusions to ontological and supernatural aspects of being, and of perfectibility in the human soul.

Superstition and scepticism may be classed as the two extremes of this want of discriminative power and discipline, in the human mind.

RELIGIOUS CHANGES are not uncommon in the history of the world, and therefore we regard them as a part of the natural economy of progress. Revelational changes occur in the same stream of prophecy. Adam, Noah, Abraham, Moses, and the prophets, continue one line of revelation culminating in the gospel; and all the leading nations of the earth have left records of religious changes. Progressive change is therefore a part of the providential scheme of perfective evolution; and ritual changes are as common as revelational mutations in the different religions of the world.

Ecclesiastical reformations have been as frequent as political transformations, and as necessary as other modes of progress; and changes of doctrine must occur, where imperfect knowledge is supplanted by more perfect science. Changes are, however, of two kinds; organic and disorganic. Old things disappear to make room for new, and there is often painful experience in both kinds of necessity. Religious revolutions are often violent, as the history of religion testifies; they have,

nevertheless, been very necessary for the progress of humanity; and many changes may be yet in store for us, before christian principles can be reduced to practice, amongst the nations of the earth. New phases of religious evolution, and ecclesiastical organization, are not, however, new principles of divine truth, but new forms of development towards perfection.

Religious revelations are of various kinds, and some minds have more faith in one kind than in another. This renders religious intercourse very difficult between different sects and races. The natural creation is admitted as legitimate revelation by one class of minds; theurgic or spiritual manifestations are admitted by another; mental intuitions are deemed more important, by a third; while spiritual revelations are accepted as alone important by a fourth class of minds. All are true in their degrees of light; but the last is, above all others, truly a religious revelation. Many philosophers, however, puzzled by the literal discrepancies of scripture, rely on intuition as a safer guide for *their* minds, in questions of moral and religious faith.

One law of perfection is revealed alike, in natural, supernatural, mental, and spiritual phenomena. They do not contradict each other, but show the same truth in different aspects; more and more deeply revealing the eternal, as we proceed from the most external and physical, to the most internal and spiritual powers of the world and its Creator.

In the natural world, we find apparent contradictions in the wolf and in the lamb; and these are not attributed to human delusions and imposture; while apparent contradictions in spiritual revelation are supposed, by sceptics, to prove the impossibility of a divine origin. And yet the natural revelation is accepted, in perfect faith, and constantly interrogated by philosophers, while

the spiritual revelation is by them distrusted. It would be tedious to discuss the irrationality of such a prejudice; but a few short observations may be useful to some minds, which are puzzled with these differences of opinion. Let us analyse the meaning of the words Deity and Divinity; natural and spiritual revelation.

The words infinity, omnipotence, omniscience, omnificence, and omnipresence, are commonly used as definitions of the transcendent attributes of Deity, and these words are as necessary and as definite in ontology, as the words infinite and evanescent, are indispensable in mathematics. And just as definite limits and proportions, in measurable quantities and forms, are essential in the science of geometry, so definite limits and distinctions of perfection in Deity are indispensable in the science of divinity. What are the measurable degrees of spiritual perfection in Deity, but those which are revealed to us, in perfect or divine humanity? And where are these to be found but in the "Son of God," the spiritual "Light of the World," the Redeemer and Regenerator of mankind?

Our opaque earth revolves around the sun, which is one in nature with all the "fixed stars" of the infinite sidereal universe; and in parallel with this view of natural revelation, we may see that our terrestrial humanity has but one centre of divine perfection, which is one, in spirit, with infinite perfection.

The laws of finite gravitation and illumination are as necessary and as definite in the spiritual, as in the natural universe; and as the light of science (of visible nature and revelation) becomes more and more intense and luminous, it is found to be one in principle with the light of religion, (the science of invisible nature and spiritual revelation,) just as the reflected light of the moon proceeds from the very same source, as the direct

rays of the sun. And just as the natural light of the sun is anterior and superior to that of the moon, so the direct rays of spiritual revelation are anterior and superior to the rays of science, reflected from the facts and laws of the natural creation. The prophets foretell future events in the evolution of humanity, from a knowledge of the laws of spiritual motion and mutation, just as astronomers foretell future eclipses of the sun and moon, from a knowledge of the laws of natural motion and mutation; and the more we advance in our knowledge of astronomy and divinity, the more easily we understand the possibility of such foreknowledge, as a means of prophecy.

In accordance with the parallel between the direct rays of the sun, and the reflected rays of the moon, compared with the light of science reflected from the phenomena of nature, and the light of revelation, given direct from the spiritual "Light of the World," we may see at once, in reading Isaiah, for example, that these forms of truth are very common in the language of prophecy, given to the world long before the natural sciences had developed any such degrees of penetration.

In the thirtieth chapter of Isaiah, verse 26, are the following words:—"Moreover the light of the moon "shall be as the light of the sun, and the light of the "sun be sevenfold, as the light of seven days, in the "day that the Lord bindeth up the breach of his people, "and healeth the stroke of their wound."

Is it not easy to see now, that this language becomes much more luminously comprehensible when we understand in what manner the light of the natural sciences which interpret the laws and language of physical revelation, becomes one with the light of the organic sciences which interpret the laws and language of spiritual revelation? And can we not easily perceive that

the truths of natural science will be as the truths of spiritual science, when nature's laws are thoroughly explained; and that, in that day, the light of spiritual revelation may be sevenfold more intense and luminous in the minds of men than it is at present? or as the accumulated light of seven cycles of progressive evolution in humanity would be to the light of human knowledge in the days of the prophet?

Infinite spirit is immanent in all worlds, natural and supernatural, and transcends all imperfect worlds in perfection; while the finite human mind arrives, by slow degrees, at the rational perception of these different planes of existence; and still more slowly realizes the unity of truth and law in natural, preternatural, and ontological revelations and interpretations.

We all know, however, that obedience is a necessary discipline of order in undeveloped intellects, and therefore we may easily understand that spiritual revelation enjoins implicit obedience to religious laws, before the natural and the spiritual sciences are developed in the human mind; and that after these laws are understood, conscious and willing obedience will be yielded to all the laws of natural and spiritual truth.

The modes of *religious intercourse* amongst different races have hitherto been those of missionary propaganda, and mutual repulsion, not to mention exterminating wars and persecutions. Martyrdom has probably been one of the most obvious features of religious propaganda, although the martyrs of Mahomedan conquest were those who refused to be converted to the new religion, while the martyrs of Christianity, at least in the first ages of the Gospel, were those who had embraced the new religion. In later times, the persecution of heretics and Jews, has mostly been the sinful work of established churches. Some degrees of tolera-

tion exist amongst different sects of philosophic and religious doctrines; but the only active intercourse of a religious character, seems to be that of missionary propaganda, and the distribution of printed copies of the Gospel, amongst people of all races and of different languages.

Commercial intercourse at present, is the most general and active; industrial imitation and improvement follow at some distance; artistic efforts of refinement make progress east and west; scientific culture and philosophy spread slowly in the western nations, while religious evolution seems to be almost stationary in the world, if not actually sliding backwards, in the main centres of activity and thought. Perfective evolution is decidedly more rapid and general in the lower than in the higher aspects of human nature and society. How long this may last, before reaction brings about a change, in which religious elevation will keep pace with social and commercial progress, we cannot say, but it seems not unlikely that such a modulation of social and religious energy should succeed that state of feverish excitement in pursuit of worldly gain which now absorbs the race, and leads to spiritual disappointment in the hearts of both the richest and the poorest votaries of mammon.

The dominions of religion are celestial and terrestrial, the latter being evidently those of the human race in the four quarters of the earth. Europe, Africa, Asia, Australasia, America, and Oceania, have not been conquered yet by Christianity. We cannot doubt, however, that as civilized nations spread over these regions, religion must progress with them, until all races fraternize, and all creeds harmonize, in the full development of science and religious truth. As in time, however, so in space, we see natural religion prevalent amongst be-

nighted races, now as in former ages of the world; "spiritual manifestations and communications," dominant in some regions now, as formerly. Deism, or the religion of reason, dominant among some races, and in many individual minds; and spiritual religion luminous in limited regions of the globe, at present, as in bygone ages. Religion has not yet penetrated to all the depths of human nature, in all the perfectible races of mankind.

It has to penetrate into all these depths, and spread through all the regions of the earth. Regeneration must eventually elevate the human race, in every clime, where man has been created or located. Such is the unitary view of the principles of a practical and theoretical evolutive science of humanity; nor can anything less comprehensive in extent or penetrative in depth, be deemed a satisfactory definition of this branch of ontological investigation. Bible societies appear to be the most important means of religious intercourse established in the world, but much remains to be accomplished, not only in preaching the gospel to all nations, but in dispelling mental darkness, and converting unrepentant sinners in Christian communities.

Religion and Irreligion.—The principles of social integrity and responsibility are indispensable for the very existence of civilized society. An aggregation of people universally tainted with habits of lying, cheating, idleness, and promiscuity, could not live together in peace, or thrive as a community. Mankind must, therefore, have some principles of social integrity and collective unity; some kind of religion as a basis of morality. Where are we to look for these principles? Where are they revealed in nature?

We have a natural revelation of supernal truth and power in the heavenly bodies, and a natural religion in the ancient and modern worship of sun, moon, and stars.

We have a supernatural revelation of mystic truth, and the positive existence of disembodied spirits, in ancient theurgic oracles and modern "spiritual manifestations;" a supernatural religion in the pagan worship of mythological Gods or heroes, and the modern sects of "spiritualism." We have a rational revelation in the laws of science, and a philosophical religion in what is commonly called independent moralism, or deism; we have a spiritual revelation in the Bible, running parallel with all the others, and adapted to the gradual unfoldings of the human mind. Suns and stars, mystic oracles, and positive science, are no longer sufficient for the growing spirit of humanity, and the religions formerly established on these kinds of revelation, have lost their influence on civilized society. The earlier developments of spiritual revelations and traditions in the Bible, are mainly introductory to those of the Gospel. The Psalms of David, calling for the destruction of his enemies, and the triumph of God's truth, require interpretation in a higher sense than that which was apparent to his mind. His own imperfections and those of his enemies were to be destroyed, and not the sinners. The deeper truths of revelation contained in the Psalms, were not fully understood by David and the Jews of his own age; nor are they now perhaps, quite evident to every Christian.

Natural, supernatural, philosophical, and spiritual revelations and religions, are all true, as far as they can realize the principles of truth, but a very slight investigation shows that they are not equally luminous and satisfactory to the human heart and mind. No enlightened man in Christendom would think of reviving the ancient forms of natural and mythological religions, and philosophical religionists or deists have not yet explained many of the laws of nature, which they accept as the only reliable form of revelation. Man requires a posi-

tive centre of spiritual faith and knowledge, as well as a physical centre of gravitation and illumination, and this we find in "the light of the spiritual world."

What are the architypal ideas of creation in the new philosophy? Are they crystallomorphic? phytomorphic? zoomorphic? anthropomorphic? or are they merely chaotic and amorphic? Sceptics speak with contemptuous disparagement of "anthropomorphism," as if they had a notion that amorphism was a higher aspect of infinite totality. Positive science is no doubt an excellent thing, but what is known of the laws of spiritual nature? Can we read a single phrase of the creation, or spell a single word? We do not even yet know all the letters of the alphabet of natural laws, nor a single syllable of the literal meaning of creative language, so that dogmatic negation is not less presumptuous than dogmatic assertion; earnest investigation is the only attitude compatible with common sense and reason. Meanwhile, we know that spiritual revelation is the most important of all human treasures. Who can doubt that, with the perfection of Christ in our hearts, we should have heaven upon earth, in human society? and without it, hell upon earth? or purgatory, in the agonies of violence and strife, ignorance and poverty, disease and insanity, immorality and insecurity, irreligion and despair?

PERFECTIBILITY AND DEGENERATION.

What are the proximate causes of perfective progress, or of degenerative retrogression? Are they ontological, or simply experiential? internal or external? providential or accidental?

Before we speak of the principles of progress, we must consult the facts of experience, and as these are

only accessible within a narrow range, confine our observations within these limits. Let us take the breed of cattle, then, and the history of humanity, as the limits of inquiry.

In the management of cattle, it is a well known fact, that the crossing of superior with inferior breeds of the same species, is one means of general improvement, during several generations; and where the climate and the soil, the food and the treatment, are favourable, the improvement is continuous and lasting.

All these conditions are physical. The climate, the food, and the care of the stock—where they are favourable—are external factors of improvement, and where unfavourable, they induce degeneration. What is the import of crossing the breed? Is it entirely in the germ? The superior breed of animal prepares one part of the germ, and the inferior breed the other. And is not the secretion of germs, in both the male and the female organism, a purely physiological fact? the preparation of a complex element of matter, as a means of nutrition for the embryo, as much as the provision of food for the elaboration of good blood, is the preparation of a complex element for the nutrition of the growing organism? Just as much. And, moreover, it is merely the *cumulation* of good external conditions of physical existence, transmitted by hereditary descent to successive generations of the species.

Unfavourable conditions of climate, food, and care, are known to cause degeneration, in both vegetal and animal organisms; and the seed of such partakes of the degenerescence. Various causes of disease co-operate with ungenial conditions of food and climate, to deteriorate a species; and whatever be the sum of favourable or unfavourable circumstances in a given case, it is known that the result exactly corresponds to these ex-

ternal factors of animal and vegetable progress or retrogression.

The germ is merely, for the embryo, what food is for the living organism. However perfect the ontological factor of any type may be, before the incarnative process is commenced, the degree of perfection or of imperfection realized in the metamorphic evolution of the embryo, will depend upon the healthy or unhealthy secretion of the ovum, and the favourable or unfavourable conditions of gestation. If the egg of a sickly bird be ill prepared as a complex element of embryonic food, the chick will not be healthy when hatched. If the egg be good, and the conditions of incubation bad, the chick may be a starveling, unable to survive, where the rest of the brood, more favourably situated in the nest, are strong and healthy.

These facts are well known, and partly understood, in the breeds of animal and vegetable species. Are they as well understood in the case of human beings and societies, where not only the physical, but the mental and the moral factors of the experiential organism are subject to similar conditions of perfectibility and degradation?

Appropriate food and climate favour the health and vigour of a species, and these induce the healthy secretion of germs, for embryonic use. By this means, perfective evolution cumulates in each successive generation, and improvement is continuous, within such limits of acceleration or retardation, as extraneous vicissitudes in surrounding elements and forces may permit.

The internal forces then, are one element of formation in a species, and external conditions are another, and whatever be the perfection of the ontological factor, the evolutive result is mainly dependent on the external conditions of organization and sustentation, for the degrees of imperfection or perfection realized. This is

manifest in the physical frame. Is it not equally true of the instinctual, the mental, and the moral nature of mankind? Is not the whole experiential being mainly dependent on external circumstances for the means of improvement? Not for the means of being what it is, as an ontological species, but for the means of developing its autochtonic potentiality, whatever that may be, animal or human, in a natural experiential organism?

The facts are patent, and cannot be denied. Appropriate food and climate, air and water, exercise and clothing, favour the health of the body, and this is transmitted to the procreative germs, and through them to succeeding generations in the same conditions. Good models of art and poetry, music and painting, language and literature, transmitted from one generation to another, and good training schools of art for the children of all classes, are external means of progress in the instinctual plane of human nature. Good schools of science, and the development of scientific truths in each succeeding generation, are external means of mental advancement in the race; and similar means of perfective evolution in the moral nature of mankind, produce analogous results.

How far then are the external means of progress accidental or providential?

Does man create climates and food in the different latitudes and longitudes of the globe? or does he merely improve them after his intelligence has been developed by experience?

Do food and climate, when favourable, develop intellectual power, as well as health and strength? or is it only here and there that a few of the vigorous physical organisms discover the truths of science, and transmit them to posterity? Are great poets and painters, musicians and inventors, in perfect health, as numerous

as other healthy beings in a given nation? Are prophets and law-givers, the founders of religions, as numerous as other individuals, in a race well favoured by the external conditions of existence? Are the endowments of genius in any art or science, transmitted to the progeny of great men or women, as good or bad physical constitutions are transmitted, with the germs of procreation?

Evidently not. The ontological factor of human nature is born with or without genius, and no amount of physical health or disease can alter the vocation of the individual. Common mortals can diffuse the science when it is discovered, and thus improve the intellectual evolution of the race, but no amount of education can produce a poet, an inventor, a Shakespeare, or a Watt.

God creates the climate and the food of man, then, in the first instance, and he also creates the man of genius (prophet, poet, inventor, or philosopher), who endows the race with religious, scientific, artistic, and industrial food and climate, to improve the experiential conditions of mankind, so that none of these conditions of perfective evolution are accidental, however much they may become external; and all the elements of progress, both internal and external, are providential factors of creation, sustentation, direction, and regeneration. The periodic arrival of men of genius upon earth, is not a chance occurrence, but a regulated order of events, as much as the successive phases of natural evolution, and the seasons of the year, in other planes of evolution and perfective progress.

God rules the world, and man co-operates with Deity, in proportion to the means with which he is endowed. But how does man proceed? and why does he not always act with wisdom? What are the causes of ignorance and vice, poverty and violence, disease and suffer-

ing, degradation and retrogression? Are these to be considered as retardative, or accelerative factors of perfective evolution? What, in a word, are the uses of incidental degeneration in the general progress of evolution, on our globe? Here we come to the "mystery of iniquity" in another form. We cannot answer such a question.

One of the uses to mankind, is that of an experience by which we learn that the laws of adaptation between the internal and external factors of existence are inviolable, and that where conditions are unfavourable, the ontological potentiality of the type, cannot be fully evolved in the experiential organism.

Another use may be that the human being in the present phase of history, acquires a certain kind of experience much faster by suffering and disease, than by health and agreeable existence. Another use may be, that perfectible generations are renewed much faster by premature decay, than they would be by the natural and healthy career of life.

Disease induces man to study the anatomy and physiology of his own body, without which science he could not acquire a knowledge of organic principles in nature, and in human society. Ignorance and violence, fraud and immorality, are failings and diseases of the body politic, but we confess we cannot penetrate into the mystery of iniquity. It is enough for us to know that "the wages of sin is death," and that virtue is the approved means of perfective moral evolution.

As far as we can discern the uses of suffering and poverty, error and perversion of any kind, they stimulate mankind to work and pray for deliverance from evil, and thus accelerate the progress of the race, through the natural phases of ignorance and darkness, into the higher phases of perfective light and happiness. How-

ever much we may dislike the imperfections of the world within us, and around us, a little thought will show that we could not easily conceive it otherwise, for though eternal laws and principles are necessarily perfect, phenomenal mutations cannot be so. Although the ontological soul of man be immortal before, as well as after, his terrestrial existence, already made in the ethereal world before it comes into the natural world, it cannot take a material shape already made, nor an experiential mind, but must appropriate some kind of raw material to form the body, by a succession of undisturbed metamorphic processes; and obtain actual experience of objective forms and forces, to develop the mental faculties by educative processes.

If man is not to live for ever in the mortal frame, we cannot conceive these facts being otherwise; nor could we imagine creative evolution possible, if there were no alternate states of being in different eternal worlds; no chaotic state in any world to put in order; no decay of any realm or any organism, when once evolved, but everything, in every sphere, for ever perfectly unchanging and inert; infinite immobility and silent contemplation. It seems, all things considered, we would rather have creation as it is, with all its evolutive imperfections and vicissitudes. Creation must precede regeneration and perfectation; chaos must be organized before it can be harmonized; decline must naturally lead to destruction and chaos in one direction, as fast as creation and improvement lead to perfection in another. Destruction and creation, therefore, are necessary factors of equilibrium in nature. Destruction of what? Creation of what? Not the destruction of indestructible forces, but that of mortal bodies or mutable organisms; not the creation of uncreated forces, but that of perishable organisms, which serve as temporary habitations and

conditions of existence, for immaterial and immortal beings.

Are plants and animals, then, immortal forms of life? We doubt not, that they are as persistent as the living forces, which animate the glandular and other special organs of the human body; and are as much an essential portion of the organic forces of the planet earth, as the living forces of the human body, are an indestructible portion of the immortal soul. The elements of all bodies pass from one state to another, from one body to another, but the immaterial forces of life are indestructible, in every part of the creation.

But why were animals created to prey upon each other? and man, to prey upon them all? and one race of men to supplant another, by extermination? We do not know; but the facts, we doubt not, are for the evolutive good of all.

It is a stumbling block to sceptical minds, that God should be said in scripture, to have given to the Israelites, the land of the Canaanites, and commanded them to conquer the people, and exterminate idolatry; but they deem it natural and necessary for European Christians to conquer the red Indians of America; the aborigines of Australia and Africa; to take possession of their lands, even though these native races be exterminated in the process. Is it not evident that what we call nature and necessity here drive us to do with heathen populations what God commanded the Israelites to do in former ages? And is it not as difficult to reconcile the philosophy of necessity, to our common feelings, as it is to reconcile faith in biblical revelation, to these same feelings?

One thing is certain, in this puzzle, which is, that whatever be the modes of revelation, the facts and principles of perfective evolution are the same. Whether

the truth be discovered to us by natural instinct, or trance experience, or mental intuition, or spiritual inspiration, the destruction of inferior races, habits, and ideas, by superior races and conceptions, habits and endowments, is a persistent fact in the history of humanity. We do not know the hidden meaning of the "mystery of iniquity;" but it has evidently some rational connection with the principles of Perfective Philosophy.

DIVISION III.—EVOLUTIVE PHILOSOPHY.

THE genesis and life history of individual and collective organisms are the data of evolutive science and philosophy. What are the eternal forces which animate living bodies? And how were individuals and species, families and orders, classes and realms of organisms, formed in this natural world?

We have, to some extent, the history of all the realms on the surface of our globe, and by a careful investigation we may discover the main factors of genetic and developmental evolution in the organic and the social phenomena of nature.

In the mineral kingdom we find but one kind of force, namely, the *physical*, manifested in heat, light, electricity, and gravitation, as modes of motion, governed by invariable laws; while in the vegetable kingdom, an *organic* principle of force and influence is manifested in the structural evolution and life history of plants; and in the insect world, a second principle of vital energy is recognized as *instinct*, with peculiar modes of motion and *sensation*. In the higher animals and man, we find *mental* and *emotional* kinds of energy and modes of motion; and thus we have, in combination with connective physical forces and modes of motion, four kinds of living energy or vital forces, organized in personal, collective, and coordinate combinations. From what sources, and by what means are these organisms evolved?

What is the history of the formation of living bodies? What is the history of the tissues of which simple organs are composed, and of the cells and protoplasms which give origin to tissues? What is the genesis of germ-cells and sperm-cells, as the elemental originators of the evolutive processes. Ovagenesis, histogenesis, and organogenesis, are several degrees of evolutive progression, in the physical aspect of the question; but is this the only aspect? Has nothing been evolved in the realms of epicosmic nature, but physical germs, tissues, organs, and organisms, derived from no other kinds of forces and motions, but those of external physical forces and conditions? In the personal unity of human nature, we find four kinds of living forces, faculties, and modes of action; commonly called body, soul, mind, and spirit; material systems and organs of the body, with physiological and industrial modes of action; instinctual systems and faculties of the soul, with corresponding artistic and instinctual modes of sensation and reaction; mental systems and faculties of mind, with rational and scientific modes of thought, perception, and reflection; spiritual systems and faculties of volition, with psychological and sociological modes of emotion and volition, attraction and repulsion, affinity, cohesion, and association.

Organic philosophy involves the study of all these forces, in their respective degrees of morphological evolution, physiological development, final occultation, and continuous reproduction. Experiential psychology belongs as much to this field of investigation, as experiential physiology and embryology. First principles govern this science as much as any other; and we must take a penetrating comprehensive view of all the forces, principles, and causes of evolution, before we can establish a thorough and complete system of evolutive philosophy.

But let us see what other thinkers have put forth, before we venture to theorise.

Some philosophers regard incidental physical forces and conditions as the leading factors of all forms and degrees of evolution; and then speak of "time, space, "matter, and motion; the indestructibility of matter; "the continuity of motion; the correlation and equiva- "lence of forces; the direction of motion; the rythm of "motion; the instability of the homogeneous; the "multiplication of effects; differention and integration; "and finally, of equilibration," as a complete enumeration of first principles, by which all the phenomena of the creation and preservation of the universe may be explained.

They speak of action and reaction between the external and internal factors of organic evolution; but as the external forces are mainly physical, and the internal are hypothetically derived from these, the hypothesis must postulate the convertibility of physical forces and modes of action, into instinctual and mental forces and modes of sensation, perception, emotion, and volition; while such a postulate has never been warranted by any positive experience. It is further taken for granted that the physical universe is the only phenomenal world of the creation; and that the abstract principles just quoted, are sufficient to explain all possible mutations, and stabilities in nature. The world of incubation and embryogenesis, is thus classed as an occult alembic of convertibility in which external physical forces are transformed into psychological energies, under the control of abstract laws of order. Infinite *physical forces*, and *abstract principles* of motion, mutation, rythm and equilibrium, are thus deemed sufficient to account for the creation, or the origin and evolution of spiritual forces and emotions, by the simple process of convertibility.

We cannot accept this hypothesis, in lieu of the distinct existence of an invisible world, from which all psychological forces, in the visible creation, are derived; which not only agrees with the traditions of the human race, but affords a rational view of the phenomena of equilibrium, between the alternating appearances and disappearances of living forces, with the formation and dissolution of all physical organisms.

These questions are now claiming the attention of philosophic naturalists, and spontaneous inductions are drifting without helm or rudder, at the mercy of the winds and waves of two recent suppositions, namely: 1°. That physical forces are convertible with living forces; and 2°. That all types of organism are derived from a very small number of simple germs, by a continuous process of modification and variation.

The first of these hypotheses is not openly avowed, but it is more or less implied in the words "correlation and equivalence of forces," and "the origin of species." Some are more cautious in their modes of statement, without being more explicit, in distinguishing internal from external factors, in the processes of evolution. Professor Owen's views are given thus:—"As to the "successive appearance of new species in the course of "geological time, ... we must not confound the "propositions of species being the result of a continu- "ously operating secondary cause, and of the mode of "operation of such cause. Biologists may accept the "first, without accepting any current hypothesis, as to "the second."

"Buffon enumerated fifteen primitive stocks or types "from which he deemed all species, genera, orders, &c., "derivable. Lamarck, adverting to observed ranges of "variation in certain species, affirmed that such varia- "tions would proceed, and keep pace, with the continued

" operation of the causes producing them; that such " changes of form and structure would induce corre- " sponding changes in action, and that a change of " actions, when habitual, became another cause of altered " structure; that the more frequent employment of cer- " tain parts or organs leads to a proportional increase of " development of such parts; and that as the increased " use of one part is usually accompanied by a corre- " sponding disuse of another part, this very disuse, by " inducing a proportional degree of atrophy, becomes " another element in the progressive mutation of organic " forms. (*Philosophie Zoologique*, 8vo. 1809, Vol. I. " chap. 3 & 7.)

" A third theorist (vestiges of the natural history of " creation) calls to mind the instances of sudden depar- " ture from the specific type, manifested by a malformed " or monstrous offspring, and quotes the instances in " which such malformations have lived and propagated " the deviating structure. He notes also the extreme " degrees of change and of complexity of structure, " undergone by the germ and embryo of a highly organ- " ized animal, in its progress to maturity. He specu- " lates on the influence of premature birth, or on a " somewhat prolonged fœtation, in establishing the be- " ginning of a specific form, different from that of the " parent."

" Mr. Wallace, assuming that varieties may arise in a " wild species, shows (Proceedings of Linnean Society, " August, 1858,) how such deviations from type may " tend to adapt a variety to some changes in surround- " ing conditions, under which it is better calculated to " exist, than the type from which it deviated."

" Mr. Charles Darwin had, previously to Mr. Wallace, " worked at this principle." (Palæontology, by Richard Owen, p. 403) We may pause a moment here to ask

Professor Owen what difference there is between his views and those of Mr. Darwin? Does the latter confound the continuous operation of secondary causes, with the modes of operation? And is this the only kind of mistake to be avoided in dealing with the question of the origin of species? But even when biologists accept the first proposition, and are very careful not to confound it with the second, they are none the less committed to the theory of physico-vital convertibility. Is that Professor Owen's view? If not, what is the natural distinction between primary and secondary causes? between organic living energies and modes of motion, and the physical conditions of experiential life and organization?

The following quotations from "The Origin of Species," by Charles Darwin, will give the author's ideas in his own words:—

"As natural selection acts solely by accumulating "slight successive favourable variations, it can produce "no great or sudden modification; it can only act by "very short and slow steps. . . . We can thus see why "nature is prodigal in variety, though niggard in innovation. But why this should be a law of nature, if "each species has been independently created, no man "can explain."

"Many other facts are, as it seems to me, explicable "on this theory. How strange it is that a bird under "the form of a woodpecker, should have been made to "prey on insects on the ground; that upland geese, "which never or rarely swim, should have been created "with webbed feet; that a thrush should have been "created to dive and feed on subaquatic insects; and "that a petrel should have been created with habits "and structure fitting it for the life of an Auk or Grebe! "and so on in endless other cases. But on the view of

" each species constantly trying to increase in number,
" with natural selection always ready to adapt the slowly
" varying descendants of each, to any unoccupied or ill-
" occupied place in nature, these facts cease to be strange,
" or perhaps might even have been anticipated."

" . . . . How inexplicable on the theory of creation,
" is the occasional appearance of stripes on the shoulder
" and legs of the several species of the horse genus, and
" in their hybrids! How simply is this fact explained,
" if we believe that these species have descended from a
" striped progenitor, in the same manner as the several
" domestic breeds of pigeon have descended from the
" blue and barred rock pigeon."

" I believe that animals have descended from, at most,
" only four or five progenitors, and plants from an equal
" or less number."

" Analogy would lead me one step further, namely,
" to the belief that all animals and plants have descended
" from some one prototype. But analogy may be a
" deceitful guide. Nevertheless all living things have
" much in common in their *chemical composition*, their
" *germinal vesicles*, their *cellular structure*, and their *laws*
" of *growth* and *reproduction*. We see this even in so
" trifling a circumstance as that the same poison secreted
" by the same gall-fly, produces monstrous growths on
" the wild rose or oak-tree, therefore I should infer from
" analogy, that probably all the organic beings which
" have ever lived on this earth, have descended from
" some one primordial form, *into which life was first*
" *breathed*."

" Authors of the highest eminence seem to be fully
" satisfied with the view, that each species has been
" independently created. To my mind, it accords better
" with *what we know* of the *laws impressed on matter* by
" the Creator, that the production and extinction of the

" past and present inhabitants of the world, should have " been due to *secondary causes*, like those determining " the birth and death of the individual."

" It is interesting to contemplate an entangled bank " clothed with many plants of many kinds, with birds " singing on the bushes, with various insects flitting " about, and with worms crawling through the damp " earth, and to reflect that these elaborately-constructed " forms, so different from each other, and dependent on " each other in so complex a manner, have all been *pro-* " *duced by laws* acting around us. These laws, taken in " the largest sense, being *growth* and *reproduction; in-* " *heritance*, which is almost implied in reproduction; " *variability* from the indirect and direct action of the " *external conditions* of life, and from *use* and *disuse;* a " *ratio* of increase so high as to lead to a *struggle for* " *life*, and as a consequence to *natural selection*, entailing " *divergence of character* and the *extinction* of less im- " proved forms. Thus, from the war of nature, from " famine and death, the most exalted object which we " are capable of conceiving, namely, the production of " the higher animals, directly follows. There is gran- " deur in this view of life, with its *several powers*, having " been originally *breathed into a few forms* or into *one;* " and that whilst this planet has gone cycling on ac- " cording to the fixed laws of gravity, from so simple a " beginning, endless forms most beautiful and most " wonderful, have been and are being evolved."

This theory of creative, evolutive, and perfective philosophy, is a very simple form of spontaneous induction, from a few secondary causes; but does not sufficiently define the nature of the breathing power, nor that of the "several powers" which were "originally *breathed* into a few forms, or into one;" nor the character of the laws, which "we know" have been im-

pressed on matter, by the Creator. These powers were, however, breathed into one or into several forms, and were therefore derived from a creative power, which breathed them into shape of some kind, or into several shapes. These powers became internal factors of evolution, and have always co-operated with external factors, regulated by "laws impressed on matter" (and on mind) to produce the various types of organism which now inhabit the earth. We must, then, analyse the nature and the influence of persistent internal factors and regulative laws as well as the external conditions and resources of transitory existence.

The mystery of creation seems to be simplified, but is not much elucidated by these views. If physical forces are infinite, and governed by eternal laws "impressed upon matter," are not intellectual forces infinite? and if infinite intelligence, once upon a time, "breathed life into a few forms, or into one," on the surface of our planet, had it never breathed life before, into any kind of organism; nor ever since? What, in a word, are the life-breathing operations of an infinite Creator? And what are the laws impressed upon matter?

Is life breathed into universal nature? or merely into a succession of minute animal and vegetable organisms, on our globe? Is there an invisible world of existence for man, as well as a visible world of life and organization? The principle of life is still a puzzle, unexplained by this hypothesis. The laws impressed upon matter are those of heat, light, electricity, and gravitation, as modes of motion. Are thermological, photological, electrological, and barological laws and forces the only laws and energies of nature? the only *kinds* of secondary causes? evidently not. Organic vital energies and modes of motion are also indestructible factors of existence, incarnate in all perishable organisms.

But the mystery of creation is much deeper than that of temporary incarnation and progressive evolution; and we may possibly obtain some knowledge of organic laws and forces, though quite unable to penetrate into the mystery of being.

We do not know how the different types of organism were first created, but we know *how* the different organs of an individual body are simultaneously evolved. The external factors of secondary causation are quite distinct from the internal factors of organization, in the evolution of a bird.

The homogeneous matter of the egg is collected from external elements, and transformed by the secretions of the parent birds; whereas, the organs of the body, which are formed from this homogeneous substance, during incubation, are not derived one from another, by slow successive variations, but are separately and almost simultaneously, derived from the same general mass of plastic matter. Skin, muscle, bone, and nerve, are not derived one from another, by histological and morphological transformations. They begin together as distinct systems and organs, and are brought into individual completeness and associative union, by gradual stages of concomitant evolution.

The factors of secondary causation; namely, those of ovulation and incubation, are alike for all the organs of the body of a chick, as well as the external conditions of existence, to which these organs are predeterminedly adapted, for active life; while the internal factors of organization are not identical in nerves and muscles, skin and bones, although each of these are formed, side by side, in co-operative unity of plan, and consistent variety of form and function, in adaptation to the very same internal and external conditions of experiential life and motion.

The evolutive forces of the organs in the body of a chick, are different in their modes of motion in each organ, though one in kind, just as the organic forces are different in their organizing and vitalizing modes of motion, in classes and species of animal organisms, though one in kind, contrasted with the inorganic forces and conditions of existence; which conditions, in all cases, are the same for the evolution and continuous existence of each different organ and system of the individual organism; and for the evolution and continuous existence of the different realms, classes, and species of organisms, living together in the same latitudes and longitudes of climate and sustenance, upon the land or in the sea.

Not to dwell on the discussion of these questions, we may give a very simple illustration of our views of causation. If we place a man in a cold climate, and he builds a house for his own convenience, we have a picture of all kinds of secondary causation. The man is a creative force; the cold atmosphere which stimulates him to seek for protection, is a secondary cause, which induces the man to build the house; which again is the result of action and reaction, between an internal factor and an external factor of evolution. The man forms the design of building the house, and elaborates the plan of the building, and then proceeds to construct the edifice. The creative force that forms the plan and builds the house for a special purpose, resides in the man then, while the stimulating cold is only an external cause of the structure; and the materials of which the house is built, afford external means of realizing the design. And all these forces, motions, and mutations are governed by immutable regulative laws, impressed upon both mind and matter.

There is no constructive system of action and reaction,

between the external cold and the material stones of the building, gradually brought together by the builder; but there is a combination of internal forces in the man, and external forces in the cold air and solid stones, which altogether form a complex cause of the construction. The cold and the materials are external factors of causation; the man, the purpose of the man, the plan of the house, and the process of evolution, are internal factors of creation. The regulative laws of mind and matter, are neutral factors of causation.

In parallel with this example, we suppose there is a living principle of force, which is induced by some want of its organic nature to quit the invisible world and build for itself a physical body, in accordance with necessary laws, to live in as a convenience and a protection, during its residence in the natural world; which body the spirit leaves to fall into ruins, according to necessary laws, when it quits the natural world, just as a colonist may be induced to build a house in a new country, which he inhabits for a time, and then leaves to fall to pieces, under the influence of destructive elements, when he has returned to his native home. This is our mode of forming spontaneous inductions from the observation of facts and principles around us.

But, then, what is the incarnative or invegetative factor of a plant without intelligence or instinct? Is that explained by the same hypothesis? Is it not more akin to the production of a feather on the body of a bird? The vegetative force of a plant resides invisibly in the seed and in the crust of the globe, as the formative force of a feather resides invisibly in the skin and in the life of a bird; as the soul of a man resides invisibly in the spiritual world before it forms an experiential organism in the visible world.

All degrees and kinds of mutational phenomena lead

up to the study of eternal principles and forces, motions and modes of motion; and special cases of evolution must be traced to their immediate sources of origin, as well as through the physical conditions of temporary evolutive adaptation.

The transcendental unity of principles and forces includes and governs all natural, supernatural, and lymbic worlds of experiential life and organization, motion and mutation. They are the key to both the *latens processus ad formam*, and the *latens corporum schematismus;* the key to organic philosophy, evolutive philosophy, and perfective or regenerative religion. We find them illustrated in the human body; in the physiology, histology, and embryology of natural organisms; in embryogenesis and sociogenesis; in biology and sociology, not to mention mathematical science, with which they are identified, in abstract unity.

In dealing with questions of causation and morphological evolution, we must not confound different kinds of energy with degrees of force and motion; nor the *principles* of design, with *modes* of adaptation; nor with the characteristic *results* of adaptation; nor with the *processes* of differentiation and integration; nor with the coincident external forces and conditions which are secondary *causes* of adaptation. We must not lose sight of the internal factors of force and motion, by attributing all initial influence to the external factors of stimulation and sustentation. Internal organic energies co-operate with external forces, in all the known phenomena of evolution, regulated by eternal laws. Invisible transcendent Deity we suppose, creates and rules all forms of nature, in accordance with inviolable laws; finite invisible forces give organic form to visible elements of matter, in accordance with invariable laws. There are two kinds of factors, then, in all degrees of

evolution, from the smallest finite to the infinite; and these are easily discerned in all the transitory organisms of our globe. This supposition agrees with the traditions of humanity in all ages, and is warranted by as many positive facts and laws, as any other spontaneous induction or hypothesis.

The phenomena of embryogenesis and sociogenesis are more or less familiar to students, and as these are illustrations of the fundamental factors of evolution, we may refer to them for an outline of the data of evolutive philosophy. The classification of the sciences shows us what has been already discovered in the arts and sciences, and what remains to be discovered and applied, before humanity can be fully developed, as a social or collective organism. The evolution of transcendental theosophy, perfective religion, organic philosophy, and evolutive philosophy, has not yet attained to maturity; and although we can easily measure and appreciate all that has been done in this department, we can hardly foresee the ultimate degrees of perfection to which they may be carried, in future ages.

The nature of inorganic bodies has been much investigated by experimental methods. The science of chemistry is mainly a science of definite proportions in physical combination and analysis. Geology and meteorology are also busy with problems of physical science. We must, however, learn to understand organic unity of structure, before we can fully grasp the laws of evolution. We must understand the plan of the complete edifice as well as the temporary scaffoldings and processes of building, from the foundation upwards. When we have the whole design before us, we can more easily discern what progress has been made in the building up of scaffoldings and different parts of the perfect edifice of any complex organism.

Inorganic and organic combinations extend throughout the whole visible universe, and numerous problems of experiential science require to be resolved, before we can obtain a satisfactory view of the principles of evolutive philosophy. In the life history of individual and collective organisms on the surface of our globe, we have abundant data for the study of this branch of knowledge, and by a careful observation of what is, and has been manifest in nature (and an equally careful avoidance of suggesting what should or should not have been, according to imaginary notions), we shall find that the principles of evolution are as simple and immutable as those of organism; and that the *latens processus ad formam* is in strict accordance with the *latens corporum schematismus*, in both inorganic and organic realms.

The leading factors and characteristics of natural and perfective evolution, run parallel with those of all the definite organisms of nature. Transcendental factors are pre-existent, and all connective factors must be anterior and superior to special processes of evolution. The latter are exemplified in individual and collective organisms, and as the human body is the highest type of individual unity, we may compare the internal factors of all other individualities with those of man, since the animal, vegetable, mineral, and social realms of nature, are formed on the same general plan of unity and integrality. The following synopsis will give us an idea of the internal and external factors of organic evolution, and a second table of the evolutive characteristics of these factors will complete our survey of the leading principles of evolutive science and philosophy.

Factors of Evolutive Adaptation.

Unitary Factors.
- Z. Pre-existent factors of evolutive adaptation.
- Y. External factors of evolutive adaptation.
- X. Congeneric factors of evolutive adaptation.
- W. Incarnative factors of evolutive adaptation.

Organic Factors.
- VII. Circulative factors of adaptation.
- 7. *Inhalative factors of adaptation.*
- VI. Alimentive factors of adaptation.
- 6. *Gustative factors of adaptation.*
- V. Genetic factors of adaptation.
- 5. *Impregnative factors of adaptation.*

Relational Factors.
- IV. Telegraphic factors of adaptation.
- III. Skeletal factors of adaptation.
- 2. *Vibratory factors of adaptation.*
- II. Motorial factors of adaptation.
- 1. *Radiatory factors of adaptation.*
- I. Limitative factors of adaptation.

In dealing with questions of evolutive adaptation, we must have a clear idea of the difference between evolution and creation. Is there any difference between them, or not? And how far is it possible to answer such a question?

We can know, at least, what has been evolved, and how the processes of transformation have occurred in many cases. We have some positive experience of such facts in the social, the organic, and the inorganic realms of nature. We see a plant developed from a seed; a chick from an egg; a drop of water from invisible gases; a watch from bits of metal; an organized community from a horde of individual human beings. We have some experience, therefore, of the evolutive factors and processes of sociogenesis, mechanogenesis, embryogenesis, and aquagenesis. We know that the metal did not make the watch, without the intervention of an intellectual designing agent; a society of human beings is organized into a community, by an intellectual agency; a chick is formed in the egg by an invisible, but real agency of some kind; for the egg alone is not a complex

living organism; and water may be sometimes formed by the intervention of human intellect.

The human body is formed in the womb, by a pre-conscious power, and with it, the principle of life and thought come into manifest existence. The blood, we know, is the substance from which the body is built up, just as the metal is the matter of which the wheels and levers of a watch are formed; but we also know that blood alone is not a living organism, nor the metal of a watch the principle of mechanism. These are parallel processes of evolution, and though internal and external factors, are all visible in one class, while the external factors alone are obvious in another; it does not follow, as a necessary consequence, that internal factors, in such cases, do not really pre-exist.

As we do not know to what extent, creation and evolution are identical, in certain cases, we must admit, that, as far as human experience is concerned, creation is anterior to evolution. In human actions, design precedes the processes of execution. In sociogenesis, the creation of mankind is anterior to the organization of society; the creation of man, and of metallic elements, anterior to the formation of a watch; the existence of oxygen and hydrogen gas, anterior to the formation of water; the secretion of an egg, and the existence of a principle of organic force, anterior to the formation of a chick. We must therefore recognize the necessity of pre-existent factors of evolution. What, then, are these factors?

Pre-existent Factors of Evolutive Adaptation.—Eternal laws and forces must be anterior to any special process of creation, or of evolution. The natural world, as it is known at present, is prior to the evolution of animal and vegetable organisms. The matter of these organisms is derived from the existing elements of substance

on the globe; but whence come the organic forces? They are pre-existent, as eternal principles; but were they formed, in any kind of invisible synthetic unity, before they became manifest as phenomenal organisms? or were they "without form and void," before the processes of metamorphic evolution gave them form? We do not know; but we believe that a supernatural world exists, as well as a natural world; and that both were created before organic beings appeared upon this earth.

This view accords with the traditions of humanity, and we surmise that God created immortal souls before he gave them mortal bodies; for, though the soul may have been "breathed into the body," it must exist, before it could be breathed into any kind of substance. Invisible souls, then, must be pre-existing factors of organic evolution; and we have thus eternal laws and forces, supernatural worlds, natural worlds, and pre-existent souls, anterior to any fact of embryonic evolution.

External Factors of Evolutive Adaptation.—In observing the facts of individual evolution, on our globe, we must note the historic period of the world, at the time of the occurrence; the terrestrial sphere of life, in which the organism is destined to accomplish its career, in the sea, or on the land; the climatic latitude of sea or land, to which it is congenial; and the type of organism to which it belongs, and from which it has been hereditarily derived. These are external factors, which precede the fact of individual evolution, in all known cases, and have a definite influence on the phenomenon. With regard to the origin of the first individuals of any species of animals or plants, we acknowledge the mystery of creation, and our ignorance of the mystery.

Congeneric Factors of Evolutive Adaptation.—As far as actual experience goes, all organisms have progenitors of the same species; associates of their own species;

habits of life peculiar to that species; and a definite lease of life, common to the race. Some live a day, and die; others, weeks or months; some live a few years, and others live a century or more. A mouse has not as long a lease of life as an elephant; a dog has not as long a lease as man. And all these factors are determinate, before the special organism is evolved. The mouse, the elephant, the dog, and the man, come into the world, in similar conditions of external nature. Their bodies are formed of like elements of matter; their respective germs of origin, gestation, and nutrition, are analogous. The internal forces are, to some extent, akin; but yet, how great the difference! How comes it, that the germs of one of these, never give origin to any of the others? How is it, that the egg of a duck, never gives birth to a chick; even when hatched by a hen? It must be partly, at least, because the incarnative forces are not the same, in all these cases.

Incarnative Factors of Evolutive Adaptation.—The complex elements of organic substance, though not physiologically identical, are chemically very much alike, in the ova of fishes and serpents, birds and mammals, while the organisms evolved from each of these, are very different; and yet we see that different types of animal can live on the same kinds of food; and the same types of organism, on different kinds of food. Where the external factors are so much alike, the internal factors must be very different; and both are manifestly pre-existent.

We may suppose that vital forces are derived from the elements of eggs and blood, in all such cases, by a process of convertibility unknown to us; or that living forms exist already in a lymbic world, invisible to us, and are induced to clothe themselves with material bodies, whenever secondary causes and conditions are favourable for such an evolution. We prefer the latter

to the former supposition; and as nothing can be proved in either case, we leave the mystery as it is; observing, nevertheless, that evidence abounds with regard to the existence of disembodied human spirits in a world invisible to common sight, though not precluded from the possibility of actual manifestations of intellect and force, in communication with the natural world.

Circulative Factors of Evolutive Adaptation.—We have already shown, in our epicosmology, that the leading factors of structure and function, are alike in all collective realms and individual organisms, though different in degrees of complexity, and in dynamic depths of energy. We need only point out, therefore, that circulative, aerative, and depurative organs, differ in animals that live and breathe in water, and in those that live on land. Comparative anatomy and physiology describe these differences minutely, and can easily be consulted. We need only remark, that these apparatuses are very differently developed in birds and quadrupeds, insects and snails, that live and breathe in the same atmosphere; as well as in fishes, reptiles, lobsters, and oysters, that live and breathe in water.

Why are not these organs alike, in all animals that breathe the air, or live in water, where the external forces and conditions are the same? Is it not because the internal factors of each organism are different?

Alimentive Factors of Evolutive Adaptation.—Why are the digestive systems of animals so different in carnivorous and herbivorous species, living in the sea, or on the land? Why is the stomach of a horse so different from that of a cow, feeding in the same pasture? Why are some digestive systems so much more complex than others, in organisms that feed on the same substances, and live in the same element? In a polype, a crab, a carnivorous fish, or a whale? It is because

internal forces differ where external conditions are the same.

Genetic Factors of Evolutive Adaptation.—Why are these so different in animals that live on land, as well as in the creatures of the ocean? In both cases, the external medium is alike for all, but the internal organs are quite different. In some cases they are very simple; in others, very complex. The genetic elements of reproduction differ where external climates and resources are the same. We need not dwell on illustrations, which are everywhere abundant.

The secondary causes of genetic evolution in the higher animals are fecundation, ovulation, incubation or gestation, and lactation. The incarnative processes are those of embryogenesis; namely, inception, segmentation, tissue formation, the metamorphic involution of tissues and protoplasms, to form caducal and permanent organs; and finally, the median and articular junctions of organs and systems, to form the complex individual unity of organism. These processes are more or less analogous in all organic realms and species; and are well described in comparative embryology; we need not dwell on the details of well-known phenomena, but pass at once to other aspects of the question.

The organic viscera and functions of animals, all tell the same story of different internal forces being evolved in the midst of the same external medium; what is the evidence of the relational systems of the body, in different species? Let us see.

The Relational Factors of Evolution.

Limitative Factors of Organic Form.—What are the limitative causes of organic form in seeds and eggs, animals and plants? We see that all types of organism are modified to suit the element in which they live, and

the modes of progression by which they move from one place to another. Vertebrate animals have different forms in the four general classes of mammals, birds, reptiles, and fishes; and each of these is varied, in adaptation to particular modes of motion in the air, in water, and on land. Mammalia are generally formed for running on the earth, but in whales and seals, these running forms are modified for the convenience of swimming in the sea. In bats, again, the common form of their climbing congeners, (the monkeys and the lemurs,) is modified considerably, to enable them to fly. The principle of adaptation to the internal wants of nutrition, and to the external conditions of locomotion in the medium through which the body has to move, and in which it has to thrive, is one main limitative cause of form, for every kind of organism, animal or vegetable, high or low, in rank of realm or class, to which it may belong.

Flying animals have wings to float and carry them in the air; swimming animals have fins to move them in the water; running animals have legs to move them on the land; and these are modified in adaptation to peculiar habits and conditions of existence, in each general type.

The snake can crawl on land and swim in water, without legs or wings, but his means of locomotion, in both cases, are comparatively limited by this privation. Still we may ask the question, why has the snake no limbs; or only the merest rudiments of limbs? while other reptiles have, in some cases, both legs and wings? Why are the forms of birds so different for flying in the air? those of fishes so various, for swimming in the sea? Those of quadrupeds so modified, for running, walking, leaping, or jumping, on dry land? What, in a word, are the limitative moulders of form, in adaptation to internal wants and the external media, in which these

wants must find the means of satisfaction? Why should one animal be herbivorous while another is carnivorous, or omnivorous, in the same medium? and why should special forms be modified, as much in accordance with the external medium of life, as with the internal wants of the organism? How came internal wants to differ in different species? What are the dividual energies to be harmonized in all these ways, and the principles by which internal and external forces are so variously adapted to each other?

Why is the gigantic whale so large, and his congener, the porpus, so comparatively small, while both inhabit the same liquid element? Why is the huge elephant so large, and the tiny mouse so small, under the same external conditions of existence? How is it that we see all shapes and sizes of organic forms, inhabiting the sea at the same time, and under like conditions? All classes of vertebrata, articulata, mollusca, and radiata, inhabit the same ocean, and are also represented on the land; all classes of plants inhabit water and dry land. There is no general type of organism excluded from the atmospheric element, nor from the briny sea. It is not the external forces then, alone, which are the limitative moulders of organic form; there are internal causes which give type and stature to organic species, and special composition to the inorganic media of existence. Internal energies give both size and typical formation to every species, while external forces require that these should be adapted, in some measure, by suitable modifications to the exigencies of the medium, in which these permanently different types of structure, live and move in their respective cycles of evolution.

Measures of force, and types of organism, are internal factors of limitation, with regard to size and shape. The different media of air, water, and earth, are external

conditions of limitation and proportion for each type; and the principle of adaptation holds the balance of unstable equilibrium, between these limitative factors of organic form. This is proved by the fact of every type of organism, and every degree of size, in each class, inhabiting the same external medium, at the same time, and under similar conditions, with only slight variations of distribution and proportion to suit the principle of adaptation between internal wants and external resources.

Need we ask how it is, that some seeds have wings to fly with, such as those of the common dandelion, while the berries of the vine have no such means of floating and being wafted far away, although both inhabit the same element, and adapt their wants respectively to the conditions of external nature? The vine puts forth tendrils to lay hold of stronger neighbours for support, but takes no heed of the locomotive powers of its berries; the dandelion stands erect, and asks for no support, but furnishes, for migratory purposes, the means of floating far away to its colonizing seeds. What are the limitative moulders of these seeds and berries? are they partly external, or wholly internal? The latter seems most probable; for design is manifestly different in their forms, and in their habits, as well as in their uses. In this case, as in all others, we may trace causation through the four processes of creation; namely, 1°. *Design* in the mind of the Creator; 2°. The realisation of design in the *creation* or individualization of invisible forms and forces; 3°. The *incarnation* of these definite forms and forces, in the lymbic world of metamorphic incubation; and 4°. The natural processes of perfective evolution and prolification, in the visible world of transitory existence. Ontological design, invisible creation, metamorphic investation, and perfective evolution, then, are obviously consecutive factors of causation. The last dependent on

its immediate antecedent, as that, upon its precedent, and all upon the thought of the Creator, in forming the design of an organic world, with many complex parts, involved in one harmonious whole. The principle of adaptation between the internal and external causes of evolution is, therefore, a part of the original design of the Creator, in accordance with regulative laws, and not an accident of chaos, without rhyme or reason; or a "fortuitous concourse" of external atoms and blind polarizing forces giving form and motion to internal molecules and automatic mechanisms.

Protective Factors of Evolution.—What are the protective results of evolution? the weapons of aggression and defence? the clothings of the body to preserve internal warmth and keep out cold? In the different classes of vertebrate animals, we see that mammalia are mostly clothed with hair, or wool, or fur, of some kind; birds with feathers; reptiles with scutes or plates; and fishes with plates or scales. Besides these outward clothings and protective armours, they are mostly armed with teeth and claws, beaks and spurs, and many other special means of conquest or self-preservation. We need not here enumerate the quills of porcupines, the armour plates of armadillos, the shell of the tortoise, the electric batteries of certain fishes, and other varieties of protective apparatus in vertebrate organisms. The organs of *sight*, *touch*, and *temperature*, are all concerned in the work of self-preservation, and are variously differentiated in form and structure, in different types and species; but we need not dwell upon details where general principles alone require attention. We may speak of clothing and of weapons, then, as the main points in question.

Moluscan organisms are mostly protected by external shells; articulata, by horny or calcareous incrustations; and radiata, by stinging secretions, or hardened cuticles

and spines. Even plants are protected by some kind of bark or rind, often studded with thorns and prickles, hairs and resinous secretions.

These protective clothings and weapons are adapted to the internal wants, and the external conditions, of the species in which they are so variously developed. Why are not all clothing armours and weapons of aggression and self-protection, the same in all organisms, inhabiting the same element, and climate? It is evidently because the internal energies differ, where external conditions are alike. The same causes are, then, here at work, as in the limitative factors of size and shape, which we have just examined; and as the same mode of reasoning applies to both cases, we pass at once to the next question.

The Motorial Factors of Evolution.—The relational means of motion in the body, are the muscles of the limbs, but not to complicate the question, we may view the limbs externally, as general organs of progression, and observe how they are modified, to suit the exigencies of the medium, in which the creature has to live and move. Quadrupeds mostly move about on land; birds fly in the air, and fishes swim in water. Their limbs are modified in size and shape, proportion and disposition, to suit the convenience of the species, in the midst of its resources. The internal muscles are arranged in different ways, to suit the external forms of the limbs; and here, again, we find that the varieties of limbs are very numerous in different types, inhabiting the same external element. Dogs and cats, bears and kangaroos, monkeys and lemurs, horses and cows, rabbits and pigs, have differently formed limbs to move on land; bats and birds have differently formed wings, to fly in the air; seals and fishes have differently formed limbs, for swimming in the sea. Insects have wings differing

from those of birds, to fly in the same air; crustacean, molluscan, and radiate organisms have very different limbs from those of fishes, for moving in the sea. External conditions are alike, then, where internal motors differ widely; and the same causes operate in this case, as in the limitative and protective factors we have just now analysed.

The muscles of all animals are adapted to the bones, where these exist, but worms, and many other forms, have not bony skeletons. Mammals and birds have internal bony skeletons to which the muscles are attached, as well as to external fascia; these are called *endoskeletal.* A tortoise has a bony skeleton which is partly internal, and partly blended with an external shell of horny matter; and this system of muscular attachment may be termed *mesoskeletal.* A lobster has only an outward calcareous shell as the protective covering of external fascia, which are the natural supports of muscular attachment, and these are called *exoskeletal.* A worm has muscular fibres, attached to rings of areolar connective tissue, but, as no distinct fascia are conspicuous, and no bony structure is required, the animal is said to have no skeleton, and may be called *askeletal.* There are, then, askeletal, exoskeletal, mesoskeletal, and endoskeletal types of organism, and the *motorial muscles* are variously arranged, in all these types, although they may live and move on land, or in the ocean; subject to the same external circumstances and conditions as secondary factors of adaptation and causation. Why are these motorial mechanisms not alike?

Vibrational factors of evolution.—These are the organs of hearing, speech, equilibration, and tension in the apparatus of "muscular sensation," which are not the same in all the species that live and move on land, or in the air, or in the sea. Naturalists know how very

differently they are formed in vertebrata, mollusca, articulata and radiata, where these organs are sufficiently developed to be observed at all, in their most rudimental forms. Where they are not wanted by the species, they are undeveloped; where wanted, they are more or less developed in all external media. Some animals may have a more acute sense of hearing than man, but none have musical faculties like his; some have more powerful voices, but none have faculties of speech like his. Monkeys can climb better than men, but cannot dance and waltz to music, although they measure accurate degrees of force and motion by the muscular sense of tension. Internal moulders of this class, then, differ greatly in different types of organism, that live and move in the same external world of elements and influences. The relative factors of causation may be traced through the same degrees of sequence and antecedence, as in the previous chapters.

The skeletal factors of evolution.—Why are these not alike in all the organisms that live in water, or move freely upon land. Why are the external frames of vertebrate animals of all classes—save a few rudimental exceptions—furnished with bony endoskeletons, while those of articulata, mollusca, and radiata, are mostly furnished with deciduous exoskeletons? Or rather, we may ask, why are not the architectural supports alike, in all the animals that live on land, or in the water, or in the air?

In man we see an endoskeletal arrangement of bones, with an exoskeletal arrangement of fascia, giving attachment to the tendons of the muscles. In the tortoise we see a kind of mesoskeletal osseous framework, in which the ribs are blended with the outward shell. In beetles and other insects, we find an exoskeleton of fascia and hardened cuticle, which give insertion to muscular tissues; and in worms we find no skeleton at

all in the common acceptation of the word, but transverse rings of elastic tissue give attachment to longitudinal fibres of contractile tissue.

There are then, in different classes and species, diversities of skeletal framework, which may be conveniently named, *endoskeletal*, *mesoskeletal*, *exoskeletal*, and *askeletal*, to distinguish one from the other, although the general attachment of muscles, in all cases, may require internal and external points of insertion and support.

All these forms of framework are found in animals that live and move in water constantly; in species that live and breathe the air on land. It is not the external medium alone then, which gives shape and size, proportion and distribution, to the skeletal frame of an organism, but the ontological design, the invisible forms and forces, the metamorphic incarnation of these forces, and the prolific preparation of the ova, in which the incarnation is accomplished. Even the shapes and sizes of prolific seeds and eggs, as well as the soft or hard shells or coverings of these, are various in parallel with the different types and species which produce them, more uniformly than with the differences of external media, in which they are deposited for incubation. The internal causes of prolification, in a word, are more predominant than the external factors of incubation. A duck's egg may be hatched by a hen, but the result will be a duckling, in accordance with the type of the prolific agents, and not a chick, in harmony with the heterogeneous incubator.

The telegraphic factors of evolution.—What are the telegraphic tissues of susceptibility to light, heat, electricity, and chemical affinity, in plants and animals which have no nerves? What are the diversities of ganglionic order and arrangement in animals with nerves? External vibrations of air, light, heat, electricity, and

chemical affinity, are transmitted through nerves to internal centres of sensation, perception, and emotion, in the human organism; and similar effects are telegraphed from peripheral to central organs, in many other species.

In parallel with different forms of skeletal arrangement we may conveniently distinguish endoganglionic from exoganglionic types, and these again from mesoganglionic and aganglionic systems of telegraphy. Where there are cerebrospinal centres of sensor and motor nerves, as well as sympathetic ganglia and filaments, we may call the system *endoganglionic*, and this will include all classes of vertebrata. A sympathetic chain of ganglia and nerves is all that exists in many of the types of articulata, mollusca, and radiata, in connexion with an exoskeletal system of support and muscular attachments, and this telegraphic apparatus we may call *exoganglionic*; where some slight rudiments of cerebral ganglia exist, as centres of visual sensation in the head of the higher types of articulata and mollusca, we may call the nervous system *mesoganglionic*, and where no trace of nervous tissue of any kind can be discovered, as in many of the lowest zoophytes, and in all vegetable organisms, we may define the tissues of susceptibility to the impressions of light, heat, electricity, and atomic affinity, which certainly exist, as an *aganglionic* system of communication between the peripheral and the central parts of the organic unit.

Here again we see all varieties of telegraphic systems in all varieties of types, living and thriving in the ocean, in fresh water, in the air, and on dry land, in all latitudes and longitudes of climate, and continuing to reproduce themselves, amidst the ever changing influences of seasons and migrations. These internal energies of evolution remain ever different in different

types, while the external forces and conditions remain ever similar for all, in the surrounding elements and changing seasons.

Need we say that the same mutual relations between causes and effects are here again conspicuous; and moreover, that the different kinds of forces in each organism, are clearly traced through the four depths of nature, by the different grades of telegraphic apparatus. In plants and seeds, and eggs, and zoophytic jelly or sarcode, we see that physiorganic forces are alone involved, and that the telegraphic communications between outward molecules and inward atoms, are purely physical. Light, heat, and electricity affect them; atomic affinity, molecular cohesion, and capillary attraction affect them, physiologically, not psychologically. No sensations or instinctual motions are observed in them; no ganglionic system is required for telegraphic purposes in these organic individuals. There must be what is commonly called instinct, in an animal, for sensation to be possible, and then an exoganglionic system is required to telegraph impressions from the physical to the psychological forces of the organism. Sensations must be very vivid, where the forces of perception and emotion lying deeper than those of mere sensation, are to be stimulated into active thought and volition, as in all the higher animals, in which an endoganglionic nervous system is developed, as a means of communication between the external and the internal forces of action and reaction in the body.

In man and in the higher animals, a very complex endoganglionic nervous system is developed; in the lowest types of reptiles and of fishes, the nervous system can only rank as mesoganglionic, being little more complex in these inferior vertebrata, than the telegraphic system of such types of molluscs and articulate animals as have

cephalic eyes and ganglia. Inferior types have exoganglionic nerves, and those organic jellies which only vegetate like plants, have no more need of nerves than plants. There is, however, in the latter, a central and radial pith which seems to be homologous with nerves, and this may possibly perform some kind of telegraphic function hardly yet observed.

However this may be, there is a systematic difference in all the relational factors of natural evolution, in each organic realm, and in each class of all organic types, whichever medium they inhabit and whatever clime. Where external "organoleptic" elements and forces are the same for all, internal organogenetic moulders differ through the whole diapason of organic evolution. Aganglionic, exoganglionic, mesoganglionic, and endoganglionic organisms, live and move in the oceans, lakes, and rivers of the earth; and all these grades of organism live and move in atmospheric media on land. Internal organic energies therefore, are clearly more potential than external forces in the natural evolution of organic realms. What is the nature of these internal forces, and whence are they derived? That is a question which cannot be answered yet, for many facts in nature, and in human history, require investigation, before a true philosophy of natural and spiritual evolution can be formed. The preceding analysis may throw some light on the problem, and a systematic view of the leading characteristics of evolution may be equally useful. What are these characteristics?

The structural and physiological characteristics are different kinds of vascular *temperament*, alimentary *constitution*, genetic *sexes*, relational *types* of form, *permutations* of state, *complexity* of structure, and *dynamic depths* of vital force, but as this view is rather individual than collective, we may pass it by unnoticed, to examine the

chief characteristics of the epicosmic realms, as a collective unit of organic evolution.

Epicosmic Evolution and Characteristics.

The analysis of the epicosmic realms has been given in our first volume, and therefore we need only notice here the main characteristics of realmic evolution and development, which may be defined as follows:—

Connective Factors.	Z.	Supernal influences of nature.
	Y.	The creation of churches, colleges, theatres, and industries.
	X.	The evolution of laws, sciences, arts, and inventions.
	W.	The evolution of human societies.
Organic Factors.	VII.	Rythmic periods of evolution in realms.
	7.	*Variational modes of evolution in realms.*
	VI.	Potential factors of increase in realms.
	6.	*Muliplicative modes of evolution.*
	V.	Prolific factors of evolution.
	5.	*Subtractive modes of decrease.*
Relational Factors.	IV.	Dynamic depths of life in realms.
	III.	Complexity of structure in realms.
	2.	*Fractional distinctions of epicosmic realms.*
	II.	Permutational factors of evolution.
	I.	*Radiational modes of action.*
	1.	Definite types of organism.

A rapid view of these general characteristics will be sufficient for our purpose, and we shall easily perceive that internal factors are at least as influential as external forces and conditions, in the evolution of all epicosmic realms.

It would be tedious to give a regular analysis of each of these leading distinctions, and therefore we shall notice them successively in a discursive manner. The natural sciences are now becoming popular, and as everybody knows something of geology, palæontology, and zoology, we may suppose the reader sufficiently acquainted with the general facts to be interested in

questions of evolutive adaptation and development. We may proceed at once then to ask what are the evolutive causes of growth and development in phenomenal nature? Individuals are born into the world, and die; collective organisms or species have come into existence and become extinct. The human race has had a beginning on this globe; has increased in numbers and in powers of social organization; has not yet attained to its full development of industrial, artistic, scientific, and religious evolution, and is therefore on its way to further progress before its final mission is fulfilled, and its natural end achieved. We do not know the limits of its social life, as we know the life history of an individual, but we believe that it has had a terrestrial commencement, a progressive evolution, and will most probably have a transitional end. The collective evolution of a species seems as definite and certain as the personal evolution of an individual of that species. We have some degrees of proof of this fact in the phenomena of co-ordinate realms.

What do we mean by this distinction? We mean the evolution of a realm of organisms, and a number of realms, with a visible head and centre of organic unity and government. The individual, the species, and the realm, are different degrees of complex organism. Man is a vertebrate animal, the human race is a collective species, and all the families, orders, and classes of vertebrata, form a complex unit of one general type. On the globe we have a number of different organic realms, and the palæontological history of the earth shows us that not only many individual types have disappeared that once had form and life, but that whole species have become extinct, leaving nothing but the fossil relics of their former bodies, and traces of their footsteps. There has been a gradual evolution, therefore, of realms and

classes, as well as of species and individuals. Not only so, but the globe itself has numerous registers of geological progression; the atmosphere, the ocean, and the land have undergone numerous phases of development, since the time of their incipient formation; and the causes which have brought about these changes are now seen continuing the work of progress in all the Jovian, Neptunian, and Plutonian depths and latitudes of observation. Individual, collective, palæontological, and geological evolution, have special causes which require systematic definition and distinction in the science and philosophy of natural evolution.

We may repeat, however, that external conditions have been less predominant in the progressive evolution of epicosmic nature during the historic period, than the co-ordinate internal factors of human influence and development; and this fact has been remarked by David Hume in his Essays, and by Mr. Buckle in his History of Civilization (vol. i. p. 142).

"Formerly the richest countries were those in which "nature was most bountiful, now the richest countries "are those in which man is most active . . . . From "these facts it may be fairly inferred that the advance "of European civilization is characterized by a dimi-"nishing influence of physical laws (forces and condi-"tions?), and an increasing influence of mental laws "(human, intellectual, and social evolution?). We have "no evidence that the powers of nature have ever "been permanently increased . . . . No reason to ex-"pect that any such increase can take place . . . . We "have abundant evidence that the resources of the "human mind have become more powerful, more nume-"rous, and more able to grapple with the difficulties of "the external world, because every fresh accession to "our knowledge supplies fresh means with which we

" can either control the operations of nature, or failing " in that, can foresee the consequences, and thus avoid " what it is impossible to prevent, in both cases dimi- " nishing the pressure exercised on us by external " agents . . . . If the measure of civilization is the " triumph of the mind over external agents, it becomes " clear that of the two classes of laws which regulate " the progress of mankind, the mental class is more " important than the physical."

It is clear then that the spiritual causes of human evolution are more influential than the physical. In the social evolution of humanity we have an exact parallel between the factors of sociogenesis, preceding the development of all communities, as incarnative forces precede and generate metamorphic evolution in the egg; here we find internal energies as well as external stimulants to action. Human society is not evolved from matter only, but from mental forces, in connection with material organisms. External nature and the food of nations are important items in the evolution of communities of human beings, but body, soul, mind, and spirit, in the individuals are necessary to organize society in its collective form of industrial, artistic, scientific, and religious corporations, joined together in one complex organism of unitary life and progress.

We do not find four kinds of forces in the matter of an egg, such as we find in the nature of the chick, which comes out of the egg; or in the human being who has formed a body in the womb; but we do find four kinds of energy in the nation which forms a collective unity of different families and corporations. In embryogenesis the incarnative forces which transform the matter of the egg, into the living body of a chick, are mysteriously invisible; while in sociogenesis, the subcreative individual beings who form societies and institutions, and

continuously develop and improve the collective organism in its diverse parts, are not invisible, although the process of inspiration and intuition by which new views and powers are evolved in the human mind is really mysterious. Living forces do the visible work, however, in both embryogenetic and sociogenetic operations. But this will occupy us by-and-bye.

Definite Types of Organism.—Whatever the principles of life may be, and from whatever sources they may be derived, one thing is certain; namely, that all the realms of nature have assumed definite forms, which are distinct and different from each other. The constitution of the air is different from that of water, and both are different from the rocks and sands of earth. We cannot suppose that water has been evolved from air, because we know their distinctive elementary constituents are different. We cannot suppose that earth has been wholly derived from either air or water, because we know that many rocks contain other elements, as well as those which are common to the ocean and the atmosphere.

The inorganic realms, then, are not only definite and distinct in form, but different in elemental constitution, and could not possibly be one evolved entirely from the other; although each may be derived from a more complex source of elemental substance.

The types of form and structure are equally definite and distinct in the organic realms, and not less different in their dynamic depths of constitution.

In vegetable organisms we find organic forces in alliance with organic substance; in the lower animals, instinctual energies are superadded to organic forces; in the higher animals, mental and emotional factors are added to the organic and instinctual; while all are more intensely manifested in the human being. And as in physical nature, no one element can be derived from

another, by any process known to man, we may observe that no one kind of living force can be derived from another, by any process known to him. If any kind of *unica substantia* exists, from which all elemental atoms are derived, it is the secret of creation to give definite elemental forms and constitutions to different portions of such radical ethereal matter; and if any kind of absolutely simple *dynamis* exists, from which all living kinds of organic, instinctual, mental, and emotional forces are derived, it is the secret of the Infinite Creator to give definite organic forms and functions to different portions of these forces, in vegetable, animal, and human organisms. The mystery of creation is beyond our ken, but the processes of evolution are, to some extent, within the limits of experience.

Radiational Modes of Action in all Realms.—Radiational modes of action and evolutive adaptation are manifested in the inorganic and organic realms. In the one they are purely physical; in the other, physical and vital.

Physical modes of motion are barological, photological, electrological, and thermological. Organic modes of motion are vegetative, instinctual, mental, and emotional. We need not dwell on the influences of physical gravitation and illumination, nor on those of heat and electricity on the realms of our planet, as the phenomena of solar heat in raising vapour from the sea to form clouds and rain, and those of subterranean heat in the earth, to promote geological mutations and commotions, are familiar to every one. The effects of solar and lunar attraction on the tides and currents of the ocean, with the gradual formation of new strata, are known results of motion and mutation in the sea; just as the influence of solar heat in forming clouds produces rains and rivers, which change the surface of the land, and

help to form new beds of earth in various directions. These influences of physical forces on the pluvial, oceanic, and volcanic phenomena of evolution, are notorious, and need no further mention; but the influence of spiritual gravitation and illumination on the social realms of our globe, is worthy of a passing notice. We may observe, however, that the influence of the sun on our planet, is a constant factor, and that there is a definite proportional ratio of Jovian, Neptunian, and Plutonian action and reaction in the growing changes of the earth, just as there is a definite ratio of growth in the evolution of an individual organism of any kind. It is not a matter of chance and uncertainty, then, but a phenomenon of natural evolution and mutation; the factors of which may be measured, and the laws of which may be discovered.

But what are the spiritual analogues of physical gravitation and illumination, heat and electricity? these have been already noticed in a previous chapter, and we will only add, that religious faith and revelation, inspiration and intuition, are the influences which work on the social realms of nature, and bring about successive evolutions of humanity, just as the influence of physical heat and gravitation, light and electricity, brings about changes in the inorganic and organic realms of nature on our globe; and we have had to recognize this fact, as the foundation of perfective evolution and philosophy.

Permutational Factors of Evolution.—The permutational phenomena of all realms are mainly those of the varying times and seasons of the year, the revolutions of the planet and the different phases of life, in the career of organisms and races. These are also ruled by laws of regular succession; the disturbances of which are balanced by alternate oscillations, within the limits of definite averages and proportions. Geology describes

the changes which have taken place in the crust of the globe, and palæontology observes the changes which have occurred in the evolutions and extinctions of organic forms, at different epochs of pre-historic time.

We have no means of knowing how the earth was formed in the beginning, nor what the forces are, with which it is endowed, as a cosmic body; nor how the inorganic and organic realms upon its surface came into existence; nor how man was first created, when some other types of organism had become extinct. These are questions of cosmogony and of psychogony beyond our depths of penetration; but still we know that by some unknown process, life was breathed into organic forms, and that these forms are not a mere agglomeration of indefinite types, but a systematic order of gradation, and of evolutive adaptation. The same organic laws of constitutive number, distributive order, connective weight, and rythmical measure, are manifest in the collective realms of nature, and in complex individual organisms. The permutations which affect the one, may be as definite and regular, then, as those which are observed invariably in the other.

The life history of many individual organisms is known, and all the permutations of formation, growth, and decline, are more or less familiar. Are these not analogous to those of realmic formation and evolution? And if so, we have a clue to the phenomena of epicosmic evolution in all realms, organic, social, and inorganic.

All the vital forces of a vegetable or an animal exist invisibly, before they are visibly manifested, in the formation of each tissue and each organ. In the human being, the organs of the body, with their transitory annexes, are commenced together, and gradually formed during a period of some nine months of gestation, in a lymbic world. In parallel with these

phenomena, we may suppose that all the vital forces of the epicosmic realms, and their extinct races, exist invisibly, in the planet, or elsewhere, before they are evolved in visible creation; and that many cycles of cosmic revolution may be necessary for their complete development, in numbers and proportions, although they may have commenced to exist, almost simultaneously, as individuals and species.

After a child is completely formed, and born into the world, it undergoes many permutations of growth and development, during its life history, and so may all the species and realms of life on our globe.

But we need not indulge in speculations of this order. Let us rather show the fractional distinctions of epicosmic realms, and their literal parallelism with those of the human body.

Fractional Distinctions of Epicosmic Realms.—In our volume on epicosmology we have shown that the twelve realms of our globe, with the social factors of unity at their head, run parallel with the twelve systems of the human body, and its universal or connective tissues and secretions. This fact suggests that there is definite order and design in the creation of individual and collective organisms; and that the laws which govern one are identical with those that rule in others.

It cannot be by chance that these coincidences happen; and if "natural selection" has any important influence in the origin of species, it must be analogous to those organic instincts which build up the body in utero, and guide the animal through life. It is another word in fact, for the living forces of all animal and vegetable organisms, which are so definite in their attractions and specific evolutions, that different types of form are as distinct in the realms of the globe, as different organs in the systems of the human body. How fortunate it is

that all the elements of bone in the blood run by natural selection into the osseous system, and all the elements of muscle into the muscular system. What a body we should have if all the atoms of the skin were bone, and all the elements of muscle fat. Sometimes such mistakes do happen by natural selection; not, however, as a rule, but an exception. And so in the organic realms of nature, passing deviations from the natural type occur as an exception to the general law of evolution.

Complexity of Structure in all Realms.—The inorganic realms are more or less complex in structure. The atmosphere is formed of nitrogen and oxygen; the water of the sea is formed of hydrogen and oxygen; the rocks and minerals of the earth contain a greater number of constituent elements; and all are organized on the same general principles of functional combination and cooperation. Plants are more complex than minerals in structure and in function; animals are more complex than plants; and human beings, most of all. And this complexity of structure in all realms runs parallel with different dynamic depths of immaterial force and life.

There is, however, a law of definite proportion in all these constituent complexities of structure, and any radical alteration of their respective characters would render the existence of the whole impossible, as an organic unity. Professor Faraday has shown that certain alterations in the constitution of the atmosphere would be fatal to all epicosmic forms of life; and this shows that no fortuitous concourse of atoms has organized the realms of nature on our globe, which are so nicely balanced, in their respective characteristics, that a radical alteration of one would be fatal to the rest. Though not equally complex in structure, they are equally necessary to each other, and manifest the wisdom of design and purpose in their natural diversity.

Dynamic Depths of Force and Life in Realms.—The inorganic realms exhibit physical force alone, in all their latitudes and longitudes of influence and evolution. Plants manifest organic living forces in connection with the physical force and matter of their bodies. The lower animals add instinct to their forces; the higher animals, intelligence and emotion. In man we find creative genius and understanding, which organize social communities, at the head of all the realms.

There are then different kinds of force and depths of feeling, evolved in the social, the organic, and the inorganic realms of nature. Are these forces radically one, or different essentially? We do not know what they are essentially, but we know that they are practically very different, and apparently distinct, in different realms: and it would be as idle to speculate on their possible identity, without evidence of convertibility, as to surmise that all the simple elements of matter are essentially the same though practically very different, and beyond the power of actual reduction.

Procreative Factors of Evolution.—Individuals which give origin to others of their kind, are of different sexes, which may be defined as *fissional*, *asexual*, *bisexual*, and *unisexual* organisms. All the highest types of animals are unisexual, although some fishes, such as the perch, belonging to the vertebrate realm, are said to be bisexual. Snails and many lower forms of animals are known to combine the two sexes in one individual; and nearly all plants are what is called hermaphrodite. Some reproductive organisms, however, are without sexual distinction; and others of the lowest type reproduce their kind by simple fission or division of themselves, into two or more individuals of the same species.

This is the primary view of procreative factors, above which we look for genetic principles, which some philo-

sophers suppose to be contained in the seed alone, or in connection with external forces, while others search more deeply for principiant causes. Aristotle, to wit, observes that "it is evident there must be something which we "call nature, for it is not *anything* (indiscriminately) that "issues from a seed, but a particular body from each "particular seed, and every seed from its own particular "body. The seed is therefore the *beginning*, and the "plastic material of that which is formed out of it. But "prior to the seed, is the (procreative) being of which it "is the seed; for the seed is the genesis, and the final "cause is the existence."

The final cause is the existence, no doubt; but what is the efficient principle and cause of life in the organism, during the whole of its life-history? This is probably what Aristotle meant to include in his definition of the final cause of existence.

We need not discuss these distinctions of prolific origin and efficient incarnation suggested by Aristotle, but observe that different sexes and modes of prolification are provided by nature, for the reproduction of each species, as fast as individuals die and disappear, and even very much faster. Prolificative factors of increase are not, however, the only external agents necessary for the increase and perpetuation of a species; and in the general evolution of a realm, we have to notice other causes of increasing or decreasing numbers.

Multiplicative Factors of Evolution differ in each species with regard to the usual numbers of young produced at one time, as in the case of cows and horses, which commonly give birth to one only at each parturition, while dogs and cats yield several in each litter. The smaller animals are usually more prolific than the larger, and the lower types much more so than the higher. Some fishes spawn their eggs by millions at a time, and

swarms of bees are hatched rapidly in the same hive. This is but one aspect of prolific power, however; for some species produce their young not only more abundantly at once, but much more frequently in a given time. The dog may not bring forth new litters more than once or twice a year, while the rabbit and the guinea-pig, under suitable conditions, produce new litters almost every month, during the few short years of their existence.

Another aspect of prolific power to multiply the species, is that of the parturient career. Some types begin late and finish early their prolific phase of life; others begin early and finish late in their career. There are prodigious differences of fecundity in different species, and their respective powers of multiplication within a given time differ with the various factors indicated in the table. Nor are the prolific powers of increase, in a race, the only causes of multiplicity of species: for these are multiplied again by other influences, which raise them from the simple to the compound or potential degrees of increase.

Potential Factors of Evolution.— The prolificative powers and habits of increase are raised into a higher power by the surrounding conditions and means of sustenance. And besides the power of sustentation there is a power of conservation of the organisms once brought into existence, without which the rate of increase would be checked by premature destruction. Distributive powers and conditions are also secondary causes of increase, where a species can find room for its new offspring, by spreading into regions more or less unoccupied and fit for the reception of colonizing swarms. Prolification, sustentation, conservation, and distribution are potential factors of evolution, which bring a species, or a host of different organisms of all kinds,

to the utmost limits of collective evolution, in a given time.

But there are variations in all these potential agents, which cause acceleration at one time and retardation at another, in different regions of the globe; and there are destructive causes which counteract the powers of multiplication at every point. As fast as the reproductive factors increase the numbers of a species in one direction, the subtractive agencies diminish them in another. What are these destructive incidences?

Subtractive Factors of Evolution.—It is well known that seeds and eggs are consumed as food for man and other creatures. Great quantities of wheat, oats, barley, rice, and many other kinds of grain, are used as food, and not as seeds for reproduction. More than ten times as many grains of wheat are used for bread, as for seed to plant in the earth to reproduce their species. The eggs of fowls are also consumed as food in millions of millions every year. The spawn of fishes are consumed by other animals in countless numbers. These facts are so familiar that we need not dwell on them, and it is obvious that all such premature destruction of prolific elements in the germ, is a check on the natural increase of the species thus exposed to counteracting agencies.

Young animals and plants are also surrounded by numerous destructive forces. They are prematurely destroyed by violence or accident, and mainly to serve as food for other creatures.

Disease and want, drought and famine, are destructive agents, which often intervene to shorten life, and thus diminish the natural powers of increase in every species. And where disease or want do not destroy the life of individuals, before the natural term of their existence, this limit puts an end to their career by natural death,

so that subtractive agencies in one or other of these forms are always counteracting the powers of increase in both animals and plants. What then, are the natural limits of variation between the constant powers of increase, and those of parallel destruction, in the general evolution of individuals and species on our globe ?

Variational Factors of Evolution.—The limits of variation between increasing rates of reproduction and destruction are not easily discovered, but we may see that they are very closely connected with the general evolution of the inorganic realms. All vegetable organisms depend upon the influence of sun and air, soil and water, which supply them with the means of sustenance, without which, in due proportions and conditions, they cannot thrive and reproduce their species. All animals depend upon the same elements and influences, along with the flourishing condition of the vegetable kingdom. The lowest forms of animal and vegetable life not only reproduce their own species where the inorganic elements and forces are favourable to their evolution, but they serve as food for higher organisms; and this double function of heterogeneous sustentation and homogeneous reproduction, belongs to every species, high and low, animal and vegetal.

There are then, two great factors of variation in the numbers and developments of species. 1st. The influences of sun and air, soil and water, which are ever changing in some unknown degrees of acceleration and retardation. 2ndly. The varying relations of organisms, which prey upon each other, and are preyed upon. War, pestilence, and famine, not to mention other causes of depression and prevention, are constantly recurring causes of perturbation in the potential factors of increase. We have no means at present of calculating the forces

of action and reaction in all these data; but we know that they control the relative powers of prolification, sustentation, conservation, and distribution, in the human race, and in every species of animal and vegetable, on the earth and in the sea. We know also, that other things being equal, the human race has power to multiply and foster certain species, and to destroy others in large numbers, even up to the limits of ultimate extinction. By the natural process of evolution, before man appeared upon the earth, certain species have appeared and disappeared, and others may possibly become extinct in time, with or without the agency of man, especially in the ocean.

What was the origin of all the different types which have come into existence? What have been the causes of extinction, where the race is lost? These are puzzling questions, involved in mystery, which some answer by one hypothesis, and some by another. We do not know how they came into existence, but we know that by whatever processes they were evolved, that nothing comes from nothing, and that all forms and forces before they become manifested in phenomenal existence, must pre-exist in nature. All forces are indestructible; all principles eternal. Whence it follows that whatever becomes visible by evolution, was in existence before the process. All visible forms and forces are evolved from invisible forms and forces, as they cannot be evolved from nothing. Even the form of a locomotive engine was in the invisible mind of the inventor, before it was in the visible matter of the mechanism.

The variational factors of life are controlled then, by supernal forces, physical and psychological, but we have no means of measuring the limits of their oscillations between potential increase and decrease

on our globe. We can note the actual state of things, and form conjectures of the future limits and degrees of evolution, but that is all. We may nevertheless see that evolutive factors run in parallels, and that the laws which govern individual mutations are the same as those which govern collective evolutions. In the metamorphic apparition of a chick in the egg, we see a constant process of increasing cell formation and organic combination, until nearly all the primary pabulum has been absorbed; and then commence a series of assimilative processes and waste, within the body, which is all in favour of increasing growth, until the natural limits of bulk have been attained, after which, a time of nearly equal balance between loss and gain arrives, which in its turn is followed by a process of decline. In all such cases we observe that predetermined limits are affixed, not only to the life, growth, and stature of the individual, be it an eagle or a sparrow, an elephant or a tiny mouse, but that regular phases of development for each are predetermined. Infancy, youth, maturity, and decline are common to them all, while their respective limits of size and cycles of evolution are very different.

The systems of the human body are gradually evolved in simultaneous order and successive stages, but when once completely formed, they have the same career to run; and possibly the epicosmic realms may be gradually formed in simultaneous and successive creations, to run an equal course of active co-operation on the surface of the planet, when once they have been normally developed. The social realms are evidently not completely formed as yet, and possibly the others may be only partially evolved, but we have not sufficient data for deliberate induction on such questions.

We see that different types of organism are repro-

duced and die, much faster than others in the realms, but do not know that waste and assimilation occur much faster in one organ than another, in the human body, although many facts have been observed which lead us to believe it is so. The cells of muscular fibre, bones and ligaments, and other tissues of the body may be very unequal in the wear and tear of life, and in their natural velocities of cell renewal and decay. In both the organs of the body and the realms of nature, collective systems may endure together, by perpetual renewal, although the elementary constituents of each have different periods of revolution; cells being oftener renewed in one tissue than another: individuals having shorter lives in one species than in another.

The Rythmical Factors of Evolution.—Here we enter upon limits of calculation more within our reach. The phases of individual evolution are within our powers of observation. The life history of individual man is equal to that of most other organisms, and that of the human race surpasses the life of any individual plant or animal. The times of gestation and birth, youth and puberty, reproductive activity and the crisis of sterility, senile decay and death, are known in man, and in many other species; and their relative proportions are easily determined. The period of human gestation is seven or nine months; that of impuber youth varies between nine and sixteen years; prolific capacity in woman varies in different climes and races between the ages of nine and thirty-nine, or fifteen and fifty-five; the period of decline may vary between the ages of fifty and a hundred. The average periods under favourable circumstances, may be reckoned at nine months for gestation, a year for lactation, seven years for the first dentition, fourteen years for the state of

childhood, from thirty to forty years for the prolific phase of life in woman, and from twenty to fifty years for the declining phase of life.

These phases of evolution are very unequal in different individuals. In a general definition, we might say twenty years for youth, thirty for virility, and twenty for decay, equal seventy years; but this is merely an average calculation; the natural rythm is somewhat different. The unprolific phase of youth in temperate climates is about sixteen years; the prolific phase of adult life about thirty years, and the senile phase of sterility often more than forty years in women, though less in men.

In different species all these rythmic cycles differ. The phase of incubation varies from hours to days, and weeks, and months. The phase of unprolific youth may vary in similar proportions as well as the respective phases of reproductive activity and sterile decline. From the smallest insects up to the highest types of animals, the times of each successive phase are widely different. They are, however, easily ascertained and measured in all cases, where the life history of individuals is carefully observed. It is not the factors of individual evolution which are difficult to analyze and estimate, but those of collective evolution in a species, and more especially in the human race. We have, nevertheless, certain data for such a calculation.

In the first place, the human race upon our globe is the only species which is capable of forming a social organism. All the other species are but annexes to humanity, in the womb of time; and like the annexes of an individual fœtus in the uterus, they remain more or less stationary in structure and in function, while the permanent organs of the body are undergoing a continuous process of metamorphic evolution, to pre-

pare them for a future career of complex organic unity and community of life. When the phase of gestation is complete, annexes are cast away as useless, and a new period of evolution commences under new conditions. This parallel seems not improbable for the social organism of humanity, for many animals which now infest the globe seem useless to mankind, and will necessarily become extinct when human societies can conquer the places encumbered by inferior species. The food which now sustains these lower types will then become available for greater numbers of our race.

In following this track of thought, we can easily see that, although individuals exist in sufficient numbers, the social organism of humanity has not yet passed through its metamorphic phase of evolution; that its collective organs are not yet fully formed, and brought together in connective unity; that only the rudiments of a few of these organs have been hitherto evolved; and that the metamorphic processes of corporate, domestic, municipal, and national association, are busily at work in some parts of the globe, and very sluggishly in others. When we come to deal with sociology in parallel with the known facts and laws of biological science, we shall see that it is easy to determine how far the metamorphic processes of collective evolution have progressed, in parallel with those of individual gestation; and what remains to be accomplished by these processes, before the organism is completely formed. We have to analyse the general factors of social evolution; that is to say, the formation of human societies, the discovery of laws and sciences, arts and industrial instrumentalities, as well as the creation of churches and hospitals, schools and colleges, theatres and museums, machines and manufactories, roads and canals, with all the monuments of human art and industry which man,

under the guidance of inspiration, from the spiritual world, and stimulation from the forces which surround him, has raised, or may construct, upon the surface of the globe. We have to examine the influence of mankind in the gradual improvement of organic races, and of soils and climates, in addition to the ordinary factors of progressive evolution. We must come nearer to the facts within the reach of our experience, and endeavour to obtain some knowledge of the principles and processes which rule the phenomena of sociogenesis, in civilized communities, destined to "subdue the earth and have dominion over every creature." It is in this department we may hope to find a clue to the general laws and principles of evolutive science and philosophy.

Connective Characteristics of Evolution.

Besides the evolution of inorganic and organic realms, we have to notice the social evolution of humanity, as a collective species, with the creation of laws and sciences, arts and inventions, which increase the power of nations, and enable them to act upon subordinate forces under the influence of providential guidance.

This has been, to some extent, explained, and requires little more than a general notice in connection with the question of natural evolution in epicosmic realms.

The first great question to be mooted, is that of the difference between creation and evolution. Is there any difference in the meaning of these words, applied to the morphological evolution of individual and collective organisms? We have no doubt there is; but some philosophers seem to think that there is not.

In the morphological evolution of humanity, we see that individuals are created and perpetuated before political society is formed, and that sociogenesis, in many points analogous to the phenomena of embryo-

genesis, is still a very different thing; insomuch as we can easily distinguish the pre-existence of individuals, from the gradual organization of a community; whereas we cannot easily demonstrate the pre-existence of an individual soul, before the gradual formation of its body in the womb.

We can easily determine, however, that the plan of the human body, and the plan of a perfectly analogous social organism, exist before the individual body is formed in utero, or the social organism is developed in the womb of time. We can variously demonstrate, also, that laws and forces are eternal and indestructible before and after they have been phenomenally manifested, in a given transitory form. Whence it follows that, whatever is visibly evolved in this world, existed potentially before it was developed; and will continue to exist, in some state or other, after it ceases to be visible on earth.

How, then, do immaterial living forces, previously unknown to us, become gradually manifest in plants and animals of different types; in individual human beings, and in collective social organisms?

Is physical force transformed into organic force, by some unknown process of convertibility? and this again transmuted into instinctual, intellectual, and moral force, by some organic alchemy? No such facts are known to man, in his experimental arts; and nothing warrants us in drawing such conclusions. That which is certain, with regard to the evolution of the human mind within the natural body, and the evolution of the arts and sciences, within a social community, is, that these unseen forces, from being in a previous state of latent potentiality and invisibility, become actively developed by slow degrees of evolution, in the individual and collective organisms.

All the physical forces of the human frame, from the very first month of uterine formation, and during the whole career of the mortal life, are manifested differently in each organ, and each system of the body. The skin differs from the muscles, these differ from the bones, which again differ from the nerves; while the stomach and intestines differ from the air vessels and the blood vessels, which again differ from the organs of the generative system. None of these spring from one another. They all arise together, and independently, from a common source of plastic matter, first transformed into cells very much alike in shape and size, but giving origin to different sorts of tissue, which combine in various proportions, to form very different organs.

The origin of different species of cells and tissues, organs and systems, from one common mass of homogeneous substance in the ovum, is not by the gradual mutation, then, of one kind of individual cell into another, to form different classes of tissue; nor of one class of tissues into another, to form different organs and systems in the body.

The formation of the body in the womb is a gradual process of organization, and the growth of the body, after birth, is a process of gradual development, by which invisible or latent organic forces become feebly manifest in complex unity at first, and forcibly, in adult life.

The mind of man is also feebly wrought in infancy, and forcibly in adult life. The mortal body is a slowly acquired sum of physical forces and organs; the experiential mind is a slowly acquired aggregate of ideas and faculties; but what are the latent forces of the ontological being, which become manifest in these adventitious organisms? for we may call them adventitious, in so far as we know them to be formed by the gradual

accumulation of matter only, in one case, and the gradual association of ideas, in the other. The stones of a building do not form themselves into a house or a palace; the complex elements of an egg do not form themselves into a chick.

Whatever be the type and nature of the living force which forms the primary cells, by successive segmentations of the yolk, during the period of incubation, these cells, when formed, are not identical in essential nature; for they constitute the elements of tissues which are very diverse in texture and in character; and these, again, combine in various proportions to form special organs and general systems, which are very different in structure and in function. The cells, the tissues, and the organs differ from the first, then, and are differently modified in their progressive evolutions.

We find the facts to be exactly parallel in the formation of the social organism. Whatever be the nature and the origin of the invisible forces of the human soul, which organize the body in utero; when once the individuals of the race are multiplied by successive segmentations or parturitions, the individual organisms are different in instincts and vocations; some form industrial and commercial corporations; others gravitate to literary and artistic, or poetic and dramatic habits of activity; others again, to scientific and philosophical investigations; while all are more or less alike in their domestic, social, and religious tendencies, to unite in special and in general communities.

What is the cause of these instincts in individuals, who have so marked a tendency to club together in different vocations and pursuits, according to a predetermined plan of organization, and community of action? Can it be chance, alone, or the "fortuitous concourse" of these living atoms? The fortuitous concourse, and

promiscuous intercourse of Australian savages, African negroes, and American indians, without special guidance, do not fall into the same elaborate forms of organization, as the European nations under the guidance of revelation from a higher world of love and wisdom, will and understanding. There is evidently a mysterious world of living forces, above and beyond this nether world of ignorance and darkness; from which unseen world, all visible organisms derive their origin, and to which they yield their vital forces on giving up the ghost.

What is the difference between latent physical force (heat, light, electricity, and chemical affinity), before it is manifested by these modes of motion, and while it is being thus evolved? Is it not merely the difference of a mode of motion, or of tension? What is the difference between invisible organic force and life, before life is manifested in phenomenal modes of motion, and while it is being thus evolved, in the mortal body? Is it not merely a difference between modes of motion, or of tension? It cannot possibly be anything more than this, if all forces are indestructible. The question, therefore, resolves itself into this form; what becomes of the living forces of the soul of man, after they quit the mortal frame? And whence come they, from an invisible state of tension or activity, into a visible form, with definite modes of motion?

Revelation and religion furnish the simplest and most intelligible answer to these questions. The supernatural in this view, being quite as positive as the natural; just as latent forces and modes of tension in physical forces, are quite as real as visible modes of motion.

A thousand millions of human beings inhabit the earth; and some thirty thousand of these disappear every day, and are replaced by about as many new-born infants. Where do the departed spirits go? Where

do the infants come from? Do thirty thousand people, old and young, go to nothing? and as many come from nothing, every day?

Not only human beings, but animals, die out and disappear in myriads hourly, and are replaced by others of their kind. Do these organic forms and forces come from nothing and return to nothing? Are there no animal forces in creation but those in actual visible existence which are incessantly departing, although replaced by others? Is matter in the form of eggs, the only source of all new animal and human forms and forces? of all new manifestations of intellect and genius, in each new generation of mankind? These questions are very much involved in mystery.

We know, however, that all evolutions are gradual formations and developments of unknown pre-existent forms and forces, into visible shapes and modes of motion. Individual organisms are gradually formed in the fœtal process of gestation or incubation, and slowly developed by growth and evolution; collective social organisms are formed by progressive modes of association, and slow developments of perfective evolution. The organic realms of our planet have been successively introduced, and developed together in their different classes, orders, families, and species. By what particular processes, we do not know; nor in what period of time; but we know that evolution, in all cases, means the continuously increasing manifestation of unknown pre-existent forces, in visible forms and modes of motion, up to a certain maximum point of predetermined development; after which, a continuously declining phase of power and velocity of motion sets in, until the transitory destiny of these vital forms and forces has been fulfilled, and that which was visible, is visible no more, in this world, whatever it may be in any other.

The mystery of visible and invisible life and form, is deep and dark as ever. What becomes of the human mind while the body is asleep; or in a state of trance? What becomes of the vital energy of a plant, or of an animal during hibernation? What becomes of the human soul, when it leaves the body? Who knows, or could know, if the mystery of a future life were not revealed by supernatural agency in this world, and in accordance with natural laws, although by exceptional modes of action, which are deemed miraculous?

Whatever be the processes of creation, and of evolution, this question remains the same. If God created special germs of organism at first, from which each species of animal and vegetable is developed, and enabled to perpetuate its kind, each species is destined to pursue a certain career of phenomenal existence, and then disappear. It may or may not be subject to perfective evolution, in all conditions; but however much or little it may be subject to this process, its terrestrial career is limited and mortal, although the species cannot perish, as a vital and eternal force. Whether or not, one species may be transformed into another, by the "superposing of modifications upon modifications," we cannot tell; nor does it matter, philosophically, whether creation and evolution be one and the same process of "an ordained continuous becoming of organic forms," or distinct successive operations; for the result is certainly a "continuous evolution of indestructible pre-existent forms and forces, in temporary visible modes of motion, life, and organization; and the inconsiderate sneers of men of science, with regard to "a *qua-quâ*-versal proposition of this kind," are merely spurts of temper, which need no refutation.

The evolution of organic realms bears some relation to the evolution of the earth, as a member of the solar

system; but what the rank and age of our planet may be, we cannot tell; nor do we know what the importance of an epicosmic world may be, to the orb on which it is developed; or to the solar system to which that orb belongs. There is no doubt, however, that epicosmic worlds are parts of cosmic orbs, as these are parts of a collective solar system; and that the evolution of both physical and metaphysical forms and forces, is a part of the natural formation and development of each fraction of a complex integral unit. And not improbably the organic realms on our globe are to the organism of the planet, nothing more than the peripheral nerves and glandular follicles of the skin are to the body of an animal.

What is evolution, but the gradual outcoming of something which already exists, as a principiant eternal force? What are principiant forces but invisible factors which assume a visible shape, in elemental substance and experiential conditions?

Something unseen and unknown to us, assumes a form which is definite and knowable; and, after upholding the mortal body for a time, leaves the organized matter to fall into chaos, while the animating spirit becomes occult, or hidden from the sight of natural eyes.

As the designing mind, the plan, and the uses of an edifice become known by progressive steps of construction and ornamentation, furniture and occupation, so the ontological potentialities of an individual or of a collective organism, are "continuously becoming" more completely and perfectly manifested in phenomenal forms and modes of action, by successive phases of evolution. And, as individual complex organisms and evolutions, are but mutational parts of persistent collective realms and evolutions on our globe; and as these, again, are but subordinate portions of the globe itself, as an indivi-

dual complex unit of a higher order, the lowest of these factors is involved in the highest; so that, we have at least three definite degrees of evolution, within the reach of observation and analysis; namely, 1°. Individuals and species; 2°. Existing realms and classes of epicosmic types; 3°. The geological and palæontological history of all these realms.

The organic and evolutive factors of these degrees of complex unity, must be subject to regulative laws of formation and development; and whatever be the differences of power and dimensions, in these organisms, with regard to intellect and physical force, or periods of manifestion and occultation, the laws of structure and development, must be similar in relational proportions; and therefore we can form an estimate of the unknown forces of planetary and of realmic evolution, from the known laws of individual evolution, which are within the reach of observation. In all cases we may discern that complex organisms have a beginning and an end, in visible existence; and that, between the limits of these two extremes, forces and forms which were occult in a pre-existing state, become gradually evolved in a visible state, and then suddenly become occult again, in a supersensuous world of invisible potentialities.

The fœtus, the infant, the youth, the adult, the mature, and the aged man, are one and the same individual spirit, through all these phases; though not experientially developed with equal degrees of power and completeness. The different phases of individual existence in animals and plants, are exactly parallel phenomena; and we may readily conceive that individual suns and planets pass through like phases of evolution in their phenomenal existence. Individuals have much shorter leases of mortal life, than the species

to which they belong; some of these, again, are known to have had much shorter periods of phenomenal existence, than the class of organisms to which they belong. The realms themselves have not commenced to show their first appearances together, on the surface of the planet; nor have they progressed together with equal strides of advancement or decline, in the history of epicosmic evolution. The inorganic realms precede organic realms in their formation, and will naturally be more slow to disappear as elements of epicosmic unity. These, again, are subordinate to the formation and the evolution of the planet, as a cosmic individual, whose mortal career may be much shorter than that of suns and fixed stars, though not as brief as that of satellites. Small crows, however, outlive some huge animals.

A collective realm of transitory organisms is subordinate then, to the globe, on which it is developed, just as the moulting hairs of the human skin are subordinate to the life of the body; and, therefore, we may infer that collective species have ascending and declining phases of phenomenal existence, just as individuals have; and by a careful study, we may possibly discover the degrees of evolution already accomplished in any realm or species, such as that for instance of the human race, which has evidently been slowly increased in numbers, and here and there improved in discipline, since the beginning of history and civilization.

David Hume, in his Essay, " on the Populousness of Ancient Nations," says that " stature and force of body, " length of life, even courage and *extent* of genius, seem " hitherto to have been naturally, in all ages, pretty " much the same. The arts and sciences, indeed, have " flourished in one period, and have decayed in another: " but we may observe that, at the time when they rose " to greatest perfection among one people, they were per-

" haps totally unknown to all the neighbouring nations;
" and though decayed in one age, yet in a succeeding
" generation they again revived, and diffused themselves
" over the (civilized?) world. As far, therefore, as ob-
" servation reaches, there is *no universal* difference dis-
" cernible in the human species; and though it were
" allowed that the *universe*, like an animal body, had a
" natural progress from infancy to old age; yet as it
" must still be *uncertain* whether, at present, it be ad-
" vancing to its point of perfection or declining from it,
" we cannot thence presuppose any decay in human
" nature."

Here we find the idea of human evolution feebly entertained, and loosely defined. By *extent* of genius, the author must have meant that of distribution only, amongst civilized nations, in successive ages; for he cannot have meant the importance of scientific discoveries and inventions, which are immensely superior in modern times. By the words *universal difference* in the human species, he must have alluded only to the relative proportions of civilized and uncivilized races on the face of the earth, at any given time; but so far from "presupposing any decay in human nature" from such uncertain data, we have abundant evidence of the ascending evolution of humanity from a state of social ignorance and weakness, to a state of rapid progress in the industrial and commercial, literary and artistic, scientific and philosophical, social, religious, and political organization of society in Europe and America, as well as in some parts of Asia and Africa, Australia and Polynesia. Certain races or nations have, no doubt, declined in arts and sciences within historic periods; and others have remained untutored savages, from the earliest periods, in some portions of the globe; but where the polished races have abandoned heathenism for Chris-

tianity, there is no doubt of their ultimate regeneration and improvement, although inferior tribes, which have never been reclaimed, may possibly die out, and be supplanted by superior races, as humanity advances in its collective evolution from a state of hostile chaos, to a state of organized peace and community of interests.

What may be the providential reason of continuous incapacity, in certain tribes of humanity, we cannot tell; nor why a few chosen people should have been under the special guidance of religious revelations; but one thing is evident, even among the most civilized nations, namely, that the highest truths of religion and philosophy can only be received into the understanding of a man, a woman, or a child, in accordance with the actual capacity of such an understanding. All minds reject that which is incomprehensible to them, however true; just as all stomachs reject natural foods, however good, which are indigestible with them, and consequently would be hurtful, if ingested. Hence we see that minds which want only literal forms of truth in revelation, revolt against spiritual interpretations of the word: and others, again, who can only receive natural phenomena as revelations of creative will and wisdom, reject all spiritual forms of revelation. There are then different castes of mind, and different vocations of genius in humanity, even where the race is civilized; and there are different degrees of understanding and perfectibility in different races. Some untutored tribes are little more than animals; others have industrial instincts more developed; others again have artistic tastes, religious sentiments, and intellectual endowments of a high degree; but these are relatively few in number, and their function is to educate other nations. And here, again, we may observe that where men of science are equally conversant with the facts and laws of physical

nature, the faculties of spontaneous induction and of philosophic penetration differ in accordance with peculiar idiosyncracies of mind, and different modes of thought.

A man's philosophy defines at once the depths of his ontological spirit, which have been evolved in his experiential life, and those which have not yet been evolved, or only rudimentally.

An atheist cannot penetrate below the surface of physical forces and phenomena, either by deliberate investigation or spontaneous induction; and thence denies the existence of a Creator. A pantheist cannot discern anything beyond the unity and community of all kinds of forces, physical and instinctual, moral and intellectual, in the cosmos; and thence denies the existence of a supernatural world, and a transcendental power, above creation. A deist is impressed with the evidences of design in the creation, and thence concludes there must be an Intelligent Creator of all worlds; but cannot believe the facts of mystical experience, and revelation from a supernatural world; and thence denies the validity of spiritual inspiration, and attributes the discovery of truth, of every kind, to intuition only, or the natural activity of the experiential mind.

A spiritualist or anthromorphic theist, has a deeper kind of experience, which enables him to embrace the Christian revelation, and penetrate beyond the depths of visible nature into those of spiritual unity and divinity in the ontological, the supernatural, the natural, and the lymbic or intermediate worlds and aspects of finite and infinite being. With him, that which is invisible and eternal in man, corresponds to that which is invisible and immutable in God, and in spiritual nature; while that which is visible and mortal in man, corresponds to that which is visible and transitory in creation. He distinguishes organic vital forces from physical connec-

tive forces, and forms equations which show the relative proportions between them in all measurable phenomena. He sees a fox as cunning as an elephant, though not endowed with the same amount of physical connective force and matter; and man endowed with more intelligence than either, though differing from both in physical weight and measure. He sees a small amount of physical force in man, connected with a vast amount of understanding, which is able to conduct the body in all modes of action; and to regulate immense amounts of physical forces in a steam engine; which forces are collected by his agency, and set in motion, or held in check, at his bidding. The physical power of heat and light, electricity and gravitation, set in motion by his will, and governed by his understanding, is enormous in many cases of industrial application; not to mention the colossal operations and appliances of armies and navies, and other social and religious, or political aggregates of physical and intellectual forces. In all these cases we observe that mind rules matter; organic forces give form and character to inorganic or connective forces.

Nothing that we know of endures for ever, in a given form; but intellect, as far as we can follow nature, in her multifarious phenomena, presides over all modes of motion and mutation. An automatic mechanism, such as that of a clock, or a locomotive, a wind-mill, or a water-mill, are governed by intelligence and subject to decay, as well as living organisms. Suns and planets are constantly undergoing change, and must wear out in time, as well as other mechanisms and organisms; and some creative intellect must give new cosmic bodies form, and regulate their motions, whether we regard them as mechanical automata, or as vital forces; and this intelligence must be, and is, invisible to us, just as the intelligence which invents a locomotive, or guides

a railway train in motion; or that which animates the body of an engine-driver, is invisible to us. All forces are invisible and immaterial; and, therefore, the question of understanding, or not understanding the laws and energies of nature, is not a question of physical visibility, but of intellectual penetration and discernment. No amount of rationality in man could teach an animal to understand one of the sciences; no amount of penetration in one class of minds, could teach a different class of minds to understand that which is beyond their powers of comprehension. It is useless, therefore, to expect children, or undeveloped minds, to understand principles beyond their present powers of apprehension; but not exactly useless, to prevent young men from thinking that older men of science have reasonable grounds for philosophical inductions, which are much more negative than positive, plausible than rational.

With regard to the inductions of evolutive philosophy, we must be guided by a careful analysis of facts and principles. We know that the growth of life and intelligence in man is gradual and slow; that the evolution of the arts and sciences is slow and gradual; we know that the bodies of each new generation of animals and men are derived from the material secretions of their congeners of the preceding generation, and sustained by the ingestion of external elements; but we do not know that one generic type of animal has ever been derived from a different type, by gradual and slow changes of form and size; and the few known facts of unstable variation which suggest the idea of a possible slow transformation of one type into another, do not amount to anything like a proof of such a mode of evolution, as the origin of species.

There must be something peculiar in the present phase of human progress, for the minds of a large por-

tion of the public, to be more inclined to fancy that nature is organized and ruled by chance, or by the force of law without intelligence, rather than suppose it is the result of creative intellect and will, ruling by eternal laws, in all its operations and designs. The magnitude of matter, and the force of gravitation, seem to impress the mind in such a state, more than the majesty of intellect in the human form divine. An elephant is larger than a man; a locomotive and a railway train are much more physically powerful and awful than an elephant; a massive planet and a fiery sun are more voluminous and awful than a railway train; innumerable hosts of fixed stars, more wonderfully vast in volume and in space than any notion of intelligence, which is invisible and supernatural. Eyes they have and see not, ears they have and hear not, the beauty and the harmony of spiritual love and wisdom, will and understanding, in the modulations of life and organization, motion and mutation, in all the finite organisms of creation.

Let us not, however, misunderstand the providential reasons for the continuous existence of the infant state of mind, and the various degrees of adult powers of penetration. They are important factors of collective evolution.

We need not dwell on the necessity of an incessant removal of imperfectly developed minds, incapable of further education from the world of evolutive progress, and a perpetual introduction of new minds, susceptible of better culture. That is self-evident; but what are the providential uses of atheists, pantheists, and deists, as instruments of human progress? Atheists, unable to penetrate below the surface of physical nature, are led to give their undivided attention to the investigation of natural forces, laws, and sciences, and often make dis-

coveries in this direction, which would not be made by those who give their whole attention to other aspects of nature. Pantheists moot questions of organic unity in all the forces of the universe, which are not thought worthy of attention by atheists, who are satisfied with such notions as those of the "fortuitous concourse of atoms," and the "polarizing forces" of chemical elements. They may not get beyond the ideas of "*a unica substantia*," with attributes of thought and extension; but they believe that living thought is co-extensive with the physical cosmos; and this is more than atheists can understand. Deists go beyond the notion of mere living forces, and investigate the laws of order and design in the creation, from which they infer the necessary existence of a creative mind; although they cannot trust the evidence of mystical experience with regard to the existence of a supernatural world, and a conscious future life for man. They are nevertheless, prone to analyze the human mind, and look for ontological principles of law and order in psychological phenomena, which are classed with attributes of matter, and as much distrusted by atheists, as mystical experience and so-called miracles are suspected of illusion and imposture by incredulous deists.

The physical sciences then, are more assiduously and minutely cultivated and developed by atheists generally, than other kinds of knowledge; the natural sciences of botany and zoology, anatomy and physiology, are more assiduously and minutely cultivated and developed by pantheists than by atheists, while deists cultivate psychology and the moral sciences, as well as comparative anatomy and physiology.

And now we may observe, without offence, we hope, that all these natural sciences have been more steadily, systematically, and fruitfully cultivated by all classes of

sceptics than by true believers, until very recently, and that even now, comparatively few sound Christians are engaged in the systematic study of the natural sciences, which are so necessary for the further progress of the human understanding. They will no doubt increase in number, under the guidance of Providence, for it is evident that unbelievers cannot penetrate into the spiritual depths of nature, and harmonize the laws of being in all degrees of individual, collective, co-ordinate, and ultimate complexity.

We have known good men and women amongst professed atheists, pantheists, deists, and Christians; and we do not know that immorality, or even criminality, is much more common in one sect than in another; but we know that within the limits of our own experience, peace of mind, and hope, and faith, and charity, to the extent of self-denial and self-sacrifice, are much more common amongst believers than amongst any class of sceptics.

It is nevertheless true that unbelievers are generally more progressive in their sympathies and modes of thought, than rigidly "orthodox" fanatics, who are often more conservative of that which is adventitious, obsolete, and obstructive, than of that which is essential in social and religious doctrines and institutions. Incessant controversies are, however, as important in the atmosphere of thought, as perpetual motion in the physical atmosphere, while violent tempests and revolutions are equally unwelcome, though sometimes apparently inevitable.

DIVISION IV.—CONSTITUTIVE PHILOSOPHY.

THE facts and laws of the visible creation are the data of this division. The analysis of living forces in different realms of organism, and their connection with matter and inanimate forces, such as heat, light, electricity, and chemical affinity in mortal bodies, is the definite purpose of organic science and philosophy. What are the different kinds of living energies in plants and animals, in human beings and societies? What are the depths of nature in organic realms, the schematismus corporum, and the laws of order, in creation?

It is clear that the physical forces of heat, light, electricity, and gravitation, in the inorganic realms of matter, are quite distinct from the hyperphysical forces of life and organization, instinct and volition, in terrestrial organic realms; and although purely physical modes of motion are correlative and convertible with each other, no amount of human ingenuity has ever yet been able to convert inanimate connective forces into living energies. There are then deeper depths of life in the visible creation, than those of physical gravitation and illumination, magnetism and electricity. It has been said that a problem well defined is already half solved. What then are the problems of philosophy? How are they to be defined?

The synthetic unity of nature is the question we wish to understand in its constitutive, evolutive, perfective,

and transcendental aspects. How and where are we to look for the eternal principles of unity, in these four aspects? We can look for them in all the organisms within the reach of human experience and analysis; and, as the leading causes of life and organization are the same in all organic worlds, we have in any one complex organic unity, a type of all the rest, however far removed from our experience, the ultimate degrees of power and immensity in any unknown world may be.

We have seen the transcendental, the perfective, and the evolutive aspects of ontology, and have now to analyse the constitutive factors of synthetic unity. Where shall we look for these? In the natural delimitations of phenomena, which may be thus defined in outline:

1. Individual organic unity.
2. Realmi-social organic unity.
3. Mundi-coordinate organic unity.
4. Ultimo-cosmic organic unity.

The first of these distinctions is represented in all individual organisms, animal, vegetable and mineral; and the highest known type of individuality, is that of man. The second is represented in the epicosmic realms of our earth. The third includes the unity of epicosmic realms with the planet; and the fourth extends to the whole physical cosmos. The first and second are within the reach of positive science, while the others are but partially accessible to direct observation and analysis.

The data of organic science, then, within the reach of observation, are found in the organic, and the social realms of nature on the surface of our globe, and as these have been analysed in a previous volume (epicosmology) we need not recapitulate them here. The analysis of the human body is the key to that of the

soul, and these together, are the key to all organic systems in creation. The most universal application of these views is that of the classification of the arts and sciences, with the industries and institutions of human society; and, as individual, collective, coordinate, and ultimate organisms and worlds are constituted on the same eternal principles, we need not dwell on illustrations which are only repetitions of the same primordial laws and energies wherever we direct our gaze, on the visible forms of matter.

The factors of organic structure, revealed to us in the seven systems and the five senses of the human body, with their connective tissues and secretions, are illustrations of the principles of visible unity, in every realm of nature; but the classification of the sciences is the first general application of organic method; and we may give a systematic outline of these, as the best exponent of philosophical induction and deduction.

Classification of the Sciences.

Ontological Sciences.

Z.	Transcendental philosophy.	4. Transcendent Deity. 3. Cosmogony. 2. Psychogony. 1. Eternal laws and principles.
Y.	Perfective philosophy.	4. Religious providence. 3. Biblical criticism. 2. Doctrinal theology. 1. Organic principles of religion.
X.	Evolutive philosophy.	4. Natural incarnations. 3. Degrees of organic evolution. 2. Evolutive doctrines of philosophy. 1. Organic principles of evolution.
W.	Organic philosophy.	4. Natural plans of structure. 3. Comparative forms and ranks of organism. 2. Organic interpretations and philosophy. 1. Organic principles of classification.

Classification of the Sciences—continued.

Cosmological Sciences.

- **VII. Pancosmic realms.**
  - 4. *Transcendent connective universes.*
  - 3. Superior pancosmic universes.
  - 2. Inferior pancosmic universes.
  - 1. Pancosmic spaces.
- **7. *Nebulocosmic classes.***
  - 4. *Perfect stellar nebulæ.*
  - 3. Superior stellar nebulæ.
  - 2. Intermediate stellar nebulæ.
  - 1. Inferior gaseous nebulæ.
- **VI. Galactocosmic orders.**
  - 4. Connective sidereal strata.
  - 3. Central sidereal strata.
  - 2. Intermediate sidereal strata.
  - 1. Peripheral sidereal strata.
- **6. *Zodiacosmic families.***
  - 4. Tangential constellations.
  - 3. Central equatorial constellations.
  - 2. Intermediate constellations.
  - 1. Polar constellations.
- **V. Polycosmic genera.**
  - 4. Multiple groups of suns.
  - 3. Quaternary groups of suns.
  - 2. Ternary groups of suns.
  - 1. Binary groups of suns.
- **5. *Monocosmic species.***
  - 4. Achromic suns, white light.
  - 3. Polychromic suns, grey or fused colours.
  - 2. Dichromic suns, purple, orange, green.
  - 1. Monochromic suns, red, yellow, blue.

Methodological Sciences.

- **IV. Biologics.**
  - 4. *Spiritual biology.*
  - 3. Mental biology.
  - 2. Instinctual biology.
  - 1. Physical biology.
- **III. Sociologics.**
  - 4. *Social organization and polity.*
  - 3. Scientific organization and economy.
  - 2. Artistic organization and economy.
  - 1. Industrial organization and economy.
- **2. *Dialegmatics.***
  - 4. *Methodic sciences—investigative.*
  - 3. Dramatic sciences—impartative.
  - 2. Linguistic sciences—impartative.
  - 1. Musical sciences—impartative.

Classification of the Sciences—continued.

Methodological Sciences.

II. MECHANICS.
- 4. *Barological statics and dynamics.*
- 3. Thermological statics and dynamics.
- 2. Electrological statics and dynamics.
- 1. Photological statics and dynamics.

1. *Mathematics.*
- 4. Calculus.
- 3. Algebra.
- 2. Arithmetic.
- 1. Geometry.

I. PHYSICS.
- 4. *Barological physics and chemics.*
- 3. Thermological physics and chemics.
- 2. Electrological physics and chemics.
- 1. Photological physics and chemics.

We need not repeat the explanations already given of the methodological and cosmological sciences; nor is it necessary to say that we do not pretend to explain the incomprehensible nature of Deity, the science of cosmogony or world-creation, nor that of soul-creation. We only give a general outline of eternal laws and forces, as necessary forms of human thought.

We do not explain religious providence and inspiration; nor the laws of biblical criticism, applied to different religious revelations; nor the science of doctrinal divinity; we give a general outline of the principles of perfective evolution and philosophy.

We do not prètend to explain the mystery of the continuous appearance and disappearance of human souls in this natural world; nor the rationale of degrees of evolution, in different forms of organism; nor the doctrines of evolutive philosophy; we give a systematic outline of the data and the principles of evolution.

We do not here explain the *schematismus corporum* of living organisms; nor the comparative ranks and degrees

of life and organization in animated nature; nor the doctrines of organic philosophy; we give a systematic outline of the unitary classification of all the sciences discovered by the human mind, according to the patterns given in divine creation.

A corresponding analysis of the leading *characteristics* of science, would be necessary to complete this general synopsis of classification; such, for instance, as the following:—

1°. The comprehensiveness and ultimate perfection of mathematics.

2°. The natural parallels of law and purpose in different kinds of energy and modes of motion; such as the laws of physical attraction and repulsion in parallel with those of sympathy and antipathy in spiritual forces.

3°. The convertibilities, equivalencies, and modulations of physical and mechanical forces and modes of motion in contrast with organic agencies.

4°. The fractional laws of harmony and discord common to all the dialegmatical arts and sciences.

5°. The definite complexity of structure in all kinds and degrees of organism and collective unity in nature.

6°. The several dynamic depths of living forces in different realms and classes of organism on our globe.

And moreover, a systematic view of all the *organic* and *connective* characteristics of cosmic systems, in parallel with those of epicosmic realms and organisms; such as those of genetic sexes, alimentary constitutions, vascular temperaments, peculiar idiosyncracies, and diverse modes of action.

We merely indicate these general views of philosophical induction and deduction, suggested by the organic

sciences of biology and sociology, to show that the utmost view of principles, exemplified in the visible creation, is a very interesting branch of ontology, and is properly distinguished from the other three divisions, by the general denomination of organic, or constitutive philosophy.

We will not dilate on spontaneous inductions suggested by the facts of biology, beyond this general outline of classification, until our views on the organic sciences of sociology and biology are published; as these are the natural fields of illustration, in which abstract principles and laws are invariably manifested, in concrete phenomena; where verifications can at all times, and in all places, corroborate or rectify the inferences drawn from visible facts and measurable forces. It is enough to state that the schematismus corporum is most completely exemplified in the human body, which is the highest type of organism accessible to human observation and analysis; and that this type is a key to the laws and forces, forms and modulations of every known individuality of life and organization. We deem the systematic study of comparative anatomy and physiology very useful to that of human biology, since together they reveal the "*latens schematismus corporum*," and the "*latens processus ad formam*," in all degrees of complex unity, and are the strongest roots of positive organic science and philosophy in the great tree of spiritual knowledge. We cannot, therefore, deem them less important to the rising generation than the study of physics and mechanics, languages, and mathematics.

RECAPITULATION.

THE results of our investigation are answers to the following questions :—

1°. What are the constituents of complex perishable organisms, in the visible creation ?

2°. What are the evolutive phases of existence in these experiential organisms, during their visible career ?

3°. What are the perfective refinements of which these organisms are susceptible, while subject to the experiential conditions and vicissitudes of health and disease, weakness and infirmity, during their natural career ?

4°. What are the indestructible forces and eternal laws manifested in these mortal organisms ?

And lastly, what are the inductions of organic philosophy ?

To the first question we reply by a systematic analysis of the schematismus corporum of organic realms on the surface of our globe ; and shall continue this analysis, in special works on sociology and on biology. The same factors of complex organism are found in all types of individual, collective, coordinate, and ultimate degrees of experiential life and organization.

The abstract principles of science correspond to the concrete facts of nature, and on this basis we have given a definite classification of the sciences. The absolute

and the relative, the infinite and the finite aspects of laws and forces, are one. Intermediate degrees alone, remain obscure; although we know they cannot be more than the infinite totality, nor less than the smallest finite organism. The biological doctrine of the absolute, in force and law, is therefore a doctrine of ontological limits, in parallel with the doctrine of mathematical limits.

The depths of human nature fathom all we can conceive of universal nature; they more than equal what we know of the external world; and, as the extension of a principle adds nothing to intrinsic essence, we may deliberately repeat the ancient dictum, that "man is the measure of all things," natural and preternatural, visible and invisible, human and divine.

To the second question we reply by a systematic analysis of the factors and phases of metamorphic and developmental evolution, in complex organisms, which lie within the reach of human observation and experience, and show the natural correspondency of facts and laws which rule and govern the phenomena of embryogenesis, and sociogenesis; not to mention those of ovagenesis and mechanogenesis; nor the more abstruse questions of experiential soul-genesis and world-genesis, or psychogony and cosmogony.

The secretion of an egg from the blood of a fowl, seems to be a very simple process, by which one form of complex matter is converted into another; but the evolution of a chick by the incubation of that egg, is a more mysterious phenomenon, by which an occult force of life becomes manifest, and by slow degrees developed in its prelimited physical and instinctual potentialities. The forces of the living organism, when developed, are definite and measurable; but whence they are derived at first, and what becomes of them when they disappear,

raise new inquiries, with regard to visible and invisible states of existence, for all transitory forms of life. And this aspect of biology, applied to human nature, is connected with that of a continuous evolution and development of immortal life, in higher and higher degrees of progress and perfectibility; not a question of psychology alone, but one of ontology and of religion.

Creation, incarnation, evolution, and regeneration, are facts which cannot be independent of each other, in a systematic analysis of life and organization. Organoleptic, organogenetic, and organismic factors of creation and evolution, are correlative, and mainly inconvertible. They must be dealt with together, if we wish to obtain clear views of the problems of philosophy. We say mainly inconvertible, because the practical degrees of convertibility are very limited. What are the organoleptic factors of causation? The forces and conditions which are *external* to the organism evolved. What are the organogenetic factors of causation? The forces which are *internal* to the living organism, or *constructive* of the automatic mechanism. What are the organismic factors of causation? the experiential organs and faculties of the living *mortal organism* evolved; or the static and dynamic forms and forces of an automatic mechanism, of any kind.

Organoleptic conditions of creation are indispensable. The organogenetic forces of a living organism are indestructible; organismic factors are experiential and mortal; spiritual inspiration and physical stimulation, are external or ultrogenetic agents of causation; procreation and incubation are extragenetic agents of causation; educators or improvers are supergenetic agents; and all of them are organoleptic factors. (Continental physiologists have introduced these technical forms of expression.)

The incarnative force of a chick, which organises a body in the egg, and sustains life in that body, after it is hatched, is an organogenetic, or intragenetic factor of causation. The inventor and constructor of a mechanism, is an organogenetic or subgenetic factor of causation.

An experiential living organism (formed by a living organizing soul, from external substance, under the influence of external conditions, and in adaptation to its own wants in these conditions) is an organismic or intermediate, or protogenetic factor of causation; and a locomotive engine (under the guidance of a conductor) which carries a train of carriages along a railway line, is also an organismic or protogenetic factor of causation; a secondary cause of motion.

The inventor and his plan or invention, are two aspects of causation; the constructor of the mechanism, who may or may not be the inventor, is another aspect of organogenetic causation.

A living experiential organism, with the incarnative and sustaining forces of action and control within itself, is different, in some respects, from an automatic mechanism, such as a locomotive engine, with the inventive, constructive, and controlling powers outside of itself; although both may be subject to the same necessity of collecting physical motive power, from the combustion, or destruction, of external substances, and the consequent liberation of connective immaterial forces.

These distinctions are indispensable for a definition of the problems of creation and evolution. Before we can speak of natural selection, and variation of organic forms and proportions, under the stimulating influences of varying external conditions, as the "origin of species," we must obtain clear views of all the aspects and relations of principiant forces, or agents of causation. All kinds of forces are principiant causes of motion and

mutation, and necessarily stand in one or other of these aspects and relations to each other, in their evolutive modes of action; and it is just as necessary to distinguish organoleptic from organogenetic and organismic aspects and relations of eternal forces in phenomenal modes of action, as it is to define the different relations of nouns, verbs, adverbs, and pronouns, in the constructive theory of language, where the very same words and class of words may stand in any of these mutual relations to all others in a sentence of any kind. Eternal forces are ever the same while their mutual relations in phenomenal modes of action and mutation, are for ever varying; and, as the essential meaning of a word is one thing, and its grammatical forms and functions in the construction of a sentence is another, and quite different thing, so the nature of an eternal force is one thing, and its relative modes of intervention in the creation and evolution of an organism or a mechanism, is another and a very different question of ontological science. It is not necessary to enter into elaborate forms of psychological analysis, in connection with evolutive problems, but we may easily perceive that questions of perfective evolution are intimately connected with the preceding distinctions of principiant energies, and phenomenal modes of action.

Before we define perfective human evolution, which depends, in a great measure, on revelation and inspiration, as organoleptic factors of regeneration, we should clearly understand that inspiration and intuition, are to revelation by voice and vision as psychological phenomena, what involuntary and unconscious movements of internal viscera, in the human body, are to the conscious movements and sensations of the external frame; and that both kinds of action are equally natural and positive, though commonly called unconscious or preconscious in

the phenomena of life, and preternatural or supernatural in cases of revelation. Biology, ontology, and religion, are thus involved together in the problem of existence.

In our third question we ask, what are the perfective refinements of which terrestrial organisms are susceptible, while subject to the vicissitudes of natural and spiritual health and disease, weakness and infirmity, during their earthly career, of conscious and preconscious existence?

To this we reply, that experience of ultra-natural phenomena is necessary to complete that of natural phenomena, with regard to the conditions and vicissitudes of spiritual health and disease, or the factors of regeneration and degeneration in humanity, during its mortal career in this lower world. Without spiritual revelation (by conscious voice and vision) from a higher world (as well as by unconscious intuition,) man could not know what his future destiny may be, nor how he could prepare himself for such a state. He might *suppose* the world to be composed of matter only, and become an atheist, without hope or aim in life; or he might suppose the visible world to be a living organism, resembling that of a vegetable, or an animal; and thus become a pantheist, without any notion of an invisible world of spiritual existence; or any hope of a conscious future life for man; or he might suppose the world to be a kind of mechanism, like a locomotive, or a watch, created by an infinite mind, and regulated by that mind, as man regulates the operations of a mechanical automaton, and thus become a deist, without any definite idea of a spiritual universe, in which God rules immortal spirits, by eternal laws, just as he rules the organic and the physical forces of the visible creation, by invariable laws.

None of these conjectural modes of thought can

satisfy the unsophisticated mind with regard to the mysterious phenomena of the continuous appearance and disappearance of human spirits in this world, and the probable existence of a world invisible to us. A few individuals in all historic ages, have professed to be endowed with powers to communicate with angels; and the mass of human kind have received these revelations from the other world, as they received the inspirations of their poets, and the inventions of their industrial benefactors; while a few inquiring minds, ungifted with the faculties of inspiration and invention, have imagined that an unbelieving earnest desire to know the truth, was sufficient for all possible discoveries, and denied the possibility of any faculties of mind, beyond those of ordinary thought and observation; not perceiving, or acknowledging that the faculties of a Jacquard or a Watt, a Shakespeare or a Homer, a Newton or a Leibnitz, are as exceptional as those of a prophet or a seer, of any spiritual revelation. Unbelievers having no experience of religious inspiration, discredit the asseverations of those who have; or else, without much knowledge of psychology, attribute such experience to physical and mental states of disease and hallucination. The mission of sceptics is to investigate natural phenomena, in which they have faith, and for which they have sufficient aptitude; while they turn away from the investigation of spiritual phenomena, which they distrust, and for which they have no aptitude. The opposite characteristics are observed in religious enthusiasts, who seek for mystical experience; and thus the two extremes are separated from each other for special purposes and uses, in the economy of providential government, while another class of minds unites and reconciles the truths of both.

The evidence of the natural senses is nevertheless

appealed to, in many of the so-called supernatural phenomena; and that of reason, is as much required in one case as in the other. We shall not discuss the rationality of Watt's invention, Shakespeare's poetry, Newton's discovery, nor that of the Christian religion. We merely wish to show that perfective evolution in all the departments of human life on this earth, such as industrial inventions, poetic and artistic creations, scientific discoveries, religious inspirations and revelations, are mainly dependent on exceptional faculties or degrees of psychological endowment in mankind, and that reason has as much to do with judging of the use or beauty, truth or goodness, of one kind of genius and inspiration as another, none of which are common to all the individuals of the race.

In Hume's "Dialogue concerning Natural Religion," the sceptic Philo observes that "It is allowed that men "never have recourse to devotion so readily as when "dejected with grief, or depressed with sickness. Is "not this a proof," he adds, "that the religious spirit "is not so nearly allied to joy as to sorrow." And from this, an inference of weakness and delusion in the devoteé is openly implied, as the sum and substance of religion.

Where is the common sense of such a philosophy? Is it not rational in a sick man to apply to a physician when he is ill, more directly and importunately than when he is well? And does this fact imply that the laws of physical health and hygiene are of no account to any but those who are already afflicted with bodily ailings, and who, in their debilitated state are incapable of distinguishing the impositions of quackery from the principles of medical art and science? And is not spiritual health as necessary and important as bodily health? Are not the laws of spiritual hygiene as

natural as those of physical hygiene? The disciplines of spiritual therapeutics, as important as those of physical therapeutics?

The question of imposture and quackery may be raised in both cases, while the principles of truth and rationality cannot be denied in either.

We need not dwell on the details of this department of experiential science and philosophy, but proceed to the fourth question, namely:

What are the eternal laws and forces manifested in all perishable organisms? These have been explained in the transcendental division of philosophy, and need only be noticed as being essential to the preceding explanations of organic laws and permutations. Relational principles of order, organic laws and energies, connective forms and states, conditions and control, are eternal factors of existence, and necessary forms of thought. Indestructible forces and eternal laws are easily admitted, while connective principles are deemed obscure; and yet, life without form, state, condition, and control, would be nothing but chaos. Living forms are individual, collective, co-ordinate, and ultimate; living states can only be visible, invisible, and intermediate, in worlds which are visible, invisible, or intermediate; conditions of life can only be defined as substance, force, space, and time; the controlling powers of life and organization in all worlds cannot be otherwise defined than as omnificient creation and destruction, omnipresent sustentation, omniscient and omnipotent will and understanding, or direction and control. We have now distinct views of natural phenomenality in the visible cosmos; spiritual phenomenality in the invisible or hypercosmic world; and of ontological potentiality in individuals, in collective realms and worlds, and in transcendent Deity. The fourth question is thus defi-

nitely answered. And lastly, what are the inductions of organic philosophy?

The first is, that the human body is an exact type of the human soul, in structure and in function, and that together in their natural career they are a definite image of all the complex organisms in the world; in their visible and invisible conditions, they imply the separate existence of a visible and an invisible universe; and in the ontological unity of his immortal spirit above the vicissitudes of experiential life in any sphere, man is an image of supernal will and understanding or transcendent Deity, above all natural and spiritual worlds of creation.

From this, we form a spontaneous induction with regard to the anthromorphic view of Deity; for whatever depths of being may exist beyond the ken of human penetration, man can form no definite idea of Almighty mind, but that which is reflected in the human intellect; and these reflex phenomena of reason must necessarily assume a human form in any human mode of thought. The will and understanding of man are limited, and liable to error and perversion; while will and understanding are omnipotent and omniscient in Deity, perfect in love and wisdom, Providence and foresight. The difference is not in kind, but in degrees of power and perfection, however incomprehensible these may be.

The human heart revolts against the cruelties of nature, and the sanction of like cruelties in scripture; but what does man know of perfect wisdom and beneficence in giving life and taking it away? The cruelties of human surgery are dictates of benevolence, as much as any act of kindness; and to humble minds the severities of fate are dictated by supernal love and wisdom, as much as any act of Providence and mercy. Scepticism appears to be the offspring of wilful dictation, with re-

gard to what nature ought to be, in human estimation; rather than a docile study of what she is with her eternal laws. We, nevertheless, deem superstition as irrational as scepticism, and dictatorial ecclesiasticism as injurious to religion, as despotic government, to civil liberty and progress. Human authority needs control.

The inductions of organic philosophy are based: 1°. On a general analysis of all kinds and degrees of forces and phenomena, within the reach of positive experience; and 2°. On a synthetic view of all known causes, in experiential modes of action and mutation.

All known *kinds* of physical and organic energies are found in animals, in low degrees of evolution.

All known *kinds* of physical and living forces are found in human beings in superior degrees.

All known *kinds* of power must exist in angels or superhuman beings in still higher and more perfect comprehensiveness.

Matter and immaterial physical forces are co-extensive with the visible universe, and belong to a world in which all parts are subordinate to the whole. Substance, force, space, and time are indestructible factors of pancosmic unity, reflected in the human mind. Are they convertible with each other in any positive sense of the word? Are elemental substances convertible one into another? Can oxygen be converted into hydrogen, or nitrogen, or platinum; or into any kind of unica substantia? Are space and time one in human modes of thought? Certain modes of motion seem to be convertible in the physical phenomena of light, heat, electricity, and gravitation, but the acid quality of oxygen with its peculiar modes of influence, has not been, and we may suppose cannot be converted into the alkaline quality and modality of hydrogen. The correlation of forces, and the equivalence of working power in different modes of

motion, do not show that the various qualities of affinity in atoms can be converted into any kind of unica substantia, or unica energia, as radical distinctions.

Substance, force, space, and time, are not living thought and feeling, emotion and volition, modes of causation, which belong to spirit. Matter and physical modes of motion are subordinate to spiritual action and control, wherever we have evidence of their co-operative union.

The solar system is a definite part of the cosmos, and in it all the parts are bound together by one law of convertible barological, photological, thermological, and electrological community of action and reaction, in which the opaque bodies are subordinate to the luminous centre of the system, which is itself but a subordinate part of the Milky Way, as a greater sidereal community. The inorganic and organic realms upon the surface of our globe, are not only parts of the planetary force and substance, but they are in some respects subordinate to the whole physical force and substance of the earth and of the sun. Are the spiritual powers of mankind subordinate to the physical forces of the solar system, in any other relations than those of conditional community? And if so, how so?

The sun magnetises the earth and all the vital organisms upon the surface, by its light and heat, magnetism and attraction, variously, every spring and summer, autumn and winter. The earth would be too cold to foster life in the organic realms, without the influence of the sun. Cosmic association and co-operation are not without uses, then, within the limits of human experience. But why do not all flowers bloom at once in the same latitudes and altitudes of climate? Why do the mountain daisy, and the chrysanthemum, wait for autumnal magnetism to bring forth flowers, having

passed through the heat of summer without blooming, while numerous other plants close by them, were excited to bloom in early spring or during summer? Why does the Christmas rose wait for winter? Why do animal organisms vary as much as vegetable organisms in these physiological relations to peculiar conditions? Is it not because organic vital forces differ from each other radically, and in their respective modes of adaptation to cosmical conditions?

In addition to what are called acid and alkaline qualities in atoms, positive and negative polarities, in purely physical forces and modes of action, there are sexual distinctions, in vegetable and animal organisms. And these exist in all degrees of organic unity, connected with various degrees of physical forces and mass of substance; but not in parallel concomitance of physical and hyper-physical degrees and kinds of life. A tiny mouse has not as great a mass of substance as an elephant, though all known kinds of energy are exhibited in each of these forms. An elephant is much more physically powerful than a man, and manifests all *kinds* of energy in his nature; but while *degrees* of physical force and substance, are much greater in a full-grown elephant than in a man, degrees of mental insight are incomparably greater in the human being than in the animal. Kinds and degrees of immaterial motors and modes of action then, are not necessarily *associated*, on the one hand; nor, on the other, are they equal in relative amounts of power, when associated: for, minerals exhibit physical force and substance without vital energies; vegetables manifest organic forces in union with matter, without instinct: in minute creatures we see instinctual forces in combination with vital and physical energies without mental or emotional faculties. In

the higher animals, all kinds of energy are combined; but not in equal ratios of progression and association.

Each kind of force, in nature, then, appears to be distinct, and separate from others, in some cases, though intimately blended or united, in others: within given limits of parallel degrees, organic energies are superior to physical force and substance in vegetable organisms; instinctual are superior to vegetable forces; mental powers are superior to both instinctual and physi-organic motors, not only within parallel degrees of limitation, in physical force and substance, but within much wider limits; since a man can invent, construct, and govern a locomotive engine, and a railway train, which are considerably more voluminous and powerful than the body of an elephant, or that of a gigantic whale.

The human race collectively is more powerful than an individual; it may be able to govern and control, to some extent, all the inferior realms upon the globe, in all kinds of physical and vital energy and modes of action; still it is manifestly unable to guide and govern the aggregate of physical forces in the planet; not to mention other kinds of energy, if any such exist. The human race is therefore but a part of the aggregate of all kinds of forces in the planet; and as a part, unable to control the whole, it is subordinate; not only to the physical and vital conditions of the earth, but also to some higher powers of thought and rule, than those which are evolved in the ignorant and feeble human will and understanding.

What can we infer from this analysis of known causes, and their modes of action? First, that organic vital energies are combinable with, and separable from, inorganic physical forces, in the epicosmic realms of our globe; secondly, that vital powers control the physical forces with which they are combined, in animal and

vegetable organisms; and that human intellect controls inorganic motors much exceeding the limits of physical form and substance, associated with it in the human body; and thirdly, that, while the physical force and matter of organic bodies remain visible and tangible, after the bodies are disorganized, the vital powers disappear, and become not only invisible, as they were before, but incognizable, in any ordinary modes of action; and fourthly, that, as all kinds of immaterial energies are indestructible, and cannot be annihilated, these occult living motors still continue to exist in an invisible world, unknown to us by any common modes of observation; but, fifthly, as they are known to manifest themselves exceptionally, by what are called "spiritual manifestations and communications," we have positive experience of their continuous existence with power to act upon this lower stage; and sixthly, that, in addition to the natural world, in which organic causes are obvious in physical organisms and modes of action; there is a supernatural universe, in which human spirits live, and think, and act, when severed from the earthly bodies with which they had formerly been united. What other beings may exist along with human spirits, in the unseen world, we only know through revelations from that sphere; and as these are not believed to be trustworthy in all cases, we need not dwell on questions of credulity and incredulity, which every one must deal with for himself, by sifting evidence, and seeking for that experience which is necessary to verify the affirmations of prophets, seers, and spiritual mediums; and seventhly, that, as human beings in this plane are governed by spiritual revelations, intuitions, and illuminations, we have reason to infer that all inferior beings are controlled, in some manner, by the wisdom of superior thought, presiding over the creations, evolutions, and

extinctions of life and form in the natural world; and eighthly, that, whatever be the depths of inorganic and organic nature, in the suns and planets of the visible universe, still higher powers in the invisible universe preside over the creation, evolution, and extinction of all such cosmic bodies, and sidereal systems; and ninthly, that, as all living forces are invisible and immanent in natural, lymbic, and supernatural worlds, they are transcendent in Deity, eternally and simultaneously within and above creation and mutation, in all possible spheres of mundane and ultramundane life.

Sceptics may object to the evidence adduced as proof of the existence of a future life for man, since spiritual manifestations are seldom accessible to them; but Christians can refer to scripture for authority, on all such questions: "Heaven (the supernatural universe) is the throne of God;" the suns and stars of the natural universe are only footstools of his throne. See Matth. xxiii. 22; xxii. 29, &c. And with regard to incarnation, see Matth. xi. 14.

But why do we refer to scripture, as authority, in questions of philosophy? Because ontology has to investigate the principles of life in their eternal existence, which includes both natural and preternatural modes of action and reaction: and this investigation cannot be complete, without interrogating all known kinds of revelation, with regard to the mysteries and miracles of life and death, good and evil, order and chaos, imperfection and perfection.

Nature is a book of mysteries and marvels, the simpler parts of which are plain enough to common sense, while deeper laws revealed in it require interpretation by elaborate science.

Scripture is a book of mysteries and marvels, the simpler parts of which are plain enough to common

sense, while the deeper laws of natural and supernatural relations revealed in it, require interpretation by consummate psychological and ontological science.

We do not distrust the mysterious revelations and prodigies of nature, because we do not know at once their hidden laws of equilibrium by which so many jarring elements and forces are regulated in simultaneous and successive modes of evolution. Why then should we distrust the mysterious revelations and prodigies of scripture, because we do not know at once the higher laws of equilibrium which reconcile apparent contradictions in simultaneous and successive modes of inspiration and enunciation?

The book of nature is both literal and allegorical in her modes of revelation; for the invisible spirit of an organism is known by the form and structure of the visible body, which is only a transitory symbol of immortal life. The body of a lion and that of a man, are very different symbols of causation: and, although we have some knowledge of the literal meanings of these different words, in the text of natural revelation, we know but little of their allegorical or hidden meanings as enunciations of design in the creation.

The book of scripture is both literal and allegorical in modes of revelation; for the practical meaning of a text is known by the letter of the word, while the hidden meanings are but little understood as enunciations of wisdom in providential modes of impartation. We cannot understand why God should create such creatures as the entozoa which infest the vitals of the higher animals and man; nor why the allegory of a serpent speaking to the mother of mankind, should be used to describe the origin of disobedience and sin. But we know that man is naturally ignorant and violent; and that some kind of external stimulant is necessary to induce him to

study the structure of his own body, and the mysterious nature of his own spirit. Physical and spiritual modes of revelation then, are equally enigmatical to ignorant humanity, and continuous investigation is necessary to unravel the more recondite mysteries of both. Analogies are obvious in all the organisms of nature, and in the texts of scripture; and the key to one order of parallels and symbols may serve to unlock the secrets of both. If man is the measure of all things in matter, he is also the measure of all things in spirit; and when once he understands the laws of his own being, he is prepared to understand somewhat of the laws of all being. The natural world is a continuously evolved drama of life and death; the spiritual world is a counterpart of the same Divine drama. What is the destiny of life, and the mysterious law of dramatic evolution in both worlds?

The earth is given to man, with all the wealth of the creation, but he must labour to obtain the staff of physical life and strength; the riches of heaven are given to man in scripture, with all the treasures of the spirit of regeneration, but he must labour to obtain the staff of spiritual life and understanding. Barren rocks and sands contain rich ores for man to smelt and use, when he is able, and they are prominent amidst the soils which easily produce corn, and oil, and wine, for his immediate sustenance. Hard texts of scripture contain rich stores of thought for man, when he is able to explain them; in addition to the simple words of law and gospel, by which his spirit is consoled and strengthened in its daily wants and faintings.

Those who merely want natural and spiritual food for the body and the soul, need not crush rocks to obtain superfluous gold, nor puzzle the mind with hard texts of scripture, to obtain brilliant treasures of spiritual

knowledge. Without mystical experience of any kind, we know that man has power over physical forces to a great extent; he can blast rocks, pierce through mountains, build ships and drive them through the waves, by means of wind and steam, not to mention other modes of action, by which physical motors are subject to the control of human intellect and will. Organic forces in mankind, and in the animal and vegetable kingdoms, have power within given limits to control the inorganic elements of nature; and the mind of man is governed by some kind of inspiration in poets and inventors, prophets and philosophers, who are the leading agents of all progress in society. These originators of perfective influence are also principiant causes of sociogenesis, in all its metamorphic revolutions and progressions. Whence it follows that transcendental love and wisdom rule the inspiration of prophets, poets, and inventors, who in their turn transmit perfective wisdom to the rest of mankind, in whom organic energies have power to rule the inorganic forces of inferior realms; and all these modes of action in all degrees of power, are in strict accordance with invariable laws of order and equilibrium, however simple, or however marvellous they may appear to ignorant humanity.

The want of power to explain the unknown laws and mysteries of physical nature and her revelations, is ignorance or indifference; what then is the want of power to explain the laws and mysteries of spiritual nature and her revelations? Is it not ignorance with indifference and want of faith? The laws of physical motion are not in contradiction with those of spiritual life; and thought is exemplified in forms of matter as well as in living forms.

The combination of nitrogen with oxygen to form atmospheric air, is the result of a thought in a prede-

termined plan of structure; the more intimate union of hydrogen and oxygen to form water, is the result of a different thought as part of the same predetermined plan; the chemical union of more numerous simple atoms to form complex earths and salts, is the result of an organic thought, in adaptation to the same scheme of nature, in accordance with eternal laws; all these modes of action, and persistent forms of structure, amidst varying contingencies of motion and mutation, reveal modes of thought and forethought, as well as invariable laws. What thought? human thought? Certainly not. Then superhuman wisdom and forethought exist, and are manifest in physical phenomena, as well as in spiritual revelation.

Forms of thought precede designs of mechanism. Automatic mechanisms are models of design. What are suns and planets, but creations of superhuman reason? What are the forms of living bodies, but the results of a predetermined plan or mode of thought. Every new discovery of science is but an introduction of the human mind into the scheme of the Creator moulded and spoken in the visible creation.

And now, what is the amount of human discovery in each section of the sciences? Comparatively little is yet known of sociology and biology, not to mention methodics or the art and science of investigation; and astronomy overwhelms us with all that is unknown of sidereal laws and forces. Nor have we yet been able to penetrate as far into the ontological depths of cosmic nature, as into those of epicosmic realms. The ontology of visible worlds, spiritual worlds, intermediate worlds, and of infinite being, is but partially unfolded to the human mind. Something is known of the immaterial forces and laws of order in the inorganic, the organic, and the human realms on earth; but what is known

of the organism of the globe itself? We know it contains all kinds of life and organization in subordinate forms, and that man does not guide the planet in its energies and motions, as a member of the solar system.

Do other cosmic orbs contain organic realms and human beings? We do not know; nor is this kind of knowledge necessary for the happiness of man in his terrestrial career. We know but little of the origin and guidance of living forces in the world of preconscious evolution, and almost nothing of the modes in which these occult motors operate after they quit the body. And with regard to the existence or non-existence of like phenomena on other globes, we are altogether in the dark. Nor is anything positively known of the metamorphic evolutions and dissolutions of suns and planets. Where a chick comes from into an egg, and where its life goes to out of the body, we cannot tell; nor should we know more of the immortal spirit of man without religious revelation and experience.

Religion tells us that the soul of man is a living and responsible being, in the invisible world, as well as in the visible. That there is a spiritual universe above the natural cosmos, and an Almighty Creator above creation. And this agrees with the inborn tension of faith.

David Hume has defined this "instinct of faith" in his essay on "Sceptical Doubts and their Solution," in which he says—

"Here is a kind of pre-established harmony between "the course of nature and the succession of our ideas; "and though the powers and forces by which the former "is governed, be wholly unknown to us, yet our "thoughts and conceptions have still, we find, gone on "in the same train with the other works of nature . . . "As this operation of the mind, by which we infer like "effects from like causes, is so essential to the subsis-

" tence of all human creatures, it is not probable that " it could be trusted to the fallacious deductions of our " reason, which is slow in its operations, appears not in any " degree during the first years of infancy; and at best, " is in every age and period of human life, extremely " liable to error and mistake. It is more conformable " to the ordinary wisdom of nature to secure so neces- " sary an act of the mind, by some instinct or mechani- " cal (spontaneous?) tendency, which may be infallible " in its operations, may discover itself at the first ap- " pearance of life and thought, and may be independent " of all laboured deductions of the understanding. As " nature has taught us the use of our limbs without " giving us the knowledge of the muscles and the " nerves, by which they are actuated; so has she planted " in us an instinct which carries forward the thought, " in a correspondent course to that which she has esta- " blished among external objects; though we are igno- " rant of those powers and forces on which this regular " course and succession of objects totally depends."

The faculty of spontaneous induction in the mind, corresponds to that of faith, and both are analogous to gravitation in the body, by which physical equilibrium is maintained. And just as the body may be thrown off its balance by ill-regulated movements, so the mind may lose its natural equilibrium by the perplexing intricacies and exaggerations of metaphysical abstraction. It is nevertheless well to train the body to perform feats of dexterity, in harmony with the laws of gravitation, and the mind, to perform feats of rational equilibrium, in accordance with the laws of common sense.

We can only know the eternal forces, laws, and principles, which are manifested in the perishable organisms of nature, within the reach of human observation; but then, some of these eternal forces extend certainly

to universal nature; and as perishable finite bodies are animated by indestructible organic forces, and mechanical automata are created and regulated in their functions, by human intelligence, we are led to believe that omnipotent will and omniscient wisdom create and rule the infinite creation, as the finite immortal spirit of a man creates and regulates the perishable mechanisms which he has invented and constructed; and this induction quite agrees with revelation from a higher world, as well as with the evidences of design and purpose, in the life and organization of this lower sphere.

Sceptical minds object to the word *supernatural* as an ambiguous definition of invisible forces and phenomena, which fosters superstition without advancing science; but we must remind them that the spirit of a man is just as superior to matter, while it is in the body, and creates a locomotive engine, as it can be, when it leaves the body, and performs some other miracle, in accordance with eternal laws; and therefore it is useless, in the face of these known facts of spiritual mystery and invisibility, to quibble about words and definitions which are equally conventional in natural and in preternatural psychology.

We have direct evidence of the existence of an invisible spirit in the natural body, and equally direct evidence, in certain cases, of the rational action and diction of invisible spirits, out of the earthy frame; and in both cases the sanity of the spirit is measured by the faculties of common sense and reason.

We know that a certain amount of human intelligence exists, and is perpetuated on the surface of our globe; and we infer that like phenomena are possible, and even probable, on all suns and planets; while something more than ordinary human degrees of will and understanding control the permutations of the natural and the spiritual

worlds. More than ordinary *degrees* of human will and understanding are necessary, but not more than human *kinds* of conscious and preconscious intellect and will, need be postulated as the attributes of Deity, to create and govern any number of complex organisms, in any life and system of alternation, from invisible to visible forms of motion.

And this is the main characteristic of definite anthropomorphic theism, in contrast with inflated notions of infinity and individual liberty devoid of any positive consistency of analytical and systematic unity. Are there any forces different *in kind*, from those of divine human nature? and if so, what are the possible definitions of such kinds of force? Are all the kinds of energy known in human nature, co-extensive with universal nature? And, if not, why not? Who knows, or can pretend to say?

It is nevertheless easy to show, that those who deem imperfect human wisdom and benevolence superior to that which is manifest in the creation, have but a very limited understanding of what perfect wisdom and benevolence may be, in the phenomena of life and death, regeneration and degeneration, evolution and progression, on the surface of our planet; and that human wisdom and divine, may *seem* to be irreconcilable *only* where human imperfection sits presumptuously in judgment on superhuman perfection.

A little thought suffices to convince us that eternal principles are absolute, and indestructible in all possible degrees of limitation or extension. That the conditions of life, are not life itself; time, space, substance, and force, are essential conditions of life; but they are not to be confounded with organic, instinctual, mental, and spiritual principles, although equally eternal and indestructible. Nor do mutable conditions *rule* organic

forces, in any sense; although they *limit* finite modes of motion and adaptation. If time and space, force and substance, are infinite conditions of existence, why should we suppose that spiritual forces are restricted to the tiny limits of our globe?

Instinct, reason, and affection, in the animal creation, are similar in kinds, though different in degrees. They are also similar in man, but very different in degrees. We conceive them to be quite similar, in superhuman beings, though superior in degrees of comprehension. The faculties of imagination, memory, and judgment, are very unequal in men; powers of application and concatenation, perception and discrimination, penetration, and comprehension, are very different; and these degrees of power in all the faculties of mind, may be carried to the utmost limits of intellectual potentiality. When we consider how much the human mind surpasses that of animals; how greatly the mind of one man surpasses that of another; and how far the understanding of the wisest man, falls short of perfect comprehension, in all the sciences; we can have no difficulty in perceiving that man did not create the world, which he cannot understand; and that higher powers of reason were necessary to conceive and execute the plan.

After studying the very complex science of biology, we are naturally led to ask if there be as much mechanical art and science displayed in the structure of the human body, as in the mechanism of the visible creation? As much organic prescience in the preconscious human soul which builds the body *in utero*, and sustains it during life, as in the invisible or preternatural forces, which energise the natural world, and sustain it in perpetual motion? And, as far as we can ascertain, there is more art and science displayed in the structure of the human body, than in the mechanism of

the solar system; more organic prescience in the human soul that builds the body, than in the preconscious forces of a bird, that form a chick in the egg. But then we cannot fathom the mystery of preconscious powers and their alternate states of apparition and occultation, in human, or in animal, or in cosmic nature. We infer that no amount of animal preconscious instinct could form a human body and experiential mind; no amount of merely human prescience could form the sidereal universe; and that a superhuman being could alone be able to create the world, and sustain it in perpetual motion. We believe that one Almighty Being created a planet and a sun; a lion and a man; and all the creatures that inhabit or infest planetary and human bodies.

We believe that Omniscient Being, through the minds of angels, gave the revelations of the Old and New Testaments, with all the prophecies and precepts that are supposed to disfigure the beauty and harmony of these divine books, as the ferocious animals which inhabit the globe, are supposed to mar the beauty and harmony of divine creation, in the natural world; and we believe that it is as easy to reconcile the apparent contradictions of different revelations as those of different creations; and by the very same laws of perfective evolution. God has power to give one revelation after another, and supplant one race of animals by another; and this has been already done, within known periods of history. We need not deny the divine origin of antediluvian animals which have been destroyed; nor that of a wolf or a tiger, because our feelings prompt us to suppress them; nor the divine origin of certain texts of the bible, which have been superseded by the gospel; although still maintained by the descendants of ancient races, as certain animals infest uncultivated regions for

a time; until civilization reclaims the whole earth, and the gospel, every race and nation.

Many minds dispute the authenticity of revelation. It is nevertheless evident that spiritual manifestations and communications can alone reveal to us the modes of human life and progress in a spiritual universe, invisible to common sight; and these, being common now in Europe and America, call for due investigation as psychological phenomena; but it is not our business to insist on the validity of the evidence adduced in proof of their trustworthiness. The gospel is sufficient for all purposes of practical religion; and none but those who have no faith in the existence of a future state, need seek for the experience of so-called "spiritual manifestations and communications," which have no authority or power to supersede the Christian church, however much they may suggest new views of ontological and speculative doctrine.

The laws of Moses and the Jewish people are marvels of religious evolution; the gospel and the church of Christ, are marvels of religious evolution; and both are involved in the everlasting truth of God, which rules all churches in all ages of the world.

Moses and Mahomet are causes of religious gravitation in many parts of the world for millions of human souls; Zoroaster, Brahma, Buddha, Laotsé, and Confucius, are institutors of religious thought and congregation, for some sects and nations. How far these secondary founders of religion may be deemed legitimate planetary centres of spiritual gravitation around the central "light of the world," analogous to lunigery planets in our solar system, we cannot say; but there they are as facts, beyond the possibility of doubt. Whatever be the providential order of primary and secondary groupings in spiritual systems, we cannot deny the facts of history

and religious evolution in humanity. And though religious centres of attraction may appear to be independent of each other, they cannot really remain so, in the social evolution of the race.

Is there no source of solar illumination in the spiritual world, as well as in the natural? Is the religious world of gravitation composed of secondary groupings, only, without a common visible head and focus of attraction?

"The everlasting truth of God, in all churches and all ages," is like the everlasting light of nature, in all suns, and constellations, while each solar system has its central sun, and each humanity its spiritual "light of the world;" and no spiritual light in this terrestrial sphere of ours is comparable with that of the "Son of Man." Satellites may gravitate to planets, but these must gravitate to their respective sources of illumination. The fixed stars of heaven give us light by night, but they do not supersede the light of day.

"Independent morals" are as chaotic as independent justice, independent police, independent administration, independent armies and navies would be; and independent worshippers of "everlasting truth in all churches and all ages," without definite forms of revelation and organization in church and state, would be as chaotic as a horde of savages, unable to form an organized society with practical means of evolution and perfectibility.

As erratic comets wander amongst the planets of our system, and approach the sun, to wander off again, into the depths of space, so sceptical philosophers approach all systems of morals and religion, and wander off again into the depths of speculative thought, in search of "the everlasting truth of nature," as if the light of the sun of our system, was not the same as that of all suns in the universe, however various their colours.

At one time people were afraid of comets, but natural

science has dispelled such fears; some religious souls are still afraid of sceptical philosophers, but spiritual knowledge will dissipate the clouds of all such apprehension.

The truths of science are slowly evolved as one form of thought supplants another; the truths of religion are slowly evolved, as one form of creed and doctrine supersedes another. In astronomy the system of Ptolemy has been exploded by that of Copernicus, Kepler, and Newton. In geology, the rival theories of fire and water have been absorbed in the united Jovian, Neptunian, and Plutonian factors of cooperative action. In zoology and botany the systems of Linnæus have been displaced by those of Ray and De Jussieu, Cuvier, and others, still susceptible of improvement and completion. In chemistry and physics, old theories have been supplanted by new ones, which are still confessedly imperfect. The philosophies of Aristotle, Plato, Zeno, and Democritus have been superseded by new speculative systems; Arius and St. Augustin, Luther, Calvin, and Swedenborg, have put forth systems of Christian theology which differ from each other in degrees of imperfection; fetichism, sun-worship, polytheism, monotheism, differ vastly as evolutions of religious faith and worship, and numerous races are still under the influence of unprogressive idolatry in all parts of the globe. This is a mystery of sociogenetic evolution in humanity analogous to that of embryonic evolution in the insect world, where the larvæ of some species which feed on leaves in the open air, continue during a few weeks only in the larval state, while the embryos of other species of the same order which feed on roots or ligneous fibres underground, such as that of the cock chafer, remain three or four years in the larval state, before they become perfect insects; and many are destroyed without coming to per-

fection. Such are the evolutive differences of human races, on different parts of the earth.

Christian nations under the influence of the gospel, have advanced beyond the larval state of polygamic and despotic institutions of religion and society, while savages and heathens living in religious darkness remain stagnant in their ignorance and violence, unable to progress in metamorphic evolution for want of spiritual light and understanding. This is sufficient to distinguish Christianity from heathen religions and societies, as centres of social and religious gravitation. Europe is progressive because she is Christian, and America, being peopled by Europeans, will ultimately overflow into China, and supplant idolatrous Asiatics by Christian races, as the Europeans in America supplant the Indians where these die out and disappear. There is no fear then of independent morals and philosophy supplanting Christian truths and discipline as factors of perfective evolution in humanity.

It is very important for man to know that besides the hope of life beyond the grave, all his secret thoughts and deeds in this world are open to the spirits in the other world; that nothing can be hidden from spiritual vision. It will be no small cause of humiliation to the man who leaves this world at death, to find that all his deeds and thoughts have been known to spirits and to guardian angels, during the whole course of his earthly career; and that all he wished to remain hidden has been thus made known. The use of faith will then become very evident to many a sinner, who may not realize the disappointment to be felt, when higher views of charity and justice, reciprocity and duty, are made known to him, than those he had practised in this life, or even looked for in the word of truth. It would have some influence on the conduct of unbelievers, if they could

believe that invisible spirits can see all their secret deeds and read all their inmost thoughts, although they could not understand the truths revealed in scripture. Thought is motion of the soul in the body, acting on the brain as visibly to spirits out of the body, as it acts visibly to us in the external frame when it lifts the hand to strike; by which motions we know its aims and wishes, though no word be uttered. Unspoken human thoughts are hidden from us but not from spirits. Spoken thoughts are dark to us in many forms of the creation and of revelation, but not to more enlightened minds. How can we learn to interpret divine thoughts?

There is a very simple method of interpreting all the most important portions of the word of life. Every text therein concerns man and his destiny, in this world and the next. All the illustrations borrowed from the natural world, relate also to the spiritual world, and to different states of human progress and perfection in spiritual life. The reflected light of science could never reveal any of these truths of immortality. Man must depend on the word of revelation for spiritual heat and light and life, as he depends on the sun for natural heat and light and life. Without the one he would perish spiritually, as without the other he would perish physically. The most important revelations of the word are written so that he who runs may read; and the more subtile parts contain enigmas which may often exercise our understanding to explain, by means of the one great clue, that all is written for the use of man, and with exclusive regard to his progressive spiritual evolution.

It is the vocation of divines to interpret scripture, but we may explain our meaning here by the elucidation of a text of the gospel where examples borrowed from natural phenomena are used to illustrate spiritual truth. "Immediately after the tribulation of those days shall

the sun be darkened and the moon shall not give her light, and the stars shall fall from heaven, and the powers of the heavens shall be shaken. And then shall appear the sign of the Son of Man in heaven: and then shall all the tribes of the earth mourn, and they shall see the Son of Man coming in the clouds of heaven, with power and great glory."—(Matth. xxiv. 29, 30.) The whole of this chapter describes the forthcoming destruction of the temple of Jerusalem, and the future career of the apostles in the midst of Gentile nations. The word of God in the Old Testament is the light of the spiritual sun: the reflected light of human science is the light of the intellectual moon: the oracles of polytheism were the stars of the spiritual heavens of the Gentiles at that time; and events have proved that the light of the Bible was darkened, the natural sciences gave no useful light, and the stars of the spiritual firmament of polytheism fell from their high places, while all the oracular heavens of the social and religious authorities of the nations were rudely shaken. During this time the apostles spread the word of truth in all surrounding nations, and brought to them this living sign of the Son of Man in heaven; the tribulations caused all the tribes of the earth to mourn; and as soon as the Gospels were written, the mourning tribes saw the Son of Man coming in the clouds of heaven (the letter of the written gospel of truth), with evangelizing power and great glory, of hope and consolation to the poor and desolate souls of men. And, as it was foretold, the whole change came to pass before that generation passed away. "Verily, I say unto you, this generation shall not pass, till all these things be fulfilled."

The use of faith, and the use of science then, are quite distinct, and do not clash, but aid each other in the progressive evolution and development of human souls. By

nature we know and understand the wants of individual and natural selfhood only: by the word we learn to know and understand the wants and duties of collective selfhood, not only in this world, but in the world to come. We learn to know that God means to create divine order in the collective life of humanity, as well as in the spiritual life of individuals; and also to know that those who follow the dictates of individual selfhood, and disobey the laws of divine order in collective selfhood are satans or devils who oppose the will of God and will meet with the reward of disobedience in chaotic hells, in lieu of divine peace in heavenly societies. What could earthly science tell us of the spiritual evolution of humanity in this world or the next; and what influence could it have on obdurate spirits if it alone propounded such a law of spiritual progress?

The highest aims of industry are uses which blend with beauty in works of art; the highest aims of art are the union of truth with beauty, in perfect science; the highest aims of science are the union of truth with goodness, that love and wisdom may pervade the life of mankind; and this is the religious union of man with God, in the eternal laws of peace and harmony. Religion, therefore, is not a matter of indifference to philosophy: although wisdom and true science are most needed by pastors and healers of all denominations, whose humble duties and responsibilities are so important in the perfective evolution of humanity.

Having discriminated eternal laws and forces from transitory facts and modes of motion, we may now proceed with the discussion of first principles and philosophic theories.

PART II.—DISCUSSION OF PRINCIPLES.

EVOLUTIVE FACTS AND THEORIES.

EMBRYOGENESIS.—Eternal laws and forces, being anterior and superior to all transitory phenomena, generate and rule the accidents of matter and of motion. Forces are invisible, immaterial, and indestructible, while visible forms of matter are ever changing with the vicissitudes of motion. How far, then, are facts alone the data of positive science? Only in so far as they reveal to us the principiant causes which evoke and govern all their evolutions in accordance with invariable laws.

What are the facts and laws of embryogenesis? The following outline of the history of evolutive facts and theories is given by Mons. Serres, in his lectures on comparative anatomy and embryogenesis, at the Museum of Natural History, Paris, December, 1866.

A Synopsis of Different Views of Comparative Anatomists with regard to the Evolution of Animals.

"I°. These general views may be reduced to two; "namely:

"A. Those of the theory of pre-existence and "the law of centrifugal development.

"B. Those of the theory of epigenesis and

" the law of centripetal development, with
" its deductions, such as :
" 1. The law of symmetry.
" 2. The law of homœozygy (organic
" affinity).
" 3. The law of segmentation.
" 4. The law of eminencies.

" II°. Centrifugal law. Aristotle, with his two dis-
" tinctions of vegetable and animal life; their
" successive manifestation on the globe, and
" their evolution in animals.

" III°. Galien adopts this view and explains it mecha-
" nically, giving the ship as an illustration of
" structure (from the keel outwards). Fabricius,
" of Aquapendente, sacrifices his first observa-
" tions of natural phenomena to this theory.

" IV°. Harvey opposes this system, and lays the
" foundations of the theory of epigenesis. He
" demonstrates the impossibility of pre-existences.

" V°. Malpighi; an error of microscopical observation,
" causes this illustrious anatomist to believe that
" the embryo pre-exists in the cicatricule of the
" ovum.

" VI°. Malpighi constructs the embryo in accordance
" with this microscopical illusion.

" VII°. Haller first discovers this error of Malpighi.
" He adopts the views of Harvey with regard to
" Epigenesis, and supports them by the experi-
" ments of Trembley and of Reaumur, as well
" as by his own experimental observations.
" (Trembley first divided polypes and earth-
" worms into several parts, and saw that each
" part became a complete living animal.) Recent
" experiments show that an earth-worm divided
" lengthways through the head and neck, also

" forms each part into a complete head and neck,
" and continued to live as an animal with two
" heads; each of these being again carefully
" divided, the worm continued to live with one
" body and four heads.

" VIII°. Haller abandons the theory of epigenesis
" in his old age, and admits the pre-existence of
" the organs as a necessary consequence of those
" of the germs.

" IX°. Vicq d'Azyr refers us to the heart as the prin-
" ciple of centrifugal force and its developments.

" X°. Here begins the controversy between the parti-
" sans of the two systems, which can hardly
" be said to have ceased with the life of the late
" Frederic Cuvier.

" XI°. Needham attacked the idea of the pre-existence
" of germs, and the theory has not been able to
" survive.

" XII°. Wolff attacks the idea of the pre-existence of
" organs, and denies the influence of the centri-
" fugal forces of the heart.

" XIII°. Needham and Wolff admit the theory of
" epigenesis, and the latter appeals to his own
" experiments for proof.

" XIV°. The eighteenth century adopts without ex-
" amination, the idea of the pre-existence of the
" germs of life. (Witness the writings of Hart-
" zecker, Leibnitz, and Bonnet.)

" XV°. They neglect the difficult investigations of
" embryogenesis, and confine themselves to the
" study of perfect animal organisms. (See
" Ruisch.)

" XVI°. The sciences of histology, comparative anato-
" my, zoology, and palæontology, were the result of
" this exclusive study of the fully developed organ-

" isms of animals; and by their vast importance
" caused the want of embryological investigations
" to be overlooked. (Bichat, Vicq d'Azyr, Cu-
" vier, Jeoffroy St. Hilaire, and De Blainville are
" the illustrious men of this period.)

" XVII°. The neglect of embryological observation,
" left the field open to hypothesis. The general
" idea of pre-existence being obsolete, was sup-
" planted by the theory of epigenesis, in the
" nineteenth century.

" XVIII°. The phenomena of genetic formations were
" first attributed to the intervention of occult
" forces; called:

" by Needham, { 1. The force of expansion. 2. The force of resistance.

" by Wolff, { 1. Essential force. 2. Solidescent force.

" by Blummback " and Meckel, { 1. Plastic force. 2. Nisus formativus.

" by Oken, Baer, " and Burdach, { 1. Electro-magnetic forces. 2. Positive and negative poles.

" by Carus, { The law of antagonisms between positive and negative forces.

" XIX°. Haller's theory of pre-existences was better
" than these ideas of embryogenesis, the abuse
" of which became evident in the theories of
" homology put forth by Spix, Oken, and Meckel.

" XX°. But these ideas opened the way for the ex-
" perimental theories of epigenesis and meta-
" morphosis.

" XXI°. Wolff produced the necessary facts, while
" Geoffroy St. Hilaire and M. Serres explained
" the facts and the method.

" XXII°. Modern experimental epigenesis established

" by the labours of M. M. Serres, Baer, Ratke,
" Barry, Hashke, Coste, Bishoff, Remak, Reich-
" ert, Müller, Valentin, &c.

" XXIII°. Experimental rules and principles of the
" development of animal and human organisms.
" 1°. The correlation of forms (discovered by
" Cuvier).
" 2°. The theory of analogues (by Geoffroy
" St. Hilaire).

" XXIV°. The sciences of histology and histogenesis."

" From the facts presented to us in these tabular
" enumerations, and as a natural consequence of the
" theory of epigenesis applied to the study of anatomy
" and zoology, it follows :—

" A. That the phenomena of embryogenesis *often* ex-
" hibit a transitory *kind* of comparative anatomy.

" B. That comparative anatomy is a permanent em-
" bryogenesis.

" C. That the organisms of invertebrate animals ex-
" hibit the primary embryonic states and confor-
" mations of the vertebrate organisms. (?)

" D. That all arrested developments of a given organ-
" ism, reproduce a certain stage of embryonic
" evolution.

" E. That the phenomena of monstrosity and morbid
" anatomy (teratology and pathology) are often
" mere illustrations of arrested embryonic evolu-
" tion, or of a retrogradation towards the primi-
" tive forms of embryonic structure.

" F. That the phenomena of metamorphosis are the
" general processes of nature in effecting all her
" transmutations, whence it follows :—

"1°. That zoogenesis repeats the inequalities of "development which occur in embryogenesis.

"2°. That in zoogenesis there is a gradation of "the metamorphoses of animals, just as in "zoology there is a gradation of types in "the different classes of the animal king- "dom.

"3°. That the gradation of metamorphoses re- "peats and *reproduces* the gradation of types "exemplified in the sub-type of invertebrate "animals. (?)

"4°. That amongst the vertebrata, organic meta- "morphoses in general only influence the "organisms in which they occur.

"5°. That amongst invertebrate animals, on the "contrary, and especially amongst the in- "ferior types of invertebrata, each meta- "morphosis may give origin to a new species, "and even a new genus. (?)

"6°. That in each class of animals the gradation "of metamorphic evolutions, as well as the "gradations of type, is demonstrated by "anatomical structure.

"7°. That comparative embryogenesis gives us "*an explanation* of the phenomena of gra- "dation in the typical forms of animals, by "the metamorphoses through which the "internal and the external parts of their "bodies pass before they attain to their "adult and perfect state. (?)

"8°. That consequently, and perhaps even before "long, the animal kingdom which is now "classed according to its organization, ought "to be classed according to the development "of its organisms: that is to say, that em-

"bryogenesis will become the basis of a
"natural system of classification.

"9°. That the inferior types often exhibit in
"their permanent forms, the different em-
"bryonic states of superior types.

"10°. In fact, that organic morphology is thus
"becoming the *fundamental principle* of the
"systematic classification of animals."

In this tabular history of embryogenesis, controverted questions are stated antithetically, to contrast the views of one school with those of others, and accumulate the errors of observation and opinion on one side mainly. The idea of pre-existence and the theory of centrifugal development are yoked together as if one involved the other. The words epigenesis and centripetal development are supposed to embody the facts and the laws of embryogenesis, while, in reality, they only denote the building processes of evolution under the influence of incidental forces, without any explanation of those forces, which animate the chick before and after it is hatched.

The word epigenesis implies the action of extraneous forces upon and within the matter of the egg, to produce the body and the living energies of the chick, and these extraneous factors must pre-exist in nature, with or without a special form, and special modes of motion. The heat required for incubation, is one kind of influence observed in the process of hatching; is it the only kind of epigenetic force required? It has never been converted, that we know of, into instinctual organic energy. It is not the pre-existence of organic forces which is denied by M. Serres, but that of a microscopical chick in the germinal spot of the egg; and this leaves the question of incarnative origin, exactly where it was before. Facts are considerably comple-

mented in imaginary directions, to suit a preconceived notion of comparative anatomy and zoogenesis, in identical parallel with the phenomena of embryogenesis, as a basis for a new philosophy of method and systematic classification which has not been verified.

The known facts of embryology and comparative anatomy are the same for all schools of theory, and M. Serres argues for the supposition that no animal or vegetable organism was first created as we see it now, even in germs; but that all realms and classes, orders and families, genera and species, have been derived from a few cells or germs of organic matter, like those which now exist, in the simplest forms of physiological substance, just as the fœtus is formed by successive transformations of the simple and apparently homogeneous substance of the egg, by the metamorphic processes of embryogenesis. So that the creative operations of nature, which have occupied endless millions of ages to produce the present diversities of animals and plants, are now repeated in a few days, or weeks, or months of embryonic evolution, in each species of the higher animals.

The hypothesis may or may not be right, with regard to secondary modes of action and reaction in nature, but right or wrong, it does not account for all the facts and forces of life and organisation; nor does it solve the most important problems of evolutive science and philosophy.

The physiological likeness of one ovum to another of a different realm or class or species of animal is very great, but still, these germs are not identical with one another, nor with the seeds of plants, in any of the main characteristics of evolutive adaption to the special forces of internal organisation, whatever these may be. The histological modes of action by which the physiological substance of all eggs and seeds is transformed into

primary organic tissues, is somewhat alike in all classes and species of animal and vegetable embryos, but here ends the apparent identity of substance and of modes of action. As soon as characteristic tissues are distinctly formed they are different, not only in the body of each animal or plant, but in every class and species of organic type; and the organs formed of these diverse tissues, are still more markedly distinct and different. Wood and bark, leaves and fruit are not alike in trees of different species; skin and hair, wool and fur, scutes and scales, feathers and pinions are distinct and various in animals. Motorial and nervous systems differ; internal viscera differ, and give origin to special germs to reproduce the species. Absolute homogeneity is nowhere manifest in the simple elements of matter; in germinal eggs or seeds; in embryonic forms; in perfect organisms. Diversity does not spring from absolute simplicity in any of the known phenomena of evolution, whatever be the status of chaotic force and substance, before creation gives them the persistent differences and distinctions we observe in nature. More than sixty simple elements of matter irreducible by man, attest primitive diversity; and organic forces of four kinds, inconvertible one into another, by human agency, attest the fact of persistent vital diversity. None of the primordial forces, laws, and principles enumerated in our systematic table, are convertible, except as equivalents and correlatives in algebraic and mechanical permutations.

The results of positive analysis do not lead us down, then, from the ultimate diversities of force and matter, form and life, to a radical simplicity and homogeneity of force and substance, form and motion; no amount of ingenuity can establish an evolutive theory which supposes any one kind of primordial simplicity to give origin to all the known degrees of diversity in nature.

There are four distinct questions in the two theories mentioned by M. Serres; namely, pre-existence, centrifugal development; epigenesis, centripetal development.

The human form does not exist or pre-exist in the physiological elements of the human seed; that is proved by microscopical observation; but that is not the theory of the pre-existence of the human soul, before it commences the work of incarnation, by centripetal and centrifugal modes of action, in the embryo, and in the nervous system after birth.

"Amongst vertebrata, organic metamorphoses, in "general, only influence the organisms in which they "occur;" that is to say, alternate modes of reproduction do not occur in vertebrata; nor is a human fœtus ever like a fish, a reptile, or a bird; and still less like a lobster, a moth, or a worm; a snail or an oyster; a star fish or a sea-anemone; in what stage of metamorphic evolution after the segmentation of the ovum, then, can it be that "the organisms of invertebrate animals "*exhibit* the *primary* embryonic states, and *conformations* "of the vertebrate organisms?" This is not accurate, and it is unscientific to state in a lax manner, without defining what is meant by the word type, "that the inferior types often exhibit in their permanent forms the different embryonic states of superior types." It is more or less true within the limits of a family, an order, or even a class of the same realm, but not of radiate, molluscan, articulate, and vertebrate types in their respective embryonic conformations.

And as for "organic morphology becoming the fundamental principle of systematic classification," we may observe that it is already applied as far as it can be applied, in the gradation of species, genera, families, orders, and alliances in each class of realmic types; and that it can never deface the limits or obliterate the lines which

separate vertebrate from invertebrate types; nor even those which separate one class from another in their embryos and ova.

In his lectures, Mr. Serres shows that the idea of a complete animal or human form pre-existing in the zoosperm, as taught by Lewenhoch and others in the 17th century, has no foundation in fact; and as this is the only theory of any kind of pre-existence which he attempts to refute, we have every reason to suppose that beyond a passing notice of "occult forces," he does not even allude to any other. The more so as the centrifugal theory of development is a sort of consequence of the idea of a microscopical human form, embodied in the zoosperm, as the root of all development, by a gradual process of enlargement from an infinitely small centre towards a comparatively large circumference of body and limbs in the perfect organism. This theory of pre-existence is easily refuted by experimental observation; but *material* pre-existence is not the question at issue between physical and metaphysical philosophers; it is the pre-existence of the soul which is postulated by spiritualists, and strongly confirmed by revelation. The incarnation of the Saviour is a certainty for Christians; and all human beings are partakers of the same immortal human nature. The refutation of the notion of physical pre-existence and centrifugal development is no disproof of the ontological view of spiritual pre-existence and physical incarnation, in accordance with the theory of epigenesis and the law of centripetal development, warranted by scientific observation and experiment.

If a traveller found a complicated well built house in a country where no inhabitants were visible, and could prove that physical and mechanical laws and forces were amply sufficient to account for the stability and solidity of the structure, would that prove also that no hypothesis

with regard to the pre-existence of an architect or builder was necessary to account for the plan and the erection of the house? merely because the builder must have been obliged to act in accordance with the laws which rule the static and dynamic equilibrium of physical and mechanical forces, in every possible form of structure? Yet, this is an exact parallel of the modes of induction followed by physical philosophers with regard to the structure of the universe, including the human body, and its continuous existence during life.

Mr. Serres discusses three great questions of philosophy, namely: *pre-existence;* the *origin of species;* and the principles of natural *classification;* and seems to think that the science of observation and experiment is already sufficiently advanced to solve these problems. With regard to the first, he observes, without explaining what Haller meant by the "theory of pre-existences," that this undefined theory is preferable to the supposed intervention of "occult forces," called by Needham the "forces of expansion and resistance;" by Wolf, "essential and solidescent forces;" by Blumenbach and Meckel, "plastic force and nisus formativus;" by Oken, Baer, and Burdach, "electromagnetic forces, with positive and negative poles;" by Carus, "the law of antagonism between positive and negative forces." These are certainly very unsatisfactory definitions of creative forces and their modes of action, but they are not more inexplicit than the physical theory of soul-genesis and bodily organization, by means of molecular attraction and polarity, governing the metamorphic evolutions of the embryo, in accordance with the law of centripetal development.

The Origin of Species.—With regard to the "origin of species," we may observe that the permanent forms of animals are not so exact a repetition and representation

of the transitory metamorphic states of embryos, as Mr. Serres would lead us to infer; and that the ova of all known animals are as different and distinct from each other in reality, as the types from which they are derived, and to which they serve as germs of physical evolution. From the eggs of birds we never see reptiles developed, nor from the eggs of one species, the typical forms and organs of another true species, in any family or class of animals.

There is much laxity in the definitions of species and varieties, especially with regard to the lowest types of invertebrate organisms. It would be just as rational to class the caterpillar as one species, and the butterfly as another, as to tell us that "certain inferior types of invertebrate animals give origin to a different species, and sometimes even to a different genus," without defining the words genus and species, and without giving us a well authenticated life-history of the different types in question; and therefore, to form hypotheses of soul-creation, or the "origin of species" on the very inaccurate data of an assumed propinquity and probable identity between the transitory metamorphic forms of comparative embryology on the one hand, and the permanent forms of comparative zoology on the other hand, is almost as wild a method of speculation as any that has ever been imagined by the most ignorant and reckless dreamers of antiquity.

That there is *analogy* of form and structure in all types of organism, animal and vegetable, is certain; but analogy is not identity: and even were an identity of transitory embryonic forms and permanent types observed in nature, it would solve but one small part of the problem of psychogony, for the question would still remain, whence comes the living force which animates the lowest organism in its earliest stages of development,

and through all succeeding stages of progression, from the lowest to the highest forms of life and organization? The *modus operandi* of physical formation would be revealed, but not the *principle* which governs these phenomena; nor the nature and the source of the living forces which become slowly manifest in all these transitory evolutions. The origin of the first germs would still be unexplained; the transformation of inorganic atoms into organic germs, and the convertibility of physical forces into mental and instinctual energies and faculties, would not be proved by any transformation of one type of organism into another, any more than it is made evident by the transformation of a caterpillar into a butterfly (with a corresponding change of instincts), which is not a mere hypothesis, but a known fact in the life history of that insect.

"The origin of species" then, is not a simple question of metamorphic evolution, since the very marked transformation of a caterpillar into a butterfly, gives us no clue to the problem of soul creation.

The successive development theory from lower to higher forms, and the successive creation theory are equally conceivable as modes of evolution. On the one hand we see a simple ovule of complex elementary matter give rise to a series of absorptions of substance and transformations of organic forms in the evolution of the human fœtus; and after birth, the human mind is gradually developed in connection with the physical organism. The most complex results are thus evolved from the most simple beginnings; and as physiologists observe, there is a kind of analogy between the first simple cell germs of organism in man, and those of the simplest cell-like animal and vegetable organisms in the lowest vital forms of the creation. That which is certain, therefore, in the evolution of a complex individual

unit of existence, does not seem impossible in the evolution of a complex collective unit such as that of the organic realms of our globe. And furthermore, we see that individual organisms undergo metamorphic changes, which appear almost as great as the differences which separate one species from another in the permanent distinctions of organic types. The caterpillar, the pupa, and the imago, or perfect insect of the butterfly, are certainly very different degrees of extranatal evolution in one and the same individual. The hypothesis of complex evolution being exactly parallel in the individual body and the collective unity of organisms is neither absurd nor devoid of plausibility. The real truth of the matter is nevertheless unknown.

On the other hand, we find a certain fixity of type not only in different realms and classes, but in animals of different species; and this comparative immutability of form is transmitted from generation to generation by hereditary descent, as far as history can reach; with certain definite geological registrations, however, of the first appearance of each type, and the final disappearance of some species, during the progressive superposition of one class of strata upon another, in the external crust of the globe.

Innumerable quantities of the lowest known types of organism still exist, just as they are found in the earliest phases of geological history; and many of the same grades of life and organization co-exist at present, in all their manifest distinctness, as those which are registered in the successive relics of palæontological history; so that, while some of the lower types may *possibly* have given origin to higher forms, at different epochs of evolution, the vast majority of each low grade of forms have *certainly* transmitted their inferior original types

to their very latest posterity. This does not prove, however, that all germs were equally simple at first, or created simultaneously.

And again, the simple ovule of the human species *appears* to be only on the same grade of evolutive rank with the simplest forms of independent animal life, whence we may suppose that the successive evolution of higher and higher grades of organism from the lowest in the scale, up to man himself, is just as simple a process as that of the successive evolution of all the organs of the human body from the cell germ of the human ovule; still we must observe that no other lowest form of cell germ but that of the human ovule, will serve for the beginning of a human embryo; and on the other hand, that no human fœtus, brought into the world by abortion, at any stage of its uterine development, will continue to live, as an individual animal of the class or genus it is said to resemble in these metamorphic phases of existence. In this case the cell germ must be of the same species as the perfect organism, and we have no positive evidence that it has ever been otherwise with any kind of cell germ and the special type to which it belongs. The life-history of insects, and alternate modes of generation are no exception to this rule, for the successive phases are as clearly related to each other, in one case as in the other. We have no evidence of any animal having ever laid an egg which gave origin to an embryonic larva of a *higher* grade than the parent; although some larvæ retrograde in their last developments; nor have we evidence that any perfect or imperfect type derived from the egg of any species, could, by "natural selection," change of climate, and continuous habit, transform itself into an animal of a higher species, and then lay eggs of a different kind from those which were laid by its parents, and from which it had

derived its own mortal frame. Alternate generation and the fact of "breeding pigeons to a feather," are not sufficient ground for the hypothesis.

Since all cell germs are equally simple in apparent form and structure, although they give origin to very different species, it is easy to conceive they were different from the beginning; and instead of imagining there could be but one period of the primitive creation of physiological germs of different kinds, there may have been successive epochs of cell-germ creation and consequent evolution. This hypothesis presents one difficulty which the other does not; namely, that of the gestation and embryonic evolution of the highest types of organism. The lowest forms of life may be developed from minute cells, floating in the water of the ocean without any aid from the parent procreators; while the highest kinds of ova require special conditions of incubation or gestation. This is a difficulty we cannot solve; nor do we deem it necessary to form any hypothesis to explain it. We simply confess we do not know how the first man was created, and therefore we accept the explanation given in the Bible.

The fact of simple prolific cell-germs being of as many different realms, classes, orders, families, genera and species as the perfect organisms from which they are derived, and as strictly distinct from each other in every potential characteristic, would seem to imply a pre-established harmony between the physical constitution of cell-germs and their correlative dynamic types of immaterial incarnative forces: the active principle of formative energy being always conjugated with the prolific germ of its own class and species, and never with one of any other realm, or class or species. The invisible and the visible worlds of forms and forces are thus indissolubly wedded to each other in the most minute

particulars, and no misalliances are permanently tolerated by the laws of nature. That which God has joined together no man can sunder in the order of organic evolution. "A thing of beauty is a joy for ever," says the poet Keats, and all the works of the Creator are designs of use and beauty, truth and goodness not to be marred by finite creatures, but to serve as models of relative perfection for the human mind to contemplate, in every degree of evolution, from the very lowest to the highest forms of the creation.

The waters of the ocean are formed of oxygen and hydrogen, but God alone can form them; the atmospheric strata and the solid strata of the earth are formed of simple elements, but omnipotence alone can give them form and due proportions, in accordance with a pre-established plan of adaptation to innumerable purposes of use for all the finite creatures destined to inhabit them.

Nor can the chemistry of man go farther than to decompose and recompose a few small drops of water to enable him to understand the works of nature, without being able to subvert the general economy. Hybridism may modify organic shapes, within very narrow limits, but the primitive forms constantly recur by lapse of time. Crossing breeds may propagate improved features and habits amongst kindred species, just as degenerescence is propagated by continuous privation and the consequent deterioration of primitive types. Neither improvement nor deterioration have ever yet been known to change one species into another, or interfere with fixed types, any more than the faculty of decomposing and recomposing water gives man power to modify the ocean as at first created. Air is elementally different from water; and organic realms are not less radically different, as parts of a complex unity.

PHILOSOPHIES.

PHYSICAL PHILOSOPHY.—Materialism has assumed a new form in the spontaneous inductions of modern science. Elemental substance, immaterial force, invariable laws of motion, infinite space, and infinite time, are recognized principles of physical science and philosophy. A few quotations from a work recently published on "Heat, as a mode of Motion," will exemplify the leading points of the "New Philosophy." At page 43, we find the following remarks on the work of a Danish author :—

"In 1843, an essay entitled, 'Theses concerning "Force,' was presented to the Royal Society of Copen- "hagen by a Danish philosopher named Colding. At "this early date; M. Colding sought to ascertain the "quantity of heat generated by the friction of various "metals against each other, and against other sub- "stances, and to determine the amount of mechanical "work consumed in its generation. In an account of "his researches given by himself in the Philosophical "Magazine (vol. xxvii. p. 56), he states that the result "of his experiments, nearly 200 in number, was that "the heat disengaged, was always in proportion to "the mechanical energy lost. Independently of the "materials by which the heat was generated, M. Cold- "ing found that an amount of heat competent to raise a "pound of water 1° centigrade would raise a weight of "a pound 1148 feet high. M. Colding starts from the

" principle that,—'as the forces of nature are something " spiritual and immaterial—entities whereof we are " cognisant only by their mastery over nature, those " entities must of course be very superior to everything " material in the world; and as it is obvious that it is " through them only that the wisdom we perceive and " admire in nature expresses itself, these powers must " evidently be in relation to the spiritual, immaterial, " and intellectual power itself that guides nature in its " progress; but, if such be the case, it is consequently " quite impossible to conceive of these forces as any- " thing naturally mortal or perishable. Surely, there- " fore, the forces ought to be regarded as absolutely " imperishable.' Whatever induces a man to work has " *some* value; and inasmuch as these speculations in- " duced M. Colding to become an experimenter, they " are on this account entitled to a certain degree of " respect" (p. 43).

In page 25, our English author states that, the "*dynamical theory*, or as it is sometimes called, " the *mechanical theory* of heat, discards the idea of " materiality as applied to heat. The supporters of this " theory do not believe heat to be matter, but an acci- " dent or condition of matter; namely, *a motion of its* " *ultimate particles*." He then explains Count Rumford's and Sir Humphrey Davy's experiments, which show that heat may be generated by friction; and observes that, Davy reasoned thus:—" If I, by friction, " liquefy ice, a substance will be produced which con- " tains a far greater absolute amount of heat than the " ice; and in this case, it cannot with any show of " reason be affirmed that I merely render sensible heat " which had been previously insensible in the frozen " mass. Liquefaction in this case, will conclusively " demonstrate a *generation* of heat. He made the ex-

" periment, and liquefied the ice by pure friction; and " the result has been regarded as the first which really " proved the immateriality of heat."

In the preface of the English book the author says, " I " have called the philosophy of heat a new philosophy, " without however restricting the term to the subject of " heat. The fact is, it cannot be so restricted: for the " connection of this agent with the general energies of " the universe is such, that if we master it perfectly, we " master all. Even now we can discern, though but " darkly, the greatness of the issues which connect " themselves with the progress we have made—issues " which were probably beyond the contemplation of " those, by whose industry and genius the foundations " of our present knowledge were laid."

" In the study of nature two elements come into play, " which belong respectively to the world of sense and to " the world of thought. We observe a fact, and seek " to refer it to its laws,—we apprehend the law, and " seek to make it good in fact. The one is theory, the " other is experiment; which, when applied to the " ordinary purposes of life, become practical science. " Nothing could illustrate more forcibly the wholesome " interaction of these two elements, than the history of " our present subject. If the steam-engine had not " been invented, we should assuredly stand below the " theoretic level which we now occupy. The achieve- " ments of heat through the steam-engine have forced, " with augmented emphasis, the question upon thinking " minds—' What is this agent, by means of which we " can supersede the force of winds and rivers—of horses " and of men? Heat can produce mechanical force, " and mechanical force can produce heat. Some com- " mon quality must therefore unite this agent and the " ordinary forms of mechanical power? This relation-

" ship established, the generalising intellect could pass " at once to the other energies of the universe, and it " now perceives *the principle* which unites them all. " Thus the triumphs of practical skill have promoted " the development of philosophy. Thus, by the inter- " action of thought and fact, of truth conceived and " truth executed, we have made our science what it is— " the noblest growth of modern times, though as yet " but partially appealed to as a source of individual " and national might."

" As a means of intellectual education, its claims are " still disputed, though once properly organised, greater " and more beneficial revolutions await its employment " here, than those which have already marked its appli- " cations in the material world. Surely the men whose " noble vocation it is to systematise the culture of " England, can never allow this giant power to grow " up in their midst without endeavouring to turn it to " practical account. Science does not need their pro- " tection, but it desires their friendship on honourable " terms: it wishes to work with them towards the great " end of all education,—the bettering of man's estate. " By continuing to decline the offered hand, they " invoke a contest which can have but one result. " Science must grow. Its development is as necessary " and as irresistible as the motion of the tides, or the " flowing of the gulph stream. It is a phase of the " energy of nature, and as such, it is sure, in due time, " to compel the recognition, if not win the alliance of " those who now decry its influence and discourage its " advance."

The convertibility of physical forces is here explained in a special sense, and illustrated by the manner in which the mechanical work of Sir Humphrey Davy's arm was converted into heat by the friction of ice, and

transferred into the liquified water. On further inquiry we discover that the mechanical work of the arm was derived from the heat of Sir Humphrey Davy's body; and this leads us to ask whence the heat of that body was obtained; the answer being, that the food ingested and consumed, supplied the heat which generated the mechanical force, which did the work that conveyed heat into the water.

All this is plain and simple; nothing comes from nothing; the heat of the water came from the human body, and the heat and work of that, came from the combustion of the food consumed. And this is the steam-engine view of convertibility. But what does the author mean when he says that—"In the study of "nature, two elements come into play which belong "respectively to the world of sense, and to the world of "thought?" Does he mean simply that the *facts* of nature are one thing as a source of experience and knowledge, and that principles in nature are a more important thing, as the basis of positive science? In this we should agree with him entirely; but we suspect that he wishes to imply more than this, by suggesting the idea that thought, with the physical work of the brain, is derived from heat, as well as the mechanical work of the arm. Of this we have no proof, and if he thinks he can see the evidence of such a fact, his language should be much more definite. Heat is a mode of motion; thought is a mode of motion. Heat is immaterial; thought is immaterial. Heat and mechanical work are manifested in the human body and in the steam-engine. Intellect and thought (or mental work) are manifested in the human body, but not in the dynamic force of a steam-engine. Here the parallel breaks down, and leaves a residue unexplained. Engines neither build nor direct themselves.

Physical forces are immaterial and convertible in the human body and in the steam-engine; intellectual forces are immaterial and convertible with one another, in the human mind, but not with the physical forces of the living body, nor with those of the steam-engine. All forces are convertible with their own kind, but not with any other kind.

And now we come to the root of all these definitions and distinctions. The indestructible principle of being and of life in man, is able to convert all kinds of immaterial forces, into an experiential soul and body, in all worlds of transitory and phenomenal existence; and this gives us a radical distinction between the ontological spirit and the experiential organism of human nature. The ontological unit of personality, is able to convert radical kinds of energy, into correlative planes of organism; namely, the physical, the physiological, the psychological, and the rational. The immortal spirit collects and organizes all these forces for a complex purpose, and expends them for the realization of a definite aim.

1°. It collects physical and physiological heat by nutritive modes of motion, to expend them in mechanical work for the *uses* of industry.

2°. It collects instinctual sensations and modes of motion to expend them along with physical force in constructive works of taste for the attainment and enjoyment of the *beautiful* in art.

3°. It collects mental perceptions or immaterial ideas and modes of motion, to expend them in the physio-mental work of thought, in order to discover the fundamental laws of nature, the necessary principles of reason, and to create and clothe itself with the positive *truths* of science.

4°. It collects spiritual emotions or immaterial forces

and modes of motion, and expends them in works of love and affection, or human association, for the sake of *goodness* and happiness for itself and for the human race collectively, in this world, and for all God's creatures, in all worlds.

Physical philosophy does not explain psychological forces, nor account for the phenomena of

1°. Perpetual destruction or death of complex living organisms, resulting in a transitory chaos of elemental substances.

2°. Perpetual generation of complex living organisms, resulting in a transitory organization of elemental substances.

3°. Continuous improvement of complex living organisms, resulting in perfective evolution.

4°. Eternal perfection of laws and principles, love and wisdom in abiding Providence.

Without some knowledge of these principles and facts, the words chaos, organization, progress, and providence have no definite meaning; to gain some insight into laws of life and organization, we must carefully analyze the schematismus corporum in complex organisms; the factors and phases of metamorphic and developmental evolution in the transitory cycles of mundane existence, in each realm, class, family and species of organism; the perfective progress of each type, from the most imperfect to relatively perfect states of evolution; and the transcendental factors of perfection itself, in all kinds of eternal forces, laws, and principles, which are immanent and manifest in living organisms, and in all degrees of progress.

In Aphorism XVII. of the second part of the Novum Organum, Bacon says—"The first and almost "perpetual precaution and warning which we consider "necessary is this: that none should suppose from the

"great part assigned by us to forms, that we mean such "forms as the meditations and thoughts of men have "hitherto been accustomed to. In the first place, we do "not at present mean the *concrete forms*, which (as we "have observed) are in the common course of things "compounded of simple natures, as those of a lion, "an eagle, a rose, gold, or the like. The moment for "discussing these will arrive when we come to the *latent* "*process* and *latent conformation*, as the discovery of "them, as they exist in what are called substances, or "*concrete natures*."

"Nor again would we be thought to mean (even when "treating of simple natures) any *abstract forms* or ideas, "either undefined or badly defined in matter. For when "we speak of *forms*, we mean nothing else than *those* "*laws and regulations* of simple action which *arrange and* "*constitute* any simple nature, such as *heat, light*, weight, "in every species of matter, and in a susceptible subject. "The form of heat, or form of light, therefore means no "more than the law of heat, or the law of light. Nor "do we ever abstract or withdraw ourselves from things "and the *operative* branch of philosophy. When, there- "fore, we say, for instance, in our investigation of the "form of heat, reject rarity, or rarity is not a form of "heat, it is the same as if we were to say, man can super- "induce heat on a dense body, or the reverse. Man can "abstract or ward off heat from a rare body."

This shows that Bacon was intent upon studying the laws of physical science mainly; for although he mentions, he does not analyse other subjects of investigation, and other "tables of degrees," such for instance, as those given in Aphorism XXI. "1°. "Of prerogative instances; 2°. Of the supports of "induction; 3°. Of the correction of induction; 4°. Of "varying the investigation according to the nature of

"the subject; 5°. Of the prerogative natures with "respect to investigation, or of what should be the first "or last objects of our research; 6°. Of the limits of "investigation, or a synopsis of all natures that exist in "the universe; 7°. Of the application to practical pur- "poses, or of what relates to man; 8°. Of the prepara- "tion for investigation; 9°. And lastly, of the ascending "and descending scale of axioms." None of these general heads, as his editor remarks, except the first, is prosecuted by the author. After dealing at some length with the enumeration and explanation of "prerogative instances," he concludes the volume, and leaves it unfinished by saying—"We must next proceed to the sup- "ports and corrections of induction, and thence to con- "cretes, the latent process, and latent conformations, and "other matters, which we have enumerated in their order, "in the twenty-first aphorism, in order that, like good "and faithful guardians, we may yield up their fortune "to mankind, upon the emancipation and majority of "their understanding, from which must necessarily "follow an improvement of their estate, and an increase "of their power over nature."

Bacon did not live to perform the task he undertook; and his followers have studied the laws of physical nature, without pursuing questions which he distinctly pointed out, but never even traced in outline. Could he have developed what he indicates in the words *latens processus ad formam*, and *latens schematismus corporum* or latent processes, and latent conformations, he would have discovered the principles of evolutive and organic method, the very principles which lie at the foundation of organic science and philosophy. He dwells mainly on the laws of physical phenomena; but his writings show nevertheless that he was a spiritual philosopher.

SPIRITUAL PHILOSOPHY.—In reviewing "Humboldt's Kosmos," the "Philosophy of the Inductive Sciences," and the controversy between Dr. Whewell and John Stuart Mill, on the origin of ideas, and the laws of evidence, Sir John Herschel expresses himself in the following manner:

"The frame of nature is not bounded by that narrow "limit which is commonly understood by the term "physics. Life, thought, and moral and social relation, "are all equally *natural*—equally elements of the great "scheme of the Kosmos, with matter and magnetism."

(I.) "Among the infinite analogies which may exist "among natural things, it may very well be admitted "that those only are designed in the original constitu- "tion of our minds, to strike us with permanent force, "to embody around them the greatest masses of "thought and interest, to become elaborated into "general propositions, and finally to work their way "into universal reception, and attain to all the recog- "nizable characters of truth, which are really dependent "on the intimate nature of things, as that nature is "known to the Creator, and which have relation to "their essential qualities and conditions, as imposed on "them by Him: so that the power bestowed on the "mind of seizing on those *primordial analogies*, and its "impulse to generalise the propositions which their con- "sideration suggests, on the one view of the subject are "equivalent to its endowment with a direct recognition "of fundamental ideas and relations not derived from "experience, and the evolution from those ideas of "necessary truths equally independent of experience in "the other. And perhaps, with this explanation, both "parties ought to rest content, satisfied that on either "view of the subject, the mind of man is represented as "in harmony with universal nature; that we are con-

" sequently capable of attaining to real knowledge; and " that the design and intelligence which we trace " throughout creation is no visionary conception, but a " truth as certain as the existence of that creation " itself."

" We seem on the verge of obtaining a glimpse of " causes, which though strictly physical, are yet of a " higher order than force itself, and of which this latter " is one of the direct or indirect effects (?). Such a " cause we think we recognize as an object of conscious- " ness in that effort (accompanied with fatigue and ex- " haustion) which intervenes between the mental act of " mere volition and the muscular contraction which " moves our limbs. Such causes, too, may possibly lie " at the root of chemical affinity of electric and magneti- " cal polarity, and thence, by no remote analogy, of " gravitation itself, and of all those material forces " whose action is not merely temporary or occasional, " but permanent and continuous."

" By contemplating our own faculties of attention, " recollection, and other similar processes, whereby the " mind continually influences the succession of its own " thoughts, or rather, in the same instant that we ex- " perience that peculiar *mental sensation* which is con- " nected with the exercise of these faculties, we come to " have suggested the notion of MENTAL POWER. By " dwelling on the *effort* whereby we put our limbs into " motion, the conception of vital effort as expended in " the production of mechanical force, is in like manner " suggested; and by dwelling on the only feature these " remarkable phenomena have in common, viz., *change* " predictable beforehand, as sure to be consequent on " their *voluntary* exercise, we attain to an abstract con- " ception of *cause* as the origin of *all* change, a concep- " tion which once so originated within our minds by

" this, our highest form of experience, personal con-
" sciousness, is reflected back, and verified by all exter-
" nal experience, though in forms far less pure and un-
" adulterated than that in which it is presented to us by
" these internal phenomena. Lastly, by the experience
" of our own intentions as capable of being carried out
" into execution by material or moral combinations, we
" have suggested to us the notion of *design* or final
" cause, and by that of our emotions as dependent on
" the result of our designed acts, the conception of
" *motive* and of moral responsibility."

" Mr. Whewell, however, puts a most decided nega-
" tive on the claims of experience to the origination of
" these ideas."

" We have seen," he says, " that there are proposi-
" tions which are known to be necessarily true, and that
" such knowledge is not and cannot be obtained by
" mere observation of actual facts. It has been shown
" also that these necessary truths are the results of cer-
" tain fundamental ideas, such as those of space, time,
" number, and the like. Hence it follows inevitably
" that these ideas and others of the same kind are not
" derived from experience. For these ideas possess a
" power of infusing into their developments that very
" necessity which experience can in no way bestow.
" This power they do not borrow from the external
" world, but possess by their own nature. Thus we
" unfold out of the idea of space, the propositions of
" geometry, which are plainly truths of the most
" rigorous necessity and universality. But if the idea
" of space were merely collected from observation of the
" external world, it could never enable or entitle us to
" assert such propositions: it could never authorise us
" to say that not merely some lines, but all lines, not
" only have, but must have those properties which

"geometry teaches. Geometry in every proposition "speaks a language which experience never dares to "utter, and indeed of which she but half comprehends "the meaning. Experience sees that assertions are true, "but sees not how profound and absolute is their truth. "(Phil. i. 71.)

"The truths of geometry *exist*, and are verified in "every part of space. They may depend on the think- "ing mind for their conception and discovery, but they "cannot be contradictory to that which forms their sub- "ject matter, and in which they are realised in every "place and at every instant of time."

"According to Kant, space is a *real condition* of the "perception of our own and all other existence, whether "it be a substantive reality (as we conceive it to be) or "not, if it be a *necessary* reality, or a *necessary* condition, "then are the expressions of its properties in geometri- "cal language necessary truths."

"The direct personal consciousness of causation which "we have when we either exert voluntary force or influ- "ence the train of our thoughts have been much and "singularly lost sight of by many writers on this sub- "ject. Whatever be the essential nature of that rela- "tion (or whether even it be in all cases the same) we "are no more left in doubt of its being a real relation, "when we experience this consciousness, than we are of "our own reality or of that of the external world. "When once suggested (as we conceive it to be) by such "experience, as a kind of mental sensation, it is seized "and dwelt on with a force and tenacity which strongly "indicate its real importance to our knowledge and "well being. The energy and assurance with which it "is generalised, or rather universalised, and extended to "all the events of nature, must be held as another "indication in the same direction. Nothing can be

" imagined more different than the two lines of experi-
" ence by which this consciousness of effective action is
" impressed. They agree in nothing but in change
" consequent on or simultaneous with voluntary effort,
" and predictable beforehand, as sure to accompany such
" effort. Yet this point of analogy is seized and made
" the basis of a *universal theory* with an invariable verifi-
" cation by experience, and a decisive acknowledgement
" of its irresistible cogency, which proves it to be one of
" those grand primordial analogies alluded to above; an
" analogy by which the physical and intellectual world
" are brought into inseparable contact, by establishing
" the influence of *will* over both."

Sir John Herschel's spiritualism is quite as positive as the "new philosophy" of physical forces.

In the "History of Civilization," Buckle deems intellect more influential than morals in the progress of humanity, while Mr. Leckey shows in the "Rise and Progress of Rationalism in Europe," that interests, feelings, and moral principles, are always predominant. A few quotations from the chapter on "the Secularisation of Politics," in Mr. Leckey's second volume will sufficiently explain his views:

"All minds are more or less governed by what che-
" mists term the laws of elective affinity . . . . The
" predominating passion of every man colours the whole
" train of his reasoning, and in every subject he ex-
" amines, he instinctively turns to that aspect which is
" most congruous to his favourite pursuit." (ii. 107.)

"It is well worthy of remark, that the triumph of
" toleration and the triumph of civil liberty, should
" both have been definitely effected in England at the
" same time, and should both have found their champion
" in the same man (Locke). Both were achieved by
" laymen in direct opposition to the Church, and in

" the moment of her extreme depression. Both too, " represented a movement of secularisation, for by the " first, theological questions were withdrawn from the " sphere of politics, and by the second, the principle of " authority was removed from a theological to a secular " basis. But what especially characterises the develop- " ment of English liberty is that, although it was " effected contrary to the Church, and contrary to the " clergy, it was not effected contrary to religion. This " —which when we consider the mournful history of " continental liberty, may perhaps be regarded as the " happiest fact in English history—was no doubt due " in a great measure to the success with which the " Dissenters had associated religion with liberty, to the " essential imperfection of the Anglican theory, which " left undefined the question when allegiance may be " transferred to a triumphant rebel, and also to the " admirable moderation of Somers and Locke, but it " was still more due to the genius of the reformation." (ii. 204.)

" . . . . It is thus that amid the transformation or " dissolution of intellectual dogmas, the great moral " principles of Christianity continually reappear, ac- " quiring new power in the lapse of ages, and in- " fluencing the type of each succeeding civilization." (ii. 249.)

The persistent feelings and aspirations of humanity are physical, instinctual, mental, and spiritual, while the special inspirations of genius give us mechanical and industrial inventions, artistic and poetical creations, scientific and philosophical discoveries, religious revelations and elucidations, as simultaneous and successive means of evolutive and perfective progress.

THEOSOPHY AND THEOLOGY.

SPIRITUAL COSMOGONIES.—Ancient theosophists describe three degrees of hierarchy in the creation of celestial beings, namely:—

1st Hierarchy.	1. Seraphim. 2. Cherubim. 3. Thrones.
2nd Hierarchy.	1. Powers. 2. Virtues. 3. Dominions.
3rd Hierarchy.	1. Principalities. 2. Archangels. 3. Angels.

Below these degrees of intellect are disembodied human spirits in Hades, and human souls in mortal bodies. Revelation can alone explain these facts; common science is inadequate, and must confess ignorance of celestial grades of Hierarchy.

Jacob Boehmen tells us "how God created three cir-
" cles, or kingdoms of spirits, corresponding to the three
" Persons of the Trinity. To each a monarch and seven
" princes were assigned, corresponding to the seven
" qualities or Fountain Spirits. One of these angelic
" sovereigns, Lucifer, fell through pride, and all his
" kingdom with him. Straightway, as the inevitable
" consequence of sin, the operation of all the seven
" qualities throughout his dominion became perverted

" and corrupt. The fiery principle, instead of being the " root of heavenly glory, became a principle of wrath " and torment. The astringent qualities, instead of " ministering due stability or coherence, became hard or " stubborn; the sweet, foul and putrescent; the bitter, " fierce and raging. So with all the rest. Now it so " happened, that the seventh quality of Lucifer's realm " coincided, in space, with this world of ours. This " earth, therefore, once a province of the heavenly " world, was broken up into a chaos of wrath and dark- " ness, roaring with hubbub of embattled elements. " Before man was created, nature had fallen. The crea- " tive word of God brought order into the ruins of this " devastated kingdom. Out of the chaos, He separated " sun and planets, earth and elements . . . ."

"The 'Heavenly Materiality,' or 'Glassy Sea,' of the " angelic kingdom, was a marvellous mirror of perfect " shapes and colours, of sounds and virtues. Therein " arose, in endless variety, the ideal forms of Heaven, " jubilant manifestations of the divine fulness, gladden- " ing the spirits of the praising angels with a blessedness " ever new. All the growth and productive effort of " our earth is an endeavour to bring forth as then it " brought forth. Every property of nature, quickened " from its fall by the divine command, 'Be fruitful " and multiply,' strives to produce in time as it did in " eternity. But for that fall, this earth had never held " perilous sands or cruel rocks; never put forth the " poisonous herb, or bred the ravenous beast; and never " would earthquake, pestilence or tempest, the deadly " outbreaks of water or of fire, have accompanied the " warfare of discorded elements. The final fires will " redeem nature, purging away the dross, and closing " the long strife of time." (Vaughan's Hours with the Mystics, vol. ii. p. 90, &c.)

This seems like a dream, but Boehmen's Theology is more intelligible.

"There is no grace whereby we can come to adoption, "save simply in the blood and death of Christ. For "Him alone hath God appointed to be a throne of "grace in his own love, which He hath set in Him, in "the sweet name Jesus (from Jehovah). He is the only "sacrifice God accepteth to reconcile his anger."

"But if this said sacrifice is to avail for me, it must "be wrought *in me*. The Father must communicate or "beget his Son in my desire of faith, so that my faith's "hunger may apprehend Him in his word of promise. "Then I put Him on, in his entire process of justifica- "tion, in my inward ground; and straightway there "begins in me the killing of the wrath of the devil, "death, and hell, from the inward power of Christ's "death."

"That man is no Christian," he observes, "who doth "merely comfort himself with the suffering, death, and "satisfaction of Christ, and doth impute it to himself "as a gift of favour, remaining still himself a wild beast "and unregenerate . . . . . I say, therefore, that no "show of grace imputed from without can make a true "Christian. Sin is not forgiven him by the speaking "of a word once for all from without, as a lord of this "world may give a murderer his life, by an outward "act of favour. No, this availeth nothing with God." (Ibid p. 345.)

In the writings of Charles Fourier, imaginary schemes of cosmogony, psychology, and sociology, are mingled with definite views of principles, which are more suggestive than those of Pythagoras and other ancient philosophers, who indulged in spontaneous inductions, based in like manner on the abstract theory of musical harmony. The following table of the "essential char-

acteristics of Deity," is very remarkable; and many other parts of Fourier's speculations are equally ingenious, although his system is in many points defective.

"*Attributes of Deity.*"

" 1. The entire government of the creation.
" 2. The universality of Divine Providence.
" 3. The smallest expenditure of force to obtain a given
" result.
" 4. Distributive justice.
" 5. The exclusive distribution of all kinds of forces.
" 6. The mathematical regulation of all forces, inorganic
" and organic.
" 7. The inevitable reaction of all false movements.
" 8. The infinite of all His attributes.
" 9. The unity of all creation."

The French text stands thus:

1. LA DIRECTION INTEGRALE DU MOVEMENT.
2. L'universalite de Providence.
3. L'economie de ressorts.
4. La justice distributive.
5. La distribution exclusive de l'attraction.
6. L'impulsion géométrique en passionel et en materiel.
7. L'impulsion repercutée par entrave.
8. L'infini en ses proprietés.
9. L'UNITÉ DU SYSTEME GENERALE.

" A partir de ces caractères, ou va determiner aisement " les destinées sociales." (La Fausse Industrie, vol. i. p. 117. Paris, 1836, first edition.)

From Vaughan's "Hours with the Mystics" (vol. ii. p. 278) we quote the following abstract of Swedenborg's theosophy:—" Humanity stands high with Boehmen, " higher yet with Swedenborg. The Divine Humanity " is at once the Lord and pattern of all creation. The

"innumerable worlds of space are arranged after the "human form. The universe is a kind of constellation "*Homo*. Every spirit belongs to some province in "Swedenborg's 'Grand Man,' and affects the corres- "pondent part of the human body. A spirit dwelling "in those parts of the universe which answer to the "heart or the liver, makes his influx felt in the cardiac "or hepatic regions of Swedenborg's frame, before he "becomes visible to the eye. Evil spirits, again, pro- "duced their correspondent maladies on his system, dur- "ing the time of his intercourse with them. Hypocrites "gave him a pain in the teeth, because hypocrisy is "spiritual tooth-ache. The inhabitants of Mercury "correspond to a province of memory in the 'Grand "Man:' the Lunarians, to the ensiform cartilage at the "bottom of the breast-bone. With Swedenborg, like- "ness is proximity: space and time (in the spiritual "world) are states of love and thought. Hence his "journeys from world to world:—passing through states "being equivalent to travelling over spaces. Thus it "took him ten hours to reach one planet, while at an- "other he arrived in two, because a longer time was "required to approximate the state of his mind to that "of the former."

Again, p. 285:—"Swedenborg declares that the "Church has been corrupted by the doctrine of three "divine persons existing from eternity. He maintains "that such a belief must in reality involve the concep- "tion of three several Gods, however loudly those who "hold it may profess to acknowledge the Divine Unity. "In his theology, the Father, Son, and Spirit, are 'the "three essentials of one God, which make One, like "Soul, Body, and Operation in man.'"

Most of the theosophic speculations of Swedenborg seem to be spontaneous inductions from the known forces

of humanity, such as any other imaginative man might make, from ordinary experience; but he professes to have been opened in his spiritual nature, so as to see and converse with spirits in the supernatural world: and he also states that he has been expressly commissioned to explain to the world, the interior meaning of the word. In his "True Christian Religion," § 779, he says:—"Since the Lord cannot manifest himself in "person (to the world), which has just been shown (in "a preceding paragraph) to be impossible, and yet he "has foretold that he would come and establish a new "church, which is the New Jerusalem, it follows that "he will effect this by the instrumentality of a man, "who is able not only to receive the doctrines of that "church in his understanding, but also to make them "known by the press. That the Lord manifested him-"self before me his servant, that he sent me on this "office, and afterwards opened the sight of my spirit, "and so let me into the spiritual world, permitting me "to see the heavens and the hells, and also to converse "with angels and spirits, and this now continually for "many years, I attest the truth; and further, that from "the first day of my call to this office, I have never "received anything appertaining to the *doctrines* of that "church from any angel, but from the Lord alone, *whilst* "*I was reading the Word.*"

There can be no doubt that Swedenborg here states what he believed to be truth; while many parts of his writings give us the impression that his own spontaneous intuition, and long pondering on the spiritual sense of the Scripture, was the source of his illumination. Many of his illustrations and his reasonings are deficient in points which the positive science of the present day would easily correct; and his periodical lapses into abnormal states seem to have misled him with regard to

the distinction between subjective and objective sensations and experience. His descriptions of "Heaven and Hell" read more like psychological descriptions of spirits in this world, than literal visions of a supernatural world. There can be no doubt, however, that many of his views are highly moral, and consonant with reason. The same may be said of the religious doctrines propounded in the "Pilgrim's Progress;" and we have no doubt that Bunyan's illumination, *while reading the Word*, was as genuine as that of Swedenborg; and that both were inspired to interpret the word to the best of their ability. It seems much more rational to suppose the New Testament itself contains the word of promise, inspired by the Spirit of Truth, the *Comforter*, promised by the Saviour, than that the church should have to wait so long for a particular system of interpretation of that very word, the coming of which should be the *second* coming of Christ, who is the Word itself. Swedenborg dwells mainly on the gospel of St. John as the ground of his system. "If ye had known me, ye should have known "my Father also; and from henceforth ye know him, "and have seen him.—Philip said unto him, Lord show "us the Father, and it sufficeth us.—Jesus said unto "him: Have I been so long time with you, and yet "hast thou not known me, Philip? he that hath seen "me hath seen the Father; and how sayest thou, then, "shew us the Father?" (St. John, chap. xiv. 7, 8, 9.) Swedenborg interprets this literally, although he is most ingenious in finding allegorical interpretations for other texts of Scripture. But what are we to understand by such texts as the following:—"Believ- "est thou not that I am in the Father, and the Father "in me? The words that I speak unto you, I speak "not of myself; but the Father that dwelleth in me, he "doeth the works." "Believe me that I *am* in the

" Father, and the Father in me: or else believe me for " the very works sake. Verily, verily, I say unto you, " he that believeth on me, the works that I do shall he " do also; and greater *works* than these shall he do; be- " cause I go unto my Father." (St. John xiv. 10, 11, 12.) " These words spake Jesus, and lifted up his eyes to " heaven, and said, Father, the hour is come, glorify thy " Son, that thy Son also may glorify thee: as thou hast " given him power over all flesh that he should give " eternal life to as many as thou hast given him. And " this is eternal life, that they might know thee the " only true God, and Jesus Christ whom thou hast sent. " I have glorified thee on the earth: I have finished the " work which thou gavest me to do. And now, O " Father, glorify thou me with thine own self, with the " glory which I had with thee before the world was. I " have manifested thy name unto the men which thou " gavest me out of the world: thine they were, and thou " gavest them me; and they have kept thy word. . . . . " And now I am no more in the world, but these are in " the world, and I come to thee. Holy Father, keep " through thine own name those whom thou hast given " me, *that they may be one, as we are.*" . . . . " I pray not " that thou shouldest take them out of the world, but " that thou shouldest keep them from the evil. They " are not of the world, even as I am not of the world. " Sanctify them through thy truth: thy word is truth. " As thou hast sent me into the world, even so have I " also sent them into the world." . . . . " Neither pray I " for these alone, but for them also which shall believe " on me through their word. That they all may be " one; as thou, Father, *art* in me, and I in thee, that " they also may be one in us: that the world may " believe that thou hast sent me." (St. John, chap. xvii.)

These words explain clearly in what sense the oneness

of God with Christ, and of Christ with his Apostles and the faithful is to be understood. And the following texts show plainly what is meant by the promise of the *Comforter*, and of the *second* advent of the word:—"If "ye love me, keep my commandments. And I will "pray the Father, and he shall give you *another* Com- "forter, that *he may abide with you for ever; even* the "Spirit of Truth"—(Is not this Comforter, the Spirit of Truth, the New Testament, or the written Word of Truth, which was not then written?) "whom the world "cannot receive, because it seeth him not, neither know- "eth him: but ye know him; for he dwelleth with you, "and shall be in you. I will not leave you comfortless; "I will come to you." (St. John, chap. xiv.) Did not the Saviour come again, in spirit, when the gospels were written and given to the world, to remain with it for ever? Swedenborg's theology seems less intelligible than the simple text of the Gospel.

One of the best recent works on ontological science is the "SPIRITUAL PHILOSOPHY," founded on the teaching of Samuel Taylor Coleridge, by the late Joseph Henry Green, edited by John Simon, F.R.S., Surgeon to St. Thomas' Hospital. A few quotations from this work will show that many parts are worthy of attention. It is therein stated that—

"Whatever phenomena, in facts or events, claim to "be regarded as results of experience, must be general- "ized under one or other of the categories or mental "'conditions' of experience; namely:

"1°. *Subject and attribute.*
"2°. *Cause and effect.*
"3°. *Whole and parts.*

"Whatever phenomena are generalized under the

" head of *subject and attribute*, must be conceived as " appearances (φαινομενα) belonging to permanent and " abiding 'substance,' so named, which is considered as " the noumenon, and of which the appearances are " sensible manifestations."

" Whatever phenomena are generalized under the " head of *cause and effect*, must be conceived as invari- " ably associated, in consequence of an unalterable con- " dition of dependency."

" Whatever phenomena are generalized under the " head of *whole and parts*, must be conceived as inter- " dependent in relation to each other, and to constitute " a totality by virtue of some conception which gives " unity to all."

" If we add to these the principal condition of experi- " ence or the form of reasoning (*i.e.*, syllogism) by which " we conclude that the results of experience may be " assumed to be laws of nature, namely, 'whatever has " 'been the result of invariable experience, and may " 'have been infallibly predicted, must be assumed to " 'be in conformity with the immutable laws of the " 'universe;' with this, I say, we may be said to have " completed the list of the main axioms, or self-evident " truths of experience." (Vol. i. p. 141.)

" The rational insight, however, of empirical know- " ledge, depends upon maintaining throughout the " *spiritual* interpretation of the categories or concipien- " cies. No just view of 'subject and attribute' can be " entertained without contemplating the 'noumenon' as " substance in the sense of supersensuous 'spirit,' nor " of 'cause and effect' without regarding the true nature " of the causative as power, rendered intelligible by " 'Will,' as the operant and originant agency; nor of a " 'whole and its parts,' except by looking at the per- " vading unity, as antecedent and indwelling spirit

" beyond the cognizance of the empirical faculties." (Vol. i. p. 144.)

" What is the end and aim of philosophy? Its " object is to discover *first principles, i.e., ideas* or " primary truths of reason."

" We may have arrived at an orderly arrangement of " correct generalizations derived from accurately ob- " served facts; but philosophical insight is first reached, " when the law, principle, or primary cause has been " satisfactorily established, so that we can anticipate " and predict what will and must happen in all similar " cases." (Vol. ii. p. 165.)

" ETERNITY.—' Before Abraham was, I am.' In order " to express in the language of sense, that which is " eternal, and above time, it must be said that the " eternal is that which is at once past, present, and " future, or that which is ever present in the endless " past and the endless future; a contradictory puzzle on " which the mind entangled in the mazes of the empiri- " cal (experiential?) faculty might for ever muse, were " it not for ideal truths which are under no conditions " of time, the same now, yesterday, and for ever." (Vol. ii. p. 261.)

" *Liberty and Necessity.*—The idea in which the " apparent contraries of liberty and necessity find their " reconciliation and unity, and become veritable com- " plements of each other, is that of *will enlightened by* " *reason.* Law, in its highest form of necessity, is " reason; and reason is truth intuitive, self-evident, " necessary. And it is in the identity and unity of " *causative will* and *regulative reason*, that we contem- " plate will that is to itself a law, that is freedom and " necessity identified." (Vol. ii. p. 264.)

" ' *Transcendence*' *and* ' *Immanence*' are terms which, as " God's relation to the world, not only do not exclude

" each other, but essentially require and imply one " another, and find their reconciliation as correlatives in " the idea of that supreme relation."

" *Substance.*—Benedict Spinoza, guided by the cate- " gory of *substance* and its *accidents*, explains the uni- " verse moral and physical, upon the assumption that it " consists wholly of a *unica substantia* whose attributes, " thought, and extension, are adequate to account for all " modes of being and existence." (Vol. ii. p. 282.)

It has been already shown that primordial diversity is a positive characteristic of all known elements, and organic forces, and therefore Spinoza's idea of a unica substantia, as the radical source of thought and extension, is purely imaginary. Charles Fourier's cosmogony is based on analogies derived from his psychology and sociology, which are in contradiction with many of the known facts and laws of natural science and phenomena. Swedenborg's views are sometimes in positive contradiction also, with known facts and laws of nature; and Jacob Boehmen's cosmogony is beyond the reach of positive experience. Nothing definite is known then, of world creation, or of soul creation, and we must rely on revelation and on science for the principles of truth, without imagining that which is unknown, and drawing worthless logical deductions from speculative notions, beyond the control of rational verification.

THE END.

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