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ON MR. SPENCER'S

FORMULA OF EVOLUTION.

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ON MR. SPENCER'S

FORMULA OF EVOLUTION

AS AN EXHAUSTIVE STATEMENT OF THE CHANGES OF THE UNIVERSE.

BY

MALCOLM GUTHRIE.

FOLLOWED BY A RESUMÉ OF THE MOST IMPORTANT CRITICISMS OF SPENCER'S "FIRST PRINCIPLES."

LONDON:
TRÜBNER & CO., LUDGATE HILL.
1879.

INTRODUCTION.

THIS criticism is not written in a spirit hostile to the doctrine of Evolution, considered as a development according to natural orders of sequence from the more simple to the more complex, nor to the theory of the development of the higher organisms from the lower.

Free from all bias, it is simply intended to be a logical examination of an important theory which has been placed before the thinking world for its acceptance.

This criticism I present in the following manner:—

First, I ask what Mr. Spencer means by Philosophy, and what is the problem it involves. I find, according to him, that Philosophy is completely unified knowledge, and that

THE PROBLEM OF PHILOSOPHY

IS

To state an intelligible formula, which, by its application to the Homogeneous, will explain, and enable us to construct, ideally, all the changes of the universe.

I then enter upon an inquiry into Mr. Spencer's Formula of Philosophy, which, though intelligible, appears

to me insufficient, inasmuch as its two factors, Matter and Motion, do not afford an explanation of the facts of life and mind.

I then attempt to amend the formula by the introduction of the term *Force*, which Mr. Spencer largely employs in his preliminary exposition, but which he has afterwards allowed to drop out of the formula, and I then find that the amended formula, though sufficient, is unintelligible.

I next endeavour, from a study of Mr. Spencer's exposition, to frame a formula which shall be a true representation of it, but which, at the best, I am only able to make a sufficient formula by making it vague, and to that extent unintelligible.

From which it results, that although the changes of the universe, in all its departments, conform to certain general processes of development or Evolution, and thus present a general similarity in the order of their changes, yet we cannot state an intelligible formula, which, by its application to the Homogeneous, will enable us to account for and construct, ideally, the changes of the universe.

From this it follows, that however much I may admire, and however much our thinkers may value, some of Mr. Spencer's great generalisations, we must come to the conclusion that he has not succeeded in solving the main problem which he submits and sets down as the aim of his work.

The implication is that no such problem of Philosophy

can ever be solved, and that there is in the universe a factor which is more than Matter and Motion, and more than Force considered as the sum total of them.

This factor, and its import as a matter of science and of individual personal value, is reserved for consideration in the fifth and concluding portion of this criticism.

As a matter of interest to the student of Mr. Spencer's Philosophy, I append the results of a task which I lately undertook for my own instruction. This consists of a statement of the principal criticisms affecting the essential theories involved in the work, so far as they have come under my notice.

This work is an elaboration of papers read before the Literary and Philosophical Society of Liverpool, Sessions 1877–78 and 1878–79. The references are to "First Principles," third edition, October 1875.

2 Parkfield Road,
Liverpool, *June* 1879.

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PART I.

THE PROBLEM OF PHILOSOPHY.

To frame an intelligible Formula, which, by its application to the Homogeneous, will explain and enable us ideally to construct and account for all the changes of the universe.

We have before us "A System of Synthetic Philosophy," vol. i. "First Principles," by Herbert Spencer, and our first object is to understand it. We approach it as students—critical students; we come to learn, but we must understand as we go along. And the first question that naturally occurs to us is, "What does Mr. Spencer mean by Philosophy?"

In part ii., ch. i. § 37, we find Philosophy defined as "*knowledge of the highest degree of generality;*" or again, "Knowledge of the lowest kind is *un-unified* knowledge; Science is *partially-unified* knowledge; philosophy is *completely-unified* knowledge."

Is philosophy, then, only the summary of our knowledge, or is it a representation of the changes of the universe? is it limited to our knowledge, or does it

express the whole course of the history of things? Does it relate to the subjective or to the objective—or to both?

In sect. 186, "Summary and Conclusion," we find a reply to this question:—

> "In commencing our search, . . . it was shown that a philosophy stands self-convicted of inadequacy if it does not formulate the whole series of changes passed through by every existence in its passage from the imperceptible to the perceptible, and again from the perceptible to the imperceptible. If it begins its explanations with existences that already have concrete forms, or leaves off while they still retain concrete forms, then, manifestly, they had preceding histories, or will have succeeding histories, or both, of which no account is given. And as such preceding and succeeding histories are subjects of possible knowledge, a philosophy which says nothing about them falls short of the required unification. Whence we saw it to follow that the formula sought, equally applicable to existences taken singly and in their totality, must be applicable to the whole history of each and to the whole history of all."

Here we have, then, an explanation of the phrases, "knowledge of the highest degree of generality," "completely unified knowledge," and find the statement implied that philosophy, to be adequate, must express in a formula "the whole series of changes passed through by every existence in its passage from the imperceptible to the perceptible, and again from the perceptible to the imperceptible." And we note in the first place an ambiguity from not terminating the explanation at the word "existence," for the succeeding part of the sentence introduces the term "perceptibility." This is, however, corrected in the following sentence, which, independently of perceptibility, speaks of preceding or succeeding histories, and therefore comprehends all changes previous to or succeeding to the existence of an organism to which

such changes are perceptible, but to which they are nevertheless subjects of possible knowledge.

Philosophy, then, must express in a formula "the whole series of changes passed through by every existence." To guard against misunderstanding, it is to be presumed that the word "existence" includes not only concrete bodies, such as solids, liquids, and gases, but *every form of matter and motion.* What these latter words mean will come under our consideration in due time.

The Formula of Philosophy.

"The law sought must be the law of the continuous redistribution of matter and motion. The changes everywhere going on . . . are changes in the relative positions of component parts, and everywhere necessarily imply . . . a new arrangement of motion. Hence we may be certain, *à priori,* that there must be a law of the concomitant redistribution of matter and motion, which holds of every change, and which, by thus unifying all changes, must be the basis of a philosophy."

In what terms, then, must the formula be propounded? In terms of the continuous redistribution of matter and motion. "It could be no other than one defining the opposite processes of concentration and diffusion in terms of matter and motion, . . . a statement of the truth that the concentration of matter implies the dissipation of motion, and that, conversely, the absorption of motion implies the diffusion of matter" (p. 542).

Here we note that the formula does not take into account the existence of an organism to which these changes are perceptible, but, quite independently of any such relation, it is applicable to all changes of matter

and motion. This in corroboration of a previous conclusion that the formula of philosophy is to be freed from relation to perceptibility.

This is an important point, for if matter and motion were the two original factors, then they existed apart from perception, and the latter was either added afterwards, or was a natural sequence from them. If added afterwards, the formula containing the two factors is only good till the third is added. If a natural sequence, then it is not to be included in the formula, but is to be explained by it. But if not in it, then the formula must be understood apart from perception and consciousness, which can be done. And though we are obliged to say that there can be no conception of matter and motion without a perceiving body, yet a perceiving body can conceive of what existed before it came into existence from conceptions derived from present experiences, and thus we can conceive of the two factors, matter and motion, and their changes and combinations anterior to the existence of a perceiving body.

But if all this is denied, and it is stated that matter and motion could not exist without consciousness, then we have three factors which have to be included in the formula, and we have to predicate matter and motion and consciousness as the factors of Evolution.

As, however, Mr. Spencer includes only two factors in his formula, to these two factors we limit our considerations in Part II. of our criticism, however much we may enlarge the scope of our speculations afterwards.

But we will pause a moment to consider the meaning of the word "existence." I presume an atom of gold is an existence. I presume an atom of hydrogen or of oxygen is an existence. I presume that all the so-called ele-

mentary substances are existences. I suppose, also, they would be held to be perceptible, since even in the gaseous state, although invisible, they are capable of manipulation, and therefore afford knowledge to the mind. According to the passage before us, we are required to explain their passage into these differentiated conditions, *i.e.*, how gold became gold, and hydrogen became hydrogen. As concrete existences, they must have had preceding histories, which are subjects of possible knowledge, and which histories a formula of philosophy is required to include.

And we are obliged, further, to conclude that the word "existence" comprises those experiences which we term heat and light, electricity, magnetism, &c., which are all decidedly perceptible.

Also, does it not include gravitation? and we might ask, if it were not for introducing an element of confusion prematurely into our studies, does it include consciousness also?

A further ambiguity appears in the word "formulate," or "express in a formula." Does it mean the construction of a formula which shall, by its generality, comprise the description of every change knowable by us? or does it mean a statement that shall explain the sequences of all phenomena in intelligible terms? The former does not account for sequences; it only characterises the totality of the changes. The latter claims to show the nature of the relation of antecedent and sequence, so that from any given state or condition of things (given the requisite knowledge), we may be enabled to work out all future sequences. The former is a loose and vague generality, descriptive of the general character of changes; the latter is penetrative and constructive. The latter is

what Mr. Spencer appears to aim at, and is implied in the title "Synthetic Philosophy;" the former is all that he accomplishes.

But this does not answer to the requirements of philosophy, according to Mr. Spencer's own showing. Explanations are wanted, not generalisations. We seek a law of construction, so that from the homogeneous or undifferentiated we can understand by deduction all the subsequent differentiations, and see that what has happened must have happened. We presume to lay down, then, as Mr. Spencer's understanding of the task of philosophy, this synthetic problem, viz., to frame an intelligible formula, which, by its application to the homogeneous, shall enable us ideally to construct and account for all the changes of the universe.

PART II.

AN INQUIRY AS TO THE INTELLIGIBILITY AND THE SUFFICIENCY OF MR. SPENCER'S FORMULA.

THE quotation as to the law sought given on page 3 implies that all knowledge is the knowledge of matter or material substances and the knowledge of their motions. Completely unified knowledge is the expression in a formula of the general or universal characteristics of all changes of the motions, combinations, and relations of material substances, and the formula which expresses these changes in the most general way is the integration of matter and the contemporaneous dissipation or transference of motion.

The formula propounded by Mr. Spencer is as follows (p. 396):—

"Evolution is an integration of matter and concomitant dissipation of motion, during which the matter passes from an indefinite, incoherent homogeneity, to a definite, coherent heterogeneity, and during which the retained motion undergoes a parallel transformation."

This formula seems to be of a descriptive rather than of a constructive character. It seems to summarise rather than to explain. It does not, in its bare enunciation, account for these integrations and dissipations. It does not account for itself. Whether it attempts to do this or not we will hereafter inquire.

Here let us pause to consider the meaning of words included in the formula.

Definitions of Matter and Motion.

"Matter," § 48. "We may therefore deliver ourselves over without hesitation to those terms of thought which experience has organised in us. We need not, in our physical, chemical, or other researches, refrain from dealing with matter as made up of *extended and resistant atoms;* for this conception, necessarily resulting from our experiences of matter, is not less legitimate than the conception of aggregate masses as extended and resistant. The atomic hypothesis, as well as the kindred hypothesis of an all-pervading ether consisting of molecules, is simply a necessary development of those universal forms which the actions of the Unknowable have wrought in us. The conclusions logically worked out by the aid of these hypotheses are sure to be in harmony with all others which these same forms involve, and will have a relative truth that is equally complete." Matter, then, is made up of extended and resistant atoms.

The differentiations of atoms, or, by preference, *ultimate units*—for atoms of the seventy or eighty so-called elementary substances are now regarded as composite, and, on Mr. Spencer's hypothesis, are bound to be so regarded—can, then, only be in differentiations of extension, viz., shape or size. Now, differentiations of shape and size are distinguishable and measurable; and although the shapes and sizes of ultimate units, if differentiated, are beyond our observation, it is necessary to consider them as possessed of shapes and sizes, which, if we had the capacity, would be representable geometrically and arithmetically. There

could be no other differentiation in them. Their only other property, viz., resistance, means merely that two of them could not occupy the same space at the same time.

"Motion." I do not find the term "motion" explained apart from a perceptive organism. I only find a description of the conception of motion, involving (sect. 49) "a something that moves; a series of positions occupied in succession; and a group of co-existent positions united in thought with the successive ones. These are the constituents of the idea." But as it is necessary to eliminate the perceptive organism in accordance with the requirements of the formula which is to explain all changes anterior to or subsequent to the existence of a perceptive organism, we are obliged to modify the explanation of the term. Motion, then, must be a description applicable to the previous description of matter—that is to say, to extended and resistant atoms. So applied, we have for the word "something" in the above quotation "extended and resistant atoms" "that move."

Then, again, "a series of positions occupied in succession" must mean positions of each atom in relation to itself, *i.e.*, rotation; or else in relation to other atoms, *i.e.*, a series of positions of atoms in relation to each other.

These movements, whether of rotation or of mutual relation, are expressible in relation to an unit of movement, and therefore in rates of motion. They can, therefore, be described arithmetically.

We therefore find that the ultimate units which have extension and resistance have also motion, and that the whole of their differentiations are to be described in terms of extension (shape or size), and in terms of motion (rates or modes, *i.e.*, rotary and relative).

And we also find that the only method of describing

these differentiations is in terms of mensuration, *i.e.*, in terms of geometry and arithmetic.

The formula, then, only recognises two factors—that is to say, matter and motion; or, since motion cannot exist by itself, it is more correct to say matter in motion.

Elsewhere we find that matter is indestructible and motion continuous. That is to say, that no atom ever ceases to exist, though it may enter into ever-changing combinations with other atoms, or may move at different rates of motion. And, further, that no atom moves more slowly without other atoms moving more quickly. No motion is ever lost; it is only transferred.

Whether any ultimate units can ever wholly lose their motion is a question. But it is clear that we cannot have motion without matter.

Note.—This suggests *a hypothesis concerning ether*, for there are three alternatives respecting these ultimate uniform units. First, that they entered into permanent combinations, as known to us in the so-called elements; secondly, that some remained free and uncombined, retaining their motion, or some degree of it; thirdly, that some lost their motion altogether, although capable of receiving it again. Now, if we conceive of ultimate units having extension and resistance and relative gravity but no special motion, we have a case similar to, say, a row of marbles close together, having no motion, but capable of transmitting motion from any centre of activity. Such a supposition would be agreeable to the theory of the undulatory transmission of light and heat. And since all solid, liquid, and gaseous bodies are to be regarded as permeable bodies, existing in the ocean of ether in much the same way as sponges exist in the sea, they would be subject to disintegration from the violent interior mechanical action of the contained ether. And the theory of heat would be a theory of increased etherial excursion rather than of increased molecular or atomic excursion, or of all three; and the theory of light would be one of undulations of ether.

Moreover, the theory of the indissolubility of the elements

would be the non-permeability of atoms by the ether, in consequence of the smallness of the interstices, due to the composition of the atom from ultimate units of the same size as the unit of ether. So also the greater the degree of complexity, the greater the facility for dissolution under heat.

There would also follow a supposition as to the individuality of a body of ether in an aggregate due to the molecular construction of that body, and the contiguity and continuity of the units of the contained ether.

And there might be other suppositions respecting magnetism and electricity, &c., according to the views held of the existence of free uncombined ultimate units of extension and resistance with polarities, or having lost all motion.

Inquiry into the Application of the Formula of Evolution and Dissolution, commencing with Dissolution.

By the light of the preceding statement of the scope of philosophy and of the formula by which all the changes of the universe are explained, let us set about the application of it as an interpretation of these changes. And we will commence with Dissolution, for this reason, viz., that we may be able to reduce the contents of the universe to its constituents, and thereby enable the mind to form a clear conception of matter and motion, the two factors of the formula, and accustom it to free those terms from any other considerations than size, shape, mode or rate of motion. In this way we shall be able to rid the theory from any associations of consciousness or intelligent ordering of processes, and get clear down to the material and mechanical basis of things.

We shall see, in fact, the earth disappear and all life; then we shall see the whole solar system reduced to vapour. Finally, the whole sidereal system shall dissolve into nebulæ, and when dissolution shall be completed by ultimate dissolution of even the nebulæ, we shall have to

ask what that state will be, and thereby try to realise in our own minds what that primal condition must have been from which Evolution was bound to start, if it is to be a complete statement of all changes. By thus realising the ultimate dissolution, we shall arrive at a starting-point for Evolution, and then by the application of the formula we shall endeavour to understand—1. The formation of the so-called elements, their relative quantities and permanence. 2. Their distribution. 3. The motions of heat, light, &c. 4. The origin of consciousness and life, and the development of organisms and mind.

The process of dissolution is thus described:—

"§ 181. For the earth, as a whole, when it has gone through the entire series of its ascending transformations, must remain, like all smaller aggregates, exposed to the contingencies of its environment; and in the course of these ceaseless changes in progress throughout a universe of which all parts are in motion, must, at some period beyond the utmost stretch of imagination, be subject to forces sufficient to cause its complete disintegration. . . . There is a force at work which, it is held, must at last bring the earth into the sun. This force is the resistance of the etherial medium. From etherial resistance is inferred a retardation of all moving bodies in the solar system. . . . If, then, retardation is going on, there must come a time, no matter how remote, when the slowly diminishing orbit of the earth will end in the sun; and though the quantity of molar motion to be then transferred into molecular motion will not be so great as that which the calculation of Helmholtz supposes, it will be great enough to reduce the substance of the earth to a gaseous state."

Such will be the case with every member of the solar system, until we arrive at the period when "the total mass must become completely integrated, and its excess of contained motion radiated into space."

Not only this, but since the stars, distributed irregularly throughout the heavens, move in conformity with

the law of gravitation, they will undergo rearrangement. "If we now ask the nature of this rearrangement, we find ourselves obliged to infer a progressive concentration." The question arises, "What must be the limit of such concentrations?" "An increasingly frequent integration of masses." "And if so relatively small a momentum as that acquired by the earth in falling to the sun would be equivalent to a molecular motion sufficient to reduce the earth to gases of extreme rarity, what must be the molecular motion generated by the mutually arrested momenta of two stars that have moved to their common centre of gravity through spaces immeasurably greater? There seems no alternative but to conclude that it would be great enough to reduce the matter of the stars to an almost inconceivable tenuity—a tenuity like that which we ascribe to nebular matter." Then "the diffused matter produced by such conflicts must form a resisting medium, occupying that central region of the cluster through which its members from time to time pass in describing their orbits—a resisting medium which they cannot move through without having their velocities diminished. Every additional collision, by augmenting this resisting medium, and making the losses of velocity greater, must aid in preventing the establishment of that equilibrium which would else arise, and so conspire to produce more frequent collisions. And the nebulous matter thus formed, presently enveloping the whole cluster, must, by continuing to shorten the gyrations of the moving masses, entail an increasingly active integration and reactive disintegration of them, until they are all dissipated. Whether, &c. . . . In any case, the conclusion to be drawn is, that the integration must continue until the conditions which bring about disintegration are

reached, and that there must then ensue a diffusion that undoes the preceding concentration."

"This, indeed, is the conclusion which presents itself as a deduction from the persistence of force. If stars concentrating to a common centre of gravity eventually reach it, then the quantities of motion they have acquired must suffice to carry them away again to those remote regions whence they started. And since, by the conditions of the case, they cannot return to these remote regions in the shape of concrete masses, they must return in the shape of diffused masses. Action and reaction being equal and opposite, the momentum producing dispersion must be as great as the momentum acquired by aggregation ; and being spread over the same quantity of matter, must cause an equivalent distribution through space, whatever be the form of the matter.

"When that integregation everywhere in progress throughout our solar system has reached its climax, there will remain to be effected the immeasurably greater integration of our solar system with other such systems. There must then reappear in molecular motion what is lost in the motion of masses; and the inevitable transformation of this motion of masses into molecular motion cannot take place without reducing the masses to a nebulous form.

"§ 183. Thus we are led to the conclusion that the entire process of things, as displayed in the aggregate of the visible universe, is analogous to the entire process of things as displayed in the smallest aggregates.

"Motion as well as matter being fixed in quantity, it would seem that the change in the distribution of matter which motion effects, coming to a limit in whichever direction it is carried, the indestructible motion thereupon necessitates a reverse distribution. Apparently the universally co-existent forces of attraction and repulsion, which, as we have seen, necessitate rhythm in all the minor changes throughout the universe, also necessitate rhythm in the totality of its changes, produce now an immeasurable period during which the attractive forces predominating cause universal concentration, and then an immeasurable period during which the repulsive forces predominating cause universal diffusion—alternate eras of evolution and dissolution."

It may be asked, Is there any occasion for carrying the theory to such an extent? Is there any necessity for supposing the process of dissolution to be complete? for supposing other than partial processes of evolution and dissolution? I submit that all these suppositions exceed the limit of legitimate philosophical speculation, and are therefore futile. The author makes them, as he is logically compelled to do, in accordance with the enormous claims, as stated by him, of philosophy; and we must therefore follow him to the full extent of his speculations. But let us not do so blindly; let us take care not to lose ourselves in these obscurities, but to aim at definite thought.

And it answers a good practical purpose in our studies. For since it conducts us by gradual steps from the complicated cosmos of the present to simpler and yet more simple conditions, we can the better educate the mind to the final realisation of that state of affairs out of which evolution arises, and the better realise for ourselves the application of the formula to those initial changes and that primordial history for which it claims to account.

As long as there is any differentiation, dissolution is not complete. Every differentiation implies an anterior history which has to be accounted for. Dissolution is incomplete until homogeneity is attained. We must do away with all differentiations of ultimate units until they are alike in size and shape, and we must obliterate all differentiations of their motions until the same description can be applied to all of them.

In studying the process of dissolution, therefore, we find it to be the dissolution of combinations of molecules, the further dissolution of molecules into atoms, and if

there be any further dissolution of atoms into ultimate units, then dissolution is not complete until this also has been effected. And the question then arises, Does any differentiation still remain—differentiation of shape or size—differentiation in rates or modes of motion?

And we also find that in this dissolution of the combinations of matter the process is accompanied by a transference of motion by which the motions of atoms or ultimate units becomes more and more equalised.

So that the end of dissolution seems to be the disintegration of all combinations into ultimate units of matter moving at equal rates. We have heterogeneity becoming less and less heterogeneous; will it ever reach the homogeneous?

It seems to me that the task prescribed by Mr. Spencer for Philosophy requires of it that it should account for all differentiations, since all differentiation implies change, and all change a history. Homogeneity must be the starting-point of Philosophy.

If not, then it must start from an arbitrary point, which every one may determine according to his own fancy. Each one may please himself at what degree of differentiation he commences with the application of his philosophical formula. Some may choose differentiated atoms already formed; some may choose living protein ready made to their hands.

A philosophy stands convicted of inadequacy if it does not account for *every differentiation.* The question as to the origin of differentiation is not to be confounded with the question as to the origin of existences or ultimate undifferentiated units, but if differentiated matter is postulated, then any degree of differentiation is equally justifiable.

Philosophy is thus brought face to face with the Homogeneous, into which, by tracing out the ultimate process of dissolution, we are logically led.

Can we picture to ourselves the Homogeneous?

It is useful to try.

Study of the Homogeneous.

We have, then, to suppose, in the first place, ultimate units having resistance and extension. They must be the same shape—say spherical—and the same size.

In the next place they are in motion. The motion may be rotary, or relative, or both. If rotary, then the motion must be in the same direction, and the axes must be parallel, and they may have some universal relation to a common centre; or the motion may be wholly (or in addition to the rotary motion) in relation to each other. This motion would be one of movement towards and movement from other units.

Here we reach a very difficult part of our subject. We may altogether abandon the rotary movement, or we may simply hold it in suspense to fall back upon in aid of the explanation of subsequent differentiations and combinations.

But before going any further it is necessary to bear in mind that the differentiation between matter and ether has to be obliterated. In homogeneity there is not a mass of units and ether. The atoms of matter and the units of ether have become identified, and when we speak of the Homogeneous we are not speaking of a mass and of the medium in which it moves, but of a mass in which the matter and the ether have become unified.

What we have to represent to ourselves, then, is a mass—a spherical mass—of undifferentiated units, each

unit moving towards what? The neighbouring unit or all the other units? and then moving away from the neighbouring or all the other units?

With the why and how of the movement we have nothing to do any more than with the how and the why of the units themselves.

If we say that philosophy starts with the homogeneous, it is not required to account for the existence of that matter and that motion which constitute it, but only to describe the properties of the two factors, so that by the application of the formula the results may be worked out. The origin of the matter and the motion is unknowable. But a complete philosophy is bound to start from the homogeneous. It may be that a philosophy is sufficient without being complete—*i.e.*, we may go back to a differentiated state, and account for all changes subsequent to that from the factors therein. But then it is not a complete philosophy, and since Mr. Spencer claims that Evolution is a complete philosophy, we are bound to go back to the homogeneous; and this is really a logical necessity, for if one man chooses an arbitrary starting-point, however remote, so may another one select a point of much greater differentiation and be equally justified.

The following is Mr. Spencer's account of the motions of the ultimate units:—

Page 223.—"However verbally intelligible may be the proposition that pressure and tension everywhere co-exist, yet we cannot truly represent to ourselves one ultimate unit of matter as drawing another while resisting it. Nevertheless this last belief is one which we are compelled to entertain. Matter cannot be conceived except as manifesting forces of attraction and repulsion. . . . We are obliged to think of all objects as made up of parts that attract and repel each other, since this is

the form of our experience of all objects. By a higher abstraction results the conception of attractive and repulsive forces pervading space. We cannot dissociate force from occupied extension, or occupied extension from force, because we have never an immediate consciousness of either in the absence of the other. Nevertheless, we have abundant proof that force is exercised through what appears to our senses a vacuity; mentally to represent this exercise, we are hence obliged to fill the apparent vacuity with a species of matter—an etherial medium. The constitution which we assign to this etherial medium, however, like the constitution we assign to solid substance, is necessarily an abstract of the impressions received from tangible bodies. The opposition to pressure which a tangible body offers to us is not shown in one direction only, but in all directions; and so likewise is its tenacity. Suppose countless lines radiating from its centre on every side, and it resists along each of these lines and coheres along each of these lines. Hence the constitution of those ultimate units through the instrumentality of which phenomena are interpreted. Be they atoms of ponderable matter or molecules of ether, the properties we conceive them to possess are nothing else than these perceptible properties idealised. Centres of force, attracting and repelling each other in all directions, are simply insensible portions of matter having the endowments common to sensible portions of matter—endowments of which we cannot by any mental effort divest them.

"*Note.*—In brief, they are the invariable elements of the conception of matter, abstracted from its variable elements, size, form, quality, &c."

Resuming, then, our consideration of the homogeneous, we have a sphere of ultimate units having like motions of rotation or of mutual attraction and repulsion. What is the corollary of this statement, bearing in mind the two propositions that motion is continuous, and that all action is equal and opposite? That all action is equal and opposite would seem to preclude the notion of any motion whatever, but as motion is continuous, we can only fall back upon this as a

solution of the difficulty, viz., that each unit moves towards its neighbour and then moves back to its original place. In a sphere of these units there would be an universal movement to the centre and an universal movement away from the centre, but from all action being equal and opposite the units would be bound to return to their original positions.

So far no differentiation is produced.

We have now to consider the question of gravitation in respect to such a mass. It will be seen that so far we have merely considered the subject free from gravitation. On that supposition there is only a movement of an unit to and from its neighbours. Now, as the outside units have neighbours only on one side, the movement towards them is not impeded by any movement in another direction, and this may possibly leave the next layer free to close in upon the next interior layer of units, and thus an universal concentric motion take place, to be followed by an universal retrocession. Now, it may be argued that the falling to the centre of such a vast mass of particles creates a pressure upon the centre parts, which causes some change of motion and some combinations of the ultimate units. But admitting this, then, since action and reaction are equal and opposite, everything is reversed and restored in the backward motion.

How Affected by Gravitation.

To get out of this difficulty it seems necessary to add gravitation or the law by which the attraction of matter exceeds repulsion. This, it seems to me, is a necessity of the case, and is the first failure of our formula.

But if we now add gravitation, according to Newton's law, to the mass before us, how is our problem affected?

Then, instead of an unit attracting its neighbour and repulsing it, we have each unit attracting every other unit inversely, according to the square of the distance. The why or how is relegated to the same nescience as the why and how of the ultimate units and their motions.

Here, then, we have set up a definite movement to a centre. Action and reaction are not equal and opposite, and concentration proceeds.

It cannot be supposed that there is no limit to the process of condensation that would immediately commence. But it would be carried to an extreme point. All the ultimate units would be pressed into closer contact and the interspaces obliterated. The pressure into closer contact would no doubt cause changes of rates and modes of motion, forming under the immense pressure structural units (atoms), having special shapes, sizes, and motions of their own, and perhaps, as we shall hereafter show, they would be indissoluble—that is to say, of a permanent, indestructible character; and the motion supposed lost in the formation of these atoms might be added to the motion of other units.

The result of such a process would be the formation of a sphere of concentric layers from the centre to the circumference of atoms of varying degrees of density and of different construction. But beyond this stage of heterogeneity we are unable to advance without the aid of external interference. The result that would be arrived at would be an equilibrium, a sphere or structural whole in which the matter and motion would have reached such a state of harmonious relationship, each in its place and moving in unison, that no further change would ensue.

Each unit and atom would be in harmony with its environment, like a wheel in a watch, with a perpetual equal motion which was not lost.

In any case, an equilibrium.

That Mr. Spencer looks forward to arriving at such a state of equilibrium, even from the present heterogeneous condition of the universe, is evident from chap. xxii., "On Equilibration." He says, p. 484:—

"In all cases, then, there is a progress towards equilibration. That universal co-existence of antagonist forces which, as we before saw, necessitates the universality of rhythm, and which, as we before saw, necessitates the decomposition of every force into divergent forces, at the same time necessitates the ultimate establishment of a balance."

Page 483.—"And now towards what do all these changes tend? . . . Does it work towards some ultimate state admitting no further modification of like kind? . . . Evolution has an impassable limit?"

Page 513.—"If evolution of every kind is an increase in complexity of structure and function that is incidental to the universal process of equilibration, and if equilibration must end in complete rest, what is the fate towards which all things tend? . . . Omnipresent Death?"

And again, p. 514:—

"That such a state must be the outcome of the processes everywhere going on seems beyond doubt. Whether any ulterior process may reverse these changes and initiate a new life, is a question to be considered hereafter. For the present it must suffice that the proximate end of all the transformations we have traced is a state of quiescence."

The theory is, that if in a condition of homogeneity, matter in motion cannot remain in this state of homogeneity, but must move to its centre, and thereby produce heterogeneity as just described, and that this movement must end in a state of equilibrium, or balance of motions, of which the formula would be $a = a$.

In the progress of our studies, then, we have arrived at a concentric equilibrium of matter in motion, beyond which we can make no progress, for when we arrive at the perfect equilibrium $a=a$, we cannot suppose any further change than by supposing one a to be more powerful than another a, which destroys the equation and denies the equilibrium. We are thus obliged to come to a stable equilibrium or else to a moving equilibrium of alternations of concentration and retrocession, beyond which equilibriums we can make no progress.

Unless, indeed, we import into our scheme the formation of some other similar sphere, and put the two into collision in order to produce that general mixing up —that seething cauldron of chaos—out of which the higher stages of heterogeneity are to be produced. If so, we thereby deny the ultimate homogeneity from which we were supposed to start.

In speculations like these the mind is lost; but a philosophy which is to account for all changes from the very first is bound to consider them. If it fails, it should limit its claims to more modest proportions, and we would consider its merits on the more limited field.

Consideration of Mr. Spencer's Argument on the Instability of the Homogeneous.

But Mr. Spencer justifies his position by abstract argument. This argument is entitled "Instability of the Homogeneous." We endeavoured to describe the homogeneous, and admitted that if gravitation to a centre must ensue that we would arrive at a condition of heterogeneity, but that it would be also a state of equilibrium. Now Mr. Spencer introduces a distinction between stable and unstable equilibrium. Stable equili-

brium is one of a lasting character; unstable equilibrium is one which a very minute exterior motion will destroy.

Of course it will be seen at once that the difference between a stable and an unstable equilibrium, according to Mr. Spencer, is only one of degree. The disturbing motion must in the one case be great, in the other small.

Now if we can get an unstable equilibrium so delicate and an exterior motion so minute that we can imagine it no motion at all, or—not to put too fine a point upon it —the very next thing to no motion at all, we realise to ourselves as near as possible the mainspring of Evolution —the leading idea of the philosophy which here and there, throughout the long course of ages, only needs one or two little similar touches to develop out into all we see. The legerdemain is accomplished so deftly as to elude the detection of the keenest observer, and we may even deceive ourselves.

This is the argument (p. 402) :—

"The condition of homogeneity," says Mr. Spencer, "is a condition of unstable equilibrium. . . . The phrase unstable equilibrium is one used in mechanics to express a balance of forces of such kind that the interference of any further force, however minute, will destroy the arrangement previously subsisting; and bring about a totally different arrangement. . . . The proposition is, then, that the state of homogeneity . . . cannot be maintained."

Illustrations are given in the instances of a pair of scales not remaining in equilibrium, particles scattered on the surface of water, and finally,—

"Were it possible to bring a mass of water into a perfect state of homogeneity—into a state of perfect quiescence and exactly equal density throughout, yet the radiation of heat from neighbouring bodies, by affecting differently its different parts, would inevitably produce inequalities of density and consequent currents, and would so render it to that extent heterogeneous."

Page 404.—"The instability thus variously illustrated is obviously consequent on the fact that the several parts of any homogeneous aggregation are necessarily exposed to different forces—forces that differ either in kind or amount—and being exposed to different forces, they are of necessity differently modified. The relations of outside and inside, and of comparative nearness to neighbouring sources of influence, imply the reception of influences that are unlike in quantity or quality or both; and it follows that unlike changes will be produced in the parts thus dissimilarly acted upon."

The argument as to the instability of the homogeneous is condemned in the very statement of it. It is said to be a condition of unstable equilibrium, viz., a balance of forces such that the least external influence will disturb, but will otherwise remain undisturbed. But since we are talking of the homogeneous or balance of forces in itself, and without any external influence, it follows that the homogeneous or perfectly balanced is in itself stable. It is only when we have the homogeneous or the equilibrium plus external influence that we get instability.

Further, on the supposition of a state of homogeneity or perfect equilibrium, it follows from the persistence of relations amongst forces that they remain in such condition. From the persistence of force this must be the case, otherwise we have force (the disturbing force) arising out of nothing, and we cannot conceive that it does not arise except out of some existing or precedent force, which is the application of Mr. Spencer's "Test of Truth."

Mr. Spencer says (p. 405):—

"No demurrer to the conclusion drawn can be based on the ground that perfect homogeneity nowhere exists; since whether that stage with which we commence be or be not one of perfect homogeneity, the process must equally be towards a relative heterogeneity."

The demurrer can be raised that perfect homogeneity nowhere exists, and it does not follow from this statement, or any of the previous ones, that, given a state of perfect homogeneity, the process must be towards a state of relative heterogeneity, for in all the cases instanced certain conditions are requisite to produce it. The conditions are *external influences.* The initial description of an unstable equilibrium presupposes an external influence, however small, to disturb it, and all the illustrations show that the condition of homogeneousness does not become heterogeneous *of itself*, but only as affected by external influences, and in a definite manner and degree, according to the specific nature of those influences. So that the proposition maintained is not the instability of the homogeneous, but the instability of the homogeneous under external influences; and since the homogeneous nowhere exists, it is rather the instability of the less heterogeneous under external influences.

Perfect homogeneity without external influences to disturb it, or a perfect symmetry of external relations, Mr. Spencer admits himself is not unstable.

Page 407.—"We need not here, however, commit ourselves to such far-reaching speculations. For the purposes of the general argument it is needful only to show that any finite mass of diffused matter, even though vast enough to form our whole sidereal system, could not be in stable equilibrium; that in default of *absolute sphericity, absolute uniformity of composition, and absolute symmetry of relation to all forces external to it*, its concentration must go on with an ever-increasing irregularity, and that thus the present aspect of the heavens is not, so far as we can judge, incongruous with *the hypothesis of a general evolution consequent on the instability of the homogeneous.*"

The fallaciousness of this reasoning is obvious. The homogeneous is defined in words which I have italicised,

in which case it is admitted that heterogeneity would not ensue. The only cases where heterogeneity ensues upon the homogeneous is where external influences produce it, as explained before. Yet the conclusion of the quotation speaks of an evolution *consequent upon* the instability of the homogeneous, as if it was an active principle apart from external influences.

The purport of this argument is obvious. The author, in the establishment of a philosophy which has to explain everything that can have a potential history, is bound to start with a state of things completely undifferentiated, for every differentiation implies a history. The undifferentiated is a state of homogeneity. But if the homogeneous is unstable, we get a start towards heterogeneity, and out of that we can make progress. A country friend of mine describes Evolution as "a lump with a start in it." This is the start.

We have now to take up a postponed consideration, and assume, to start with, the least departure from a state of homogeneity, namely, a difference in the shape of the mass.

Page 406.—"If the matter of which stars and all other celestial bodies consist be assumed to have originally existed in a diffused form throughout a space far more vast even than that which our sidereal system now occupies, the instability of the homogeneous would negative its continuance in that state. . . . In matter of such extreme tenuity and feeble cohesion there would be motion towards local centres of gravity, as well as towards the general centre of gravity. . . . Heterogeneities thus set up would tend ever to become more pronounced. Established mechanical principles would justify him in the conclusion that the motions of these irregular masses of slightly aggregated nebular matter towards their common centre of gravity must be severally rendered curvilinear by the resistance of the *medium* from which they were precipitated; and that in consequence of the irregularities

of distribution already set up, such conflicting curvilinear motions must, by composition of forces, end in a rotation of the incipient sidereal system."

It will be at once noted in this statement of Mr. Spencer's that he assumes a nebula moving in a medium. It follows that the state of homogeneity about which Mr. Spencer is arguing is not a state of homogeneity at all, since there is already a differentiation between the nebula and the medium, which differentiation is not accounted for, and his whole argument is vitiated.

It is also to be noted that he does not state whether this nebula is composed of ultimate similar units, and if so, how they get differentiated.

But from the course of the argument, it would appear that this differentiation had already taken place. The nebulæ that Mr. Spencer speaks of seem to be composed of the seventy or eighty so-called elements in a vaporous condition; or at any rate, of units already so differentiated as to fall naturally into these forms. But if Evolution fails to account for this differentiation, either of the so-called elements or of the differentiated units of which they are composed, then both differentiations implying a previous history, Evolution is convicted of inadequacy, according to Mr. Spencer's own test of the adequacy of a philosophy.

It may, however, be replied that Evolution does not claim to supply all knowledge, but only formularises all that is known, and claims a probability of the applicability of the formula to what is not yet known. If so, let it be so stated. Then we shall know that Evolution does not claim to be a complete theory of the universe, and if we find it correct to a certain extent, we accept it as so limited.

It is very evident that Mr. Spencer's theory of Evolution only starts from the supposition of an unlimited scattered group of nebulæ, these nebulæ consisting of the seventy or eighty so-called elements in a gaseous condition, and moving through a medium the whole anterior history of which is wholly unaccounted for, and that it so far fails, on the face of it, as a complete philosophy.

The Formula applied to Primary Evolution.

Now how far does Evolution, so far as we have gone, answer to the test of a philosophy stated by Mr. Spencer? Does it explain and account for the passage of the imperceptible into the perceptible, and the perceptible into the imperceptible? I do not say that in the increase of knowledge at some future time it will not do so; it would be presumptuous to limit future attainments of thought. But I mean to say that at the present time it has not done so, and the attempt to do so, as will be seen, is not only so speculative as to be futile, but also lands us in difficulties that seem incapable of solution, even under the license of speculation. Therefore we conclude the inadequacy of the theory of Evolution to account for the history of matter in motion anterior to the state of differentiated nebulæ, moving through ether, and constituted of differentiated matter (presumably the seventy or eighty so-called elements) in a gaseous condition.

Evolution, therefore, fails to account for the first stage of progress—fails to show how an ultimate unit can part with motion; that it fails to account for the law of gravitation to a centre; that, even if it accounts for the formation of the elements, it does not account for their

permanency on the variation of their cause, viz., pressure; and that it does not account for the existence and distribution of the nebulæ formed of mixed elements.

And, as a matter of fact, although Mr. Spencer does sometimes speculate upon the original condition of things and the primordial evolutionary process, he practically starts with the nebula, in itself a highly complex body, composed of differentiated matter, that is to say, the seventy or eighty so-called elements in a gaseous condition. But in so far as this complex state of the heavens and this differentiated state of matter is not accounted for except in a very speculative manner indeed, we must say that Evolution falls short of being a perfect philosophy.

Inquiry concerning the Origin of Organism on the Basis of the Formula of Evolution.

We now come to another stage, in which it seems to me that Evolution is not merely inadequate from possible lack of the materials of knowledge, which inadequacy might at some future time be made good, but in which we seem to meet with facts utterly irreconcilable with the theory of combinations of matter in motion as accounting for all phenomena. I refer to the commencement of life, to the constitution of protoplasm, to the formation of living organism.

We cannot have much difficulty in understanding the process of crystallisation as combinations of matter in motion. If the combinations of ultimate units result in definite grouping, with definite shape, as well as rate and direction of motion, we can understand that in a liquid

medium, which is never in a state of perfect rest, the imperceptible motions would bring the molecules or atoms into contact, and their harmonies of movement would induce aggregations into masses, the form of these masses being derived from the shape of the group of ultimate units forming the atom or molecule out of which the mass is built up.

But when we study the phenomena of life and its processes, even in the very simplest organism, we feel that we come upon a totally different field of activity. We cannot understand how any combination or recombinations of matter in motion can produce consciousness. If consciousness can be explained geometrically and arithmetically—that is to say, as due to certain combinations of shapes and certain rates and directions of motions—then we could accept the formula of Evolution as an explanation. But we cannot do so, and, as I indicated before, this failure seems to me not an inadequacy that can be supplied, but to be for all time utterly beyond the reach of such an explanation. The case is not parallel with crystallisation. In that case we can understand that such an explanation is possible, but in the case of life and organisms it seems impossible. There appears to be no relation between the terms of a proposition that should unite consciousness and matter in motion, so that by the production of the one in certain shapes and rates of motion the other would be produced. I do not think I need enlarge upon this topic: all I need point out is that the failure of the formula of Evolution to account for consciousness does not affect independent theories of development, does not affect theories of interaction of organism and environment, does not affect theories of moral, intellectual, and social develop-

ment, does not affect the law of the uniformity of sequence, as holding good throughout them.

I cannot think that the facts of life and organism are explainable by the formula of Evolution. This may or may not be a separate investigation from that concerning consciousness. By some it is held to be so, but to me the organic combination of two molecules into such a connection that the definitions of life are applicable to them, involves in each of them some fact of feeling. And, therefore, some fact of feeling would seem to precede life and organisation. But if feeling be the result of the combination of two or more molecules, and the organisation precedes feeling, even then we find that in all the stages beyond this initial step feeling is the principal factor inducing further changes, and is the active factor principally taken into account, and the essential element of all definitions of life. So that we may say—Without feeling no complex organism—no life—not even a simple organism. Is feeling the result of mechanical structure, or does it precede and form an essential factor in organic structure?

It would appear to me that the phenomena of life, including nourishment, growth, decay, reproduction, adaptation, heredity, consciousness, memory, emotion, reflection, and will, however much they may conform to the general modes or characteristics of material evolution (which is not denied), cannot be accounted for as to origin in any combinations of matter in motion, and cannot be expressed in terms of geometry and arithmetic, as all combinations of matter in motion are capable of being expressed; and since the formula of Evolution recognises only combinations and recombinations of matter in motion, it fails in its application to the phenomena of life and

organism as just enumerated, and is therefore inadequate as a philosophy which professes to account for the whole history of things.

Mr. Spencer on the Origination of Organism and Consciousness.

But we will proceed to a consideration of Mr. Spencer's own statement of the theory of the origin of living organisms. The best statement we find on the subject is in his letter to the editor of the "North American Review," at the end of "Biology," vol. i., when, after criticism pointing out various defects of statement, he undertakes to explain the hypothesis in such a manner that it cannot be misunderstood. In justice to its importance, I print a considerable portion of this letter *in extenso*. In order to escape any charge of an inadequate representation of Mr. Spencer's views, I print more than is necessary for my purpose; to print it all would unnecessarily encumber the argument. Size is a great deterrent to effective criticism, and the size of Mr. Spencer's arguments, as a rule, are greatly obstructive of their comprehensibility and criticism, though it makes them imposing to an impressible mind.

"From what I do not believe, let me now pass to what I do believe. Granting that the formation of organic matter, and the evolution of life in its lowest forms, may go on under existing cosmical conditions; but believing it more likely that the formation of such matter and such forms took place at a time when the heat of the earth's surface was falling through those ranges of temperature at which the higher organic compounds are unstable; I conceive that the moulding of such organic matter into the simplest types must have commenced with portions of protoplasm more minute, more indefinite, and

more inconstant in their characters, than the lowest Rhizopods —less distinguishable from a mere fragment of albumen than even the *Protogenes* of Professor Haeckel. The evolution of specific shapes must, like all other organic evolution, have resulted from the actions and reactions between such incipient types and their environments, and the continued survival of those which happened to have specialities best fitted to the specialities of their environments. To reach by this process the comparatively well-specialised forms of ordinary *Infusoria*, must, I conceive, have taken an enormous period of time.

"To prevent, as far as may be, future misapprehension, let me elaborate this conception so as to meet the particular objections raised. The reviewer takes for granted that a 'first organism' must be assumed by me, as it is by himself. But the conception of a 'first organism,' in anything like the current sense of the words, is wholly at variance with conception of Evolution, and scarcely less at variance with the facts revealed by the microscope. The lowest living things are not, properly speaking, organisms at all: for they have no distinctions of parts—no traces of organisation. It is almost a misuse of language to call them 'forms' of life: not only are their outlines, when distinguishable, too unspecific for description, but they change from moment to moment, and are never twice alike, either in two individuals or in the same individual. Even the word 'type' is applicable in but a loose way; for there is little constancy in their generic characters: according as the surrounding conditions determine, they undergo transformations, now of one kind and now of another. And the vagueness, the inconstancy, the want of appreciable structure, displayed by the simplest of living things as we now see them, are characters (or absences of characters) which, on the hypothesis of Evolution, must have been still more decided when, as at first, no 'forms,' no 'types,' no 'specific shapes,' had been moulded. That 'absolute commencement of organic life on the globe,' which the reviewer says I 'cannot evade the admission of,' I distinctly deny. The affirmation of universal evolution is in itself the negation of an 'absolute commencement' of anything. Construed in terms of Evolution, every kind of being is conceived as a product of modifications wrought by insensible gradations on a pre-existing kind of being; and this holds as fully of the supposed

'commencement of organic life' as of all subsequent developments of organic life. It is no more needful to suppose an 'absolute commencement of organic life' or a 'first organism,' than it is needful to suppose an absolute commencement of social life and a first social organism. The assumption of such a necessity in this last case, made by early speculators with their theories of 'social contracts' and the like, is disproved by the facts; and the facts, so far as they are ascertained, disprove the assumption of such a necessity in the first case."—*Principles of Biology*, vol. i. p. 481 *et seq.*

The problems to be studied are thus indicated, viz., "the formation of organic matter" and "the evolution of life in its lowest forms."

We shall give our attention first to the formation of organic matter, and for the time being pass our intermediate text until we arrive at this portion of it:—

"That organic matter was not produced all at once, but was reached through steps, we are well warranted in believing by the experiences of chemists. Organic matters are produced in the laboratory by what we may literally call *artificial evolution.* Chemists find themselves unable to form these complex combinations directly from their elements, but they succeed in forming them indirectly by successive modifications of simpler combinations. In some binary compound, one element of which is present in several equivalents, a change is made by substituting for one of these equivalents an equivalent of some other element, so producing a ternary compound. Then another of the equivalents is replaced, and so on. For instance, beginning with ammonia, NH_3, a higher form is obtained by replacing one of the atoms of hydrogen by an atom of methyl, so producing methyl-amine, $N(CH_3H_2)$; and then, under the further action of methyl, ending in a further substitution, there is reached the still more compound substance dimethyl-amine, $N(CH_3)(CH_3)H$. And in this manner highly complex substances are eventually built up. Another characteristic of their method is no less significant. Two complex compounds are employed to generate, by their action upon one another, a compound of still greater complexity; different heterogeneous molecules of one stage become

parents of a molecule a stage higher in heterogeneity. Thus, having built up acetic acid out of its elements, and having, by the process of substitution described above, changed the acetic acid into propionic acid, and propionic into butyric, of which the formula is $\left\{ \begin{matrix} C(CH_3)(CH_3)H \\ CO(HO) \end{matrix} \right\}$; this complex compound, by operating on another complex compound, such as the dimethl-amine named above, generates one of still greater complexity, butyrate of dimethyl-amine $\left\{ \begin{matrix} C(CH_3)(CH_3)H \\ CO(HO) \end{matrix} \right\} N(CH_3)(CH_3)H$."

Now, let us examine this statement in detail. We are to presume that it is an illustration of the process of the formation of organic molecules from inorganic molecules. In this case we start with ammonia, which is composed of one atom of nitrogen and three of hydrogen. The atom of nitrogen is composed of ultimate units of definite shapes and sizes and motions, making up a complex indivisible whole, having definite shape, size, and motions. These are such that on coming into contact with atoms of hydrogen, also complex atoms, and having definite shapes, sizes, and motions, those shapes, sizes, and motions of the nitrogen atom and the three hydrogen atoms are so harmonious that like, say, cog-wheels in a watch, they catch and form a more complex molecule, having also a definite shape, size, and set of motions. If we could see them, we could delineate them on paper, and describe and count their motions. Then we proceed to replace one of the atoms of hydrogen by an atom of methyl, and produce a much more complicated system of shapes, sizes, and motions, which also could be geometrically and mathematically described. By the further action of acetic acid a still more compound molecule is obtained, and in this manner highly complex substances are built up.

Again, two complex substances are employed "*to gene-*

rate," and different heterogeneous molecules of one stage "*become parents of.*" These phrases are used to describe the production of a more complex compound from two complex compounds, which is simply an extension of the process already described, and, to whatever extent carried, simply means a molecule compounded of a great number of atoms having great varieties of shape and size and great varieties of motion, but all of such forms and such modes and rates that they are capable of an arrangement into a system like the divers shapes and movements of the members of a solar system, and all of which, could we see them, could be described geometrically and arithmetically.

Now this is called by Mr. Spencer an "organic molecule;" the action of one complex molecule upon another is called "to generate," and the result "parentage." It is only a question of the meaning of words. I did not know before that organic and complex were identical in meaning. I did not know that the mechanical change by which one large wheel put into gear with a lot of small ones with the resultant distribution of motion was an act of generation, nor that the addition of 2 plus 2 was a parentage of 4.

One would like to ask, before going any further, what is the distinction between a complex molecule and an organic molecule? Mr. Spencer begins by calling certain molecules *complex,* and ends by calling the still more complex molecules *organic.* Is there anything in the latter that is not in the former? Is there more in the latter than a system of shapes, sizes, and relations of motion? I presume not, for how can there be? What is it, and how came it there? $2 \times 2 = 4$, and $4 \times 16 = 64$; but the latter, though more complex, is of the same construction as the former. So △ and □ make ⌂ and ◁□▷,

yet the latter, though more complex than the former, is constituted of the same factors.

I am told that the meaning of the distinction between inorganic and organic molecules is that the latter are animal or vegetable products. If so, there could be no such products before animals and vegetables existed; and life must have come out of complex molecules and not organic ones, in this sense.

I am also told that the distinction is one merely of convenience, and is altogether an arbitrary one. In this case we prefer the term "complex" as being scientifically accurate, and as having no misleading connotations.

We now quote from Mr. Spencer a kind of litany of Evolution.

"See, then, the remarkable parallelism. The progress towards higher types of organic molecules is effected by modifications upon modifications; as throughout Evolution in general. Each of these modifications is a change of the molecule into equilibrium with its environment—an adaptation, as it were, to new surrounding conditions to which it is subjected; as throughout Evolution in general. Larger, or more integrated, aggregates (for compound molecules are such) are successively generated; as throughout Evolution in general. More complex or heterogeneous aggregates are so made to arise, one out of another; as throughout Evolution in general. A geometrically-increasing multitude of these larger and more complex aggregates so produced at the same time results; as throughout Evolution in general. And it is by the action of the successively higher forms on one another, joined with the action of environing conditions, that the highest forms are reached; as throughout Evolution in general."

Bearing in mind that we have arrived only at complex molecules, we find in the above quotation the introduction of terms drawn from the changes of life and organism. "Coming events cast their shadows before."

The words used do not grow naturally out of the mechanical factors we have been considering, but, like a dissolving view in a magic-lantern, we trace the first appearances of an utterly disconnected picture.

First we have "the progress towards higher types of organic molecules." This must mean the progress towards more complex molecules, the phrase "higher types" being both ambiguous and superfluous, and is drawn from biological science. Next, "is effected by modifications upon modifications." Now we have found that the kind of modification which a molecule undergoes, if such it can be called, is the addition to, subtraction from, or substitution of, atoms of such shapes, sizes, and rates and modes of motion as fit them to form part of the mechanical system of the molecule, or to be withdrawn from it without destroying the combination of the rest, in much the same way that we see conjurors add article upon article to a moving equilibrium at the end of a stick, if we could suppose the motion to be in the articles themselves instead of imparted to them by the arm of the performer. It does not seem quite correct to call this recombination and reconstruction, or the reverse process a modification of the molecule, as it is the substitution of an indefinite and ambiguous word for one of a definite meaning.

"Each of these modifications (*i.e., recombinations or reconstructions*) is a change of the molecule into equilibrium with its environment." Let us examine what this means. If we suppose chemical combinations to be mechanical, they will be due to harmonies of shape, size, and movement. So if we suppose an atom of suitable size and shape for combination with another atom, as, for instance, △, itself composite, and another, □, they will combine thus, ◁□□▷, and if the rates of attrac-

tive and repulsive motion are the same, the combination is stable, as, for instance, if the rate of movement is 2 and 2 to the unit of time, or one 2 and the other 4, or one 3 and the other 4, and in proportion to the greater number of synchronometric beats (or rotations) so the stability of the complex molecule. Now, if a quantity of complex molecules be put into a liquid medium containing other complex molecules, either the molecules will agree or disagree in their shapes, sizes, or rates of motions. If they agree, then they form compounds, *i.e.*, more complex molecules in certain definite proportions. If they do not agree, then they tear each other to pieces and form new combinations with atoms of suitable shapes and sizes and synchronometric motions. This is all that can be meant by the change of a molecule into equilibrium with its environment.

It does not invalidate my criticism that my illustrations are not drawn from actual facts. I am arguing from Mr. Spencer's premises, which, starting from matter in motion, only admit of changes and recombinations of matter in motion, by which I am necessarily obliged to translate all his terms of generation, parentage, adaptation, environment, &c., into a mechanical representation.

"An adaptation, as it were, to new surrounding conditions to which it is subjected."

The phrase "as it were" is not admissible into philosophical writing, indicating merely a possible likeness or an indefinite one—a term of uncertainty and ambiguity. A likeness or illustration in philosophy should be carefully considered and sparingly used, to the elucidation and not to the confusion of a subject; as, for instance, in the illustration of the construction of a complex molecule from the trick of the juggler just adduced. Here the "as it

were" refers to the word adaptation, and I do not think it is correct. It is difficult to make out the meaning of it in terms of matter in motion. In walking, I adapt my pace to that of my companion. I adapt the size of my cork to the size of the neck of my bottle. But I do not see that when heterogeneous complex molecules come into contact in a liquid medium that they adapt themselves otherwise than by recombinations or reconstructions, as above described—viz., in accordance with harmonies of size, shape, and modes and rates of motion. If they alter themselves otherwise, it is equivalent to saying that they alter their shapes or modes and rates of motion in order to acquire such as will enable them to enter into combination with molecules in their environment; that a molecule ○○○ will change itself to ♌ to oblige ♌, and thus form ♌♍♍, and change its relative motion of 5 in unit of time to 4 in order to harmonise better with 8 in unit of time.

Adaptation of molecules would seem to imply that gold in a jar of oxygen would change itself into hydrogen, in order that it might unite with it to make water. The word "adaptation" is not used in the science of chemistry, so far as I have been able to ascertain.

"Larger or more integrated aggregates (for compound molecules are such) are necessarily generated." "Generated" here only means formed or constructed.

"More complex or heterogeneous aggregates are so made to arise one out of another."

Here the word "complex" is made synonymous with heterogeneous. A complex aggregate is a correct description of a complex molecule, which is a system of shapes, sizes, and motions in definite relations; but an aggregate made up of similar complex molecules would not be

called heterogeneous. There is also an ambiguity in the phrase, "made to arise one out of another." They do not seem words that can be adapted to express the relations and sequences of matter in motion. If I have two complex molecules, and if, by placing them in contact, a recombination ensues, and I have one, two, three, or four molecules instead, I know that I have the same number of definite specific atoms with which I started; and if I say that I made them "arise one out of another," all I mean is that they are combined in a different manner.

"A geometrically-increasing multitude of these larger and more complex aggregates so produced at the same time results. And it is by the action of successively higher forms on one another, joined with the action of environing conditions, that the highest forms are reached."

"Highest forms" means more complex molecules, and their action on one another means that their coming into contact results in the formation of still more complex molecules—not always, but when the shapes, sizes, and motions are harmonious. "Joined with the action of environing conditions," must mean, not the environment of suitable molecules, for that has just been discussed, but the conditions of etherial motions, such as heat, light, &c., and of a medium of suitable condition, such as water. But both etherial motions and the medium are all admitted to be nothing more than matter in motion.

"When we thus see the identity of method at the two extremes—when we see that the general laws of Evolution, as they are exemplified in known organisms, have been unconsciously conformed to by chemists in the artificial evolution of organic matter; we can scarcely doubt that these laws were conformed to in the natural evolution of organic matter, and afterwards in the evolution of the simplest organic forms. In the early world, as in the modern laboratory, inferior types of organic substances,

by their mutual actions under fit conditions, evolved the superior types of organic substances, ending in organisable protoplasm. And it can hardly be doubted that the shaping of organisable protoplasm, which is a substance modifiable in multitudinous ways with extreme facility, went on after the same manner. As I learn from one of our first chemists, Prof. Frankland, *protein* is capable of existing under probably at least a thousand isomeric forms; and, as we shall presently see, it is capable of forming, with itself and other elements, substances yet more intricate in composition, that are practically infinite in their varieties of kind. Exposed to those innumerable modifications of conditions which the earth's surface afforded, here in amount of light, there in amount of heat, and elsewhere in the mineral quality of its aqueous medium, this extremely changeable substance must have undergone, now one, now another, of its countless metamorphoses. And to the mutual influences of its metamorphic forms under favouring conditions we may ascribe the production of the still more composite, still more sensitive, still more variously changeable portions of organic matter, which, in masses more minute and simpler than existing *Protozoa*, displayed actions verging little by little into those called vital—actions which protein itself exhibits in a certain degree, and which the lowest known living things exhibit only in a greater degree. Thus, setting out with inductions from the experiences of organic chemists at the one extreme, and with inductions from the observations of biologists at the other extreme, we are enabled deductively to bridge the interval—are enabled to conceive how organic compounds were evolved, and how, by a continuance of the process, the nascent life displayed in these became gradually more pronounced. And this it is which has to be explained, and which the alleged cases of 'spontaneous generation' would not, were they substantiated, help us in the least to explain."

What is the purport of this argument? We have so far seen that the process of the chemist in the production of complex molecules is the same as the natural process, and it is difficult indeed to suppose that any one would think otherwise, since the chemist only manipulates the matters and motions which he deals with. He

does not and cannot alter them. He merely places them in contact, and the mechanical sequences result. Mr. Spencer, however, would draw some further conclusion. Let us try to follow it out.

"When we thus see the identity of method at the two extremes, when we see that the general laws of Evolution, as they are exemplified in known organisms, have been unconsciously conformed to by chemists in the artificial evolution of organic matter."

The first question that arises is respecting the importation into the study of a new term, "organism." Is this identical with the term "organic molecule," and therefore with the term "complex molecule"? We are induced to think so from the employment of the word "thus," which evidently connects the paragraph with the preceding one, and still more when we see that the process of the evolution of an organism is likened to the "artificial evolution of organic matter" by chemists.

"We can scarcely doubt that these laws were conformed to in the natural evolution of organic matter, and afterwards in the evolution of the simplest organic forms."

There is no doubt that the natural evolution of organic —if read as "complex"—matter, is identical with the artificial production by the chemist; but what about the evolution of the simple organic forms? It is to be presumed that "organic" still means complex. The change of the adjective having been satisfactorily effected, and, by repetition, pretty well established in our minds, we are now, by a process of mere word evolution, required to change our substantive "matter" into the substantive "forms." We can only remark, that so far we have made no progress, whether in the world of nature or in the laboratory, beyond complex molecules, which are mechanical arrange-

ments of atoms of definite and harmonious shapes, sizes, and motions. If "organism" be defined as a combination of organic molecules, and these organic molecules are merely highly complex molecules; and if, again, these highly complex molecules are composed of less complex molecules, then a highly complex molecule is by this definition an organism itself. For what is the distinction between a highly complex molecule and an organism? They are both aggregates of the less complex.

"In the early world, as in the modern laboratory, inferior types of organic substances, by their mutual actions under fit conditions, evolved the superior types of organic substances, ending in organisable protoplasm."

Here we remark the loose employment of several words. "Types," for instance, employed in relation to complex molecules, can only relate to the degree of complexity which might, for our convenience, and for that only, be so classified according to the number of atoms or kinds of atoms composed in a molecule. The "organic substances," of course, only means complex molecules, and the whole sentence is simply a repetition in vague and more advanced language of what we have had before, until we come to the phrase "ending in organisable protoplasm." If this means that nothing was organisable before the evolution of protoplasm, we are justified in our rejection of the word "organic" hitherto; or if the application is the same now as heretofore, it simply means protoplasm capable of being an item in a more complex arrangement, which is the case with other complex molecules.

"Organisable protoplasm." If we could only here have a description of what was meant by this term, and how it—the *organisable protoplasm*—was arrived

at, we would feel safe in going further. Following up the train of thought carefully, we have got as far as a complex molecule, vast varieties of them, in fact, and we find them capable of forming crystalloid and colloid masses, the particular form being due, no doubt, to the form and composition of the molecules themselves, or the mould or medium in which they happen to be placed. Yet we hesitate on this account to call them organisable. The word "organisable" does not seem to be capable of expression in terms of matter in motion. Is the atom forming part of the mechanical structure of a molecule organised or organisable? It is an essential part of a moving system, without which that system could not be what it is. And in this view it is to be considered more essentially a part of an organic whole, and therefore more organic than the molecule which forms part of a crystal or of a colloidal mass. But the fact is, that the newly introduced word *organisable* is due to the necessity for finding a step "ending in protoplasm."

What is protoplasm? We know what it is, or rather what its properties are, viewed from *this side of creation*, or present constitution of the cosmos; we want to get at it from *the other side.*

If we try to advance to it from the inorganic, we simply end in a highly complex chemical formula, and all chemical formulas are expressions of combinations of shapes, sizes, and modes and rates of motions. Has this chemical protoplasm any other properties? If so, whence came they?

Is protoplasm the chemical formula by which it is to be expressed, or is it something more? We know it is, and can be, on this basis of our reasoning, nothing more.

It is a molecule having special shapes, sizes, and motions, being the resultant of the shapes, sizes, and motions of its constituent atoms. If it is organisable—that is to say, if it forms part of a larger group, without which that group would not be a coherent group, as it itself would not be with the loss of one of its constituent atoms—it is only the same as the molecule constituent of a crystal. So far have we got with the meaning of the term organisable.

"And it can hardly be doubted that the shaping of organisable protoplasm, which is a substance modifiable in multitudinous ways with extreme facility, went on after the same manner."

We have next to consider the shaping of organisable protoplasm.

Are we to understand that the shaping of organisable protoplasm is *the shaping of the molecules* or *the shaping of masses of molecules?* As regards the shaping of the molecules, we might, perhaps, admit the possibility of a highly complex molecule of loose composition, which might retain such relations of external motion as to retain its molecular characteristics, yet be somewhat susceptible to change of shape from external conditions. Yet it is a very doubtful hypothesis.

As regards the shaping of masses of protoplasm, still regarding it not as we know it, but only as a molecule of factors of shapes, sizes, and motions, we presume the mass could be shaped by external conditions in just the same way that a mass of putty could be shaped. Let us consider the matter in detail.

In the same manner as what? If the shaping of organisable protoplasm means the shaping of the *molecules of* protoplasm, we have to consider the theory of the plasticity of molecules. Are atoms plastic? What

is the meaning of "plastic," applied to molecules and atoms? We only know the plasticity of masses. Plasticity is of two kinds—that which is capable of alteration of shape and retains the shape given, and that which returns to its original shape; the latter is more properly termed elastic, although the latter has another meaning in respect to compressibility and the return to the original bulk. We can conceive of an atom composed of ultimate units of a spherical, spheroidal, or other shape, without angles, but of definite motions and sizes, like a miniature solar system, which, in contact with other atoms, or impact of other atoms, or moved by etherial currents without disintegration of parts, should yet have the relations of distance of these parts slightly changed without change in the resultant size or specific motions of the atom. There would, however, be a slight change of shape, according to the nature of the action of the motions affecting it. Again, it is conceivable that molecules made up of atoms destitute of angles might in the same way change shape and yet preserve those definite relations of size and motions which constitute it a specific molecule. And again, in any colloidal mass composed of these particles there might be plasticity and elasticity. And it seems reasonable to suppose that all these relations of matter in motion, which are obvious to us in sensible masses, should be attributed to the smallest aggregates of atoms, or if not to these—since they may be regarded as indivisible and unchangeable complex units—at any rate to molecules which admit of etherial motions permeating their constituents, rendering them subject to change and divisibility. Yet it is not unreasonable to suppose either that aggregates, such as molecules, and the more so according to their size and complexity, should be subject

to different modes of influence to the indivisible units, such as atoms. So granted that molecules, and more especially highly complex molecules, more loosely bound together than others, may be susceptible to change of shape slightly, and while retaining their specific constituents and motions, we may admit the plasticity of some molecules. From similar methods we have the plasticity of masses. The influence of heat, which means the increased length of the beat of the molecule or of the contained ether, implies the further separation of molecules, and favourably influences the conditions of plasticity of masses, and in like manner may favourably influence the plasticity of the molecule. Then if the molecule and any aggregate of molecules be plastic, their shapes will continually be changing within certain limits, due to the range of the atomic motions, according to the motions of surrounding molecules, or currents of molecular or etherial motion, with which they may be in relation. It is perhaps, also, conceivable, since plasticity is affected by heat or etherial vibrations, that on the cessation of this heat the molecule should retain the shape it possessed under the external influences, as before described, at the moment of the cessation of the heat which rendered it plastic, and this would enable us to admit the moulding and shaping which Mr. Spencer speaks of; but these acquired shapes would not be permanent, like the shape of an atom or of a crystalloidal molecule, but, under the conditions of increased heat, would resume their original character of plasticity.

But the result, so far, has not carried us beyond complex molecules, and we are still far from understanding organisable molecules, otherwise than as capable of forming items of colloidal or crystalloid masses.

We have next to consider the combination of these plastic complex molecules with each other, with other plastic complex molecules, and with non-plastic complex molecules, whether colloidal or crystalloidal. But this is best done in the criticism of the next succeeding section.

In the meantime, passing over several sentences, the criticism of which would be merely a repetition of what we have already said, we come to one which demands attention from the introduction of new terms, which might suggest the acquirement by matter in motion of qualities that cannot be described in terms of matter in motion, and therefore impairs the accuracy of our reasonings. I refer to the passage, "The production of the still more composite, still more sensitive, still more variously changeable portions of organic (*i.e.*, complex) matter, which . . . displayed actions verging, little by little, into those called *vital*—actions which protein itself exhibits in a certain degree, and which the lowest known living things exhibit only in a greater degree."

I call attention here, in the first place, to highly complex molecules being more *sensitive*. I presume "sensitive" cannot mean consciousness, but molecules more easily decomposable on account of the heterogeneity of their composition, exposing them to the action of a greater number of other molecules, simple or complex, with which they may come into contact; or the decompositions effected by the general actions of etherial motions, or the diverse actions thereof in respect to the different constituent atoms. In the second portion of the quotation we find a reference to vital actions, which also is a new term which I cannot render into terms of matter in motion, and the consideration of which, together with the term "living," will come in with the criticism of the next section. We note here

only, *en passant*, that the difference intended to be indicated is one of degree only — that is to say, increased complexity of measurable rates and sizes and shapes, and consequent increased instability when subject to the influence of even slightly inharmonious motions.

"Thus setting out with the experience of organic chemists at the one extreme, and the inductions from the observations of biologists at the other extreme, we are enabled deductively to bridge the interval—are enabled to see how organic compounds are evolved, and how, by a continuance of the process, the nascent life displayed in these became gradually more pronounced."

It is true that we did see how complex (called organic) compounds are evolved, but we did not perceive that they displayed any life — even nascent life — whatever that means; nor did we see that this life became more "pronounced," whatever that is. We failed altogether to get beyond a complex molecule. Even if we got as far as chemical formulas representing protoplasm, they were but mechanical formulas; the protoplasm had no characteristics beyond matter and motion, and had no biological value.

We now take up the second problem, viz., "the evolution of life in its lowest forms," which we may sufficiently discuss by means of a consideration of the passages commencing with the section at the top of page 486.

"Much evidence now conspires to show that molecules of the substances we call elementary are in reality compound; and that, by the combination of these with one another, and recombinations of the products, there are formed systems of systems of molecules, unimaginable in their complexity. Step by step as the aggregate molecules so resulting grow larger and increase in heterogeneity, they become more unstable, more readily transformable by small forces, more capable of assuming various characters. Those composing organic matter transcend all others

in size and intricacy of structure; and in them these resulting traits reach their extreme. As implied by its name, *protein*, the essential substance of which organisms are built, is remarkable alike for the variety of its metamorphoses and the facility with which it undergoes them: it changes from one to another of its thousand isomeric forms on the slightest change of conditions. Now, there are facts warranting the belief that though these multitudinous isomeric forms of protein will not unite directly with one another, yet they admit of being linked together by other elements with which they combine. And it is very significant that there are habitually present two other elements, sulphur and phosphorus, which have quite special powers of holding together many equivalents—the one being pentatomic and the other hexatomic. So that it is a legitimate supposition (justified by analogies) that an atom of sulphur may be a bond of union among half-a-dozen different isomeric forms of protein; and similarly with phosphorus. A moment's thought will show that, setting out with the thousand isomeric forms of protein, this makes possible a number of these combinations almost passing the power of figures to express. Molecules so produced, perhaps exceeding in size and complexity those of protein as those of protein exceed those of inorganic matter, may, I conceive, be the special units belonging to special kinds of organisms. By their constitution they must have a plasticity, or sensitiveness to modifying forces, far beyond that of protein; and bearing in mind not only that their varieties are practically infinite in number, but that closely allied forms of them, chemically indifferent to one another as they must be, may coexist in the same aggregate, we shall see that they are fitted for entering into unlimited varieties of organic structures."

"Much evidence now conspires to show that molecules of the substances that we call elementary are in reality compound; and that, by the combinations of these with one another, and the recombinations of the products, there are formed systems of systems of molecules, unimaginable in their complexity. Step by step as the aggregate molecules so resulting grow larger and increase in heterogeneity, they become more unstable, more readily

transformable by small forces, more capable of assuming various characters."

This is all very comprehensible, but Mr. Spencer goes on to say: "Those composing organic matter transcend all others in size and intricacy of structure; and in them these resulting traits reach their extreme," without specifying what organic matter is as distinguished from complex matter, which he has all along treated as identical with it, but here seems to mark off as a special kind of complex molecules. However, some light is thrown upon this subject by the next passage. "As implied by its name, *protein*, the essential substance of which all organisms are built, is remarkable alike for the variety of its metamorphoses and the facility with which it undergoes them; it changes from one to another of its isomeric forms on the slightest change of conditions."

From this it appears that the essential substance of which all organisms are built is protein. The only organisable matter then is protein, and when organisable matter is spoken of it is protein that is meant.

It would seem further to follow, that the only organic molecule is a molecule of protein, and that throughout this criticism, wherever I have insisted upon the substitution of the phrase "complex molecule" for "organic molecule," I have been correct. The only correct use of the word "organic" is in relation to the word "protein"—a view corroborated by a passage a few lines further on, where compound molecules of sulphur or phosphorus and protein are contrasted with those of inorganic matter. So that when Mr. Spencer heretofore spoke of the "organic chemists," he only meant chemists who produced complex inorganic, *i.e.*, non-protein molecules.

But what justifies the application of the term "organic"

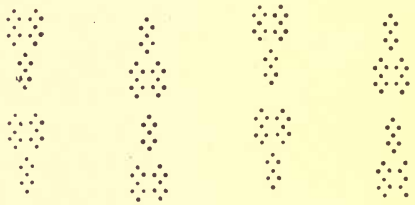
to compounds of protein, viewed not from our knowledge of protein as derived from experience, but from our knowledge of protein as a mechanical molecule or combination thereof, the result of Evolution; that is to say, a plastic complex molecule or aggregation composed of atoms having specific shapes, sizes, and motions, and the resultant in itself being a compound of specific shapes, sizes, and motions, though a shape, owing to its plasticity, capable of change under pressure. There is nothing so far to mark them off by a distinguishing title from all other complex molecules.

Mr. Spencer, speaking of molecules composed of sulphur or phosphorus and protein, says of them: "By their constitution they must have a plasticity, or sensitiveness to modifying forces, far beyond that of protein." Here we simply repeat that "sensitiveness" does not mean consciousness or feeling of any sort, and that "modifying" only means modification of shape and mechanical rearrangements of atoms and motions. "And bearing in mind not only that their varieties are practically infinite in number, but that closely allied forms of them, chemically indifferent to one another as they must be, may coexist in the same aggregate, we shall see that they are fitted for entering into unlimited varieties of organic structures." We notice here specially "coexist in the same aggregate;" but it does not show how the aggregate was formed or came into existence—that is, in fact, the problem that has to be solved. Is it merely a chance aggregate? Supposing that complex organic molecules have been formed, that is to say, sulphur and phosphorus and protein. We wish to know what aggregate they exist in, and how they form it? Do they adhere like the molecules of water or iron? Later on it is said that they are fitted to enter

into unlimited varieties of organic structure. But whence the structure? and how organic? How do three or four of them get their first skin and thus form a definite whole?

To realise to ourselves—and unless we think clearly it is no use thinking at all—the formation of an organism, we have to consider a case like this.

Given a mass of highly complex molecules, each molecule being an aggregate of atoms forming an equilibrium like the solar system, to ascertain the mode of their becoming an organic whole, as thus :—



This mass will be brought into contact in a liquid medium forming a highly complex aggregate, and will be subject to the influences of light, heat, &c., and there may result modifications of molecules and of their relations. But there will be no wearing out or waste or using up of the energy of the substance, nor repair of waste.

Mr. George Lewes, speaking of the modes of substances, says, speaking of life :—"Their peculiarity consists in this; they undergo molecular changes of composition and decomposition which are simultaneous, and by this simultaneity preserve their integrity of structure. They change their state, and their elements yet preserve their unity, and even when differentiating continue specific; unlike all other bodies, are born, grow, develop, and decay through a prescribed series of gradual evolutions, each stage being the

indispensable condition of its successor, no stage ever appearing except in its serial order."

Now, to take the first stage. Is it asserted of a complex molecule of sulphur or phosphorus and protein that this molecule casts out some of its protein and assimilates other from the environment? If so, why so? How did the cast-off molecule of protein get out of relation with the other part of the highly complex aggregate of which it formed a part? Evidently only by means of some mechanical agency in the environment, or of some etherial motion. And how did some other molecule get into relation and take its place? Would not the old molecule, being an identical system of shapes, sizes, and motions, have done just as well?

We cannot entertain the notion of an atom constituent of a complex molecule *getting worn out* in consequence of its relations of movement as part of that complex system of motions; for it was by virtue of its harmonies of shape, size, and motions that it entered into the combination, and what caused it preserves it. Such a change would imply that it ceases to be what it is. It is not merely cast out; it has become something else—that is to say, some other element. If, however, the decomposition has been effected by means of chemical recombination with an exterior molecule, then the explanation is reasonable, although we still do not see why one molecule should be so taken up by an exterior molecule when there are others in the environment with which it could combine. But the notion of interior decomposition is not admissible, for the sizes, shapes, and motions that caused the combination into the complex molecule tend to preserve that constitution until affected by exterior agencies.

But again, if we speak of masses of protein and sulphur

or phosphorus, are we not speaking of amorphous masses, chance aggregates, without definite shape or structure, like a mass of putty? What is there in the shape or composition of such a mass to imply the process of casting out and replacement of its constituents upon purely mechanical or chemical considerations? All its changes would be due to the impingement of external mechanical agencies.

And beyond this I do not see that we can go. I see not the slightest attempt to get at *structure*, and if a certain structure could be thought out by means of harmonies of sizes, shapes, rates, and modes of motion of highly complex molecules under suitable conditions of external mechanical agencies, such as a scratch in a rock, a hole in the sand, &c., this structure would exist only so long as the favouring conditions existed, and would then perish, and such structures would come and go like the crystals of ice and snow, like the clouds that float in the sky. The forms would be evanescent as the shifting sands, or might last a thousand years in a crack in the stone, like any chance aggregate of clay.

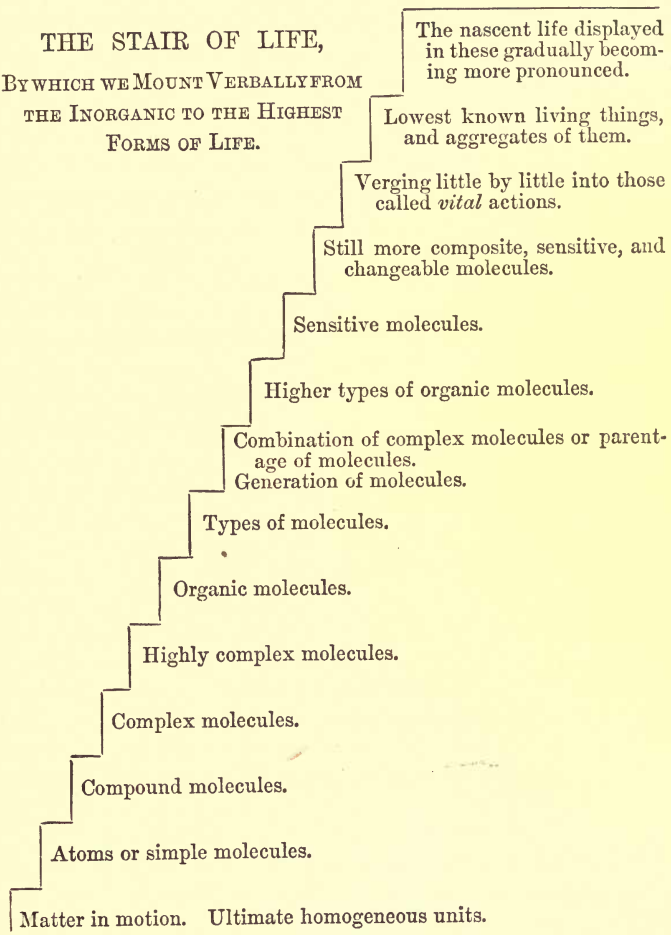
But towards anything like consciousness, heredity, reproduction, memory, or any facts comprising *the transmission of qualities other than motion* from one molecule to another, or towards anything like structure other than that of a cloud, which exists only so long and quite as long as environing conditions are favourable, we have no approach whatever. The attempt to bridge over the process of Evolution from the inorganic to the organic has proved a failure.

An attempt of this sort may be regarded as one of three things: firstly, as an endeavour to represent in words an actual and observed process of nature; or, secondly, it may be an attempt to represent and realise in thought what

might be an actual, but is an unobserved, process of nature; or, lastly, it may only be an evolution of words, representing a supposed process of nature.

The Evolution contained in the explanation we have been considering appears to be one of words only. It is a kind of ladder of semi-synonyms. The stair by which we mount from the inorganic to the highest forms of life is made up of words that bracket together biological and chemical (*i.e.*, mechanical) processes. It is a scheme founded on the frailties of language. Complex is overlapped by organic, organic is overlapped by sensitive, sensitive is overlapped by vital, and so we get life; class or degree is overlapped by type, complex combination is called generation, greater complexity, and greater sensitiveness, and generation is the generation of higher types. Then there is adaptation to environment and corresponding change of structure, and through generation again we get heredity and the establishment of highly organised living beings and organised experience.

The Evolution of Life.



It is a process of knitting together of the terms used to describe inorganic actions and the terms used to describe the actions of living organisms. When this is done the

explanation is supposed to be accomplished, but as a real explanation it is a failure.

We have thus seen that not only are the phenomena of consciousness, life, memory, generation, heredity, nourishment, and decay unexplainable *a priori* from the interaction of the two factors matter and motion, but that Mr. Spencer himself, in endeavouring to establish the theory in this most ingenious and subtle reasoning, fails to bring them within the processes of matter and motion, to whatever degree of complexity these processes may be carried.

We may, therefore, safely come to the conclusion that no merely mechanical theory, that no merely materialistic theory—for to that it is, in fact, equivalent—is able to account for life and its changes.

"The existence of such physiological units, peculiar to each species of organism, is not unaccounted for. They are evolved simultaneously with the evolution of the organisms they compose—they differentiate as fast as these organisms differentiate; and are made multitudinous in kind by the same actions which make the organism they compose multitudinous in kind. This conception is clearly representable in terms of the mechanical hypothesis. Every physicist will endorse the proposition that in each aggregate there tends to establish itself an equilibrium between the forces exercised by all the units upon each and by each upon all. Even in masses of substance so rigid as iron and glass, there goes on a molecular rearrangement, slow or rapid according as circumstances facilitate, which ends only when there is a complete balance between the actions of the parts on the whole and the actions of the whole on the parts; the implication being that every change in the form or size of the whole necessitates some redistribution of the parts. And though, in cases like these, there occurs only a polar rearrangement of the molecules, without changes in the molecules themselves; yet where, as often happens, there is a passage from the colloid to the crystalloid state, a change of constitution occurs in the molecules themselves. These truths are not limited to

inorganic matter; they unquestionably hold of organic matter. As certainly as molecules of alum have a form of equilibrium, the octahedron, into which they fall when the temperature of their solvent allows them to aggregate, so certainly must organic molecules of each kind, no matter how complex, have a form of equilibrium in which, when they aggregate, their complex forces are balanced—a form far less rigid and definite, for the reason that they have far less definite polarities, are far more unstable, and have their tendencies more easily modified by environing conditions. Equally certain is it that the special molecules having a special organic structure as their form of equilibrium, must be reacted upon by the total forces of this organic structure; and that, if environing actions lead to any change in this organic structure, these special molecules, or physiological units, subject to a changed distribution of the total forces acting upon them, will undergo modification—modification which their extreme plasticity will render easy. By this action and reaction I conceive the physiological units peculiar to each kind of organism to have been moulded along with the organism itself.

"Setting out with the stage in which protein, in minute aggregates, took on those simplest differentiations which fitted it for differently-conditioned parts of its medium, there must have unceasingly gone on perpetual readjustments of balance between aggregates and their units—actions and reactions of the two, in which the units tended ever to establish the typical form produced by actions and reactions in all antecedent generations, while the aggregate, if changed in form by change of surrounding conditions, tended ever to impress on the units a corresponding change of polarity, causing them in the next generation to reproduce the changed form—their new form of equilibrium."

This paragraph is difficult to deal with. The first two sentences take up the subject at a stage at which we have not yet arrived. Then Mr. Spencer states: "This conception is clearly representable in terms of the mechanical hypothesis." He then argues from the rearrangement of molecules in correspondence to changes of mass—which we may safely assume to be correct—a corresponding change in the organic molecules of an organic aggregate. But it

must be borne in mind that we have not yet got an organic aggregate beyond the atom of sulphur or phosphorus and protein. And if we assume a mass of these smaller aggregates, we may assume some change of its constituents to take place, in accordance with pressure, cutting, heating, freezing, passage of light, electricity, &c., in the same manner as the molecules of a bar of gold might be modified by pressure, cutting a piece off the end of it, heating, and the like. Perhaps the changes would be greater in the former case, on account of the greater complexity of the molecules, but as it would be an unorganised mass, the changes would only be in degree and not in kind. Mr. Spencer, however, denies this. He says they "have their tendencies more easily modified by environing conditions." Here we have the importation of a new term, "tendencies." The only tendency of an atomic motion is to go on, or to combine its motion with another atom moving at a harmonious rate. The only tendency (a term applicable only to the motions, and not to the shapes and sizes of atoms and molecules) of the motion of a molecule is to go on or to unite with other molecules of agreeable motions. The modification of a tendency of an atom or a molecule is to increase or decrease their rates of motion. This can be done by heat perhaps, and perhaps in some other ways, but it is rather a doubtful sort of expression to say that the tendency of their motion is changed. What is the meaning of the word "tendency"? Does it apply to organised experience, and therefore a biological term, or is it a mechanical term? If so, it is only another expression for the continuity of motion.

The rest of the argument proceeds to discuss the relations of an organism to its molecules. "By this action and reaction I conceive the physiological units peculiar to

each kind of organism to have been moulded along with the organism itself."

Before we have got an organism it is premature to discuss this question. If we have an organism, or set of organisms, already in existence—the whole question, in fact, begged — we can then discuss the interaction of organism and its physiological units, but not till then. At the same time it seems extremely difficult to me, and I am sure it will be to others, to imagine an organism without sensibility and consciousness—to imagine an organism which goes on through all its changes of birth, growth, reproduction, decay, in a manner which could be represented by wheels revolving or pulsating molecules, &c. But if sensibility and consciousness be added, how are they to be expressed in terms of shape or size or rates of motion, which are the only factors recognised in the formula?

Mr. Spencer says more—viz., "in which the units tended ever to establish the typical form produced by actions and reactions in all antecedent generations." He looks at the matter persistently from this side of creation, not the other. Why did the units tend to establish anything? Why to establish a type? Do actions and reactions of inorganic substances tend to the establishment of any type of movement? Does the pendulum acquire a tendency to wag, or the striker to strike, or the spring to wind itself up or down? But the "antecedent generations" places Mr. Spencer's argument as applicable to concerns much later than the commencement of the propagation of life by generation. How did the first tendency arise? Was it other than a mechanical tendency or motion to go on or to unite with harmonious motions? The only tendency of matter in motion is inertia. The only tendency of shapes and sizes is to retain the shapes and sizes. The

only tendency of motion is to go on moving at the same rate.

And what is the meaning of the word "impress" in the passage, "tended ever to impress on units a corresponding degree of polarity"? What is the polarity of an unit? What are the degrees of polarity? what are the changes denoted by changes of polarity? and how does one unit *impress* another? Or even granting an organism (which we have not yet arrived at), how does that organism *impress* any unit? How are all these things to be expressed in terms of matter and motion?

"Setting out," &c. Here protein aggregates take on differentiations which fit them for different mediums, that is to say, a pentatomic or hexatomic atom of sulphur or phosphorus, being on a flat surface, in an angle, or in a corner, or two together, &c., would only be able to group the protein in special shapes, for different mediums would contain different mineral substances, which might be aggregated with the protein molecules; and if the mediums changed, so would the aggregated molecule, in shape, in size, in composition. Change in motion would be, in all probability, change of molecular construction. But what is there in this beyond the changes that would take place in like manner in the inorganic?

The rest of the argument it would not be fruitful to follow, as it falls under the general criticism, and the first step, found to be insurmountable, precludes the rest.

To some such criticism as the foregoing I presume Mr. Spencer undertakes a reply towards the end of his letter, p. 491:—

"I have repeatedly and emphatically asserted that our conceptions of matter and motion are but symbols of an unknowable reality; that this reality cannot be that which we sym-

bolise it to be; and that, as manifested beyond consciousness under the forms of matter and motion, it is the same as that which, in consciousness, is manifested as feeling and thought."

Reading it in this way, then, the integration of matter and the dissipation of motion is what? The integration of one symbolic conception and the dissipation of another symbolic conception.* Or is it the integration of that which is symbolised and conceived of symbolically, and the dissipation of something which is symbolised and conceived of symbolically? And this something is unknown and unknowable. Then manifestly the formula of Evolution, which is the formula of a philosophy which was to account for the history of every existence from its emergence from the imperceptible to the perceptible, is Ignorance. It would seem, in ordinary language, to mean that the integration of matter meant the approach together and combination of movement of ultimate units, atoms, molecules, masses, to be described geometrically and arithmetically, and that the dissipation of motion was the transference from one bit of matter to another of its rate of motion, by which their measurable rates were mutually increased and diminished, and on this supposition we have discovered an intelligible but insufficient theory. But if by matter we mean we don't know what, and by motion we don't know what, but certainly not the matter and motion that we have been discussing, then we have a theory which may be sufficient, but is utterly unintelligible. The formula which was to penetrate and show the organic connection of all sequences is a formula with two blanks in it. It is the integration of x and the dissipation of y.

* Are not integration and dissipation themselves symbolic conceptions too? If so, then to translate the formula of Evolution into exact language would make it a most abstruse enigma.

Our hopeful primal ignorance ends in the certainty of it cloaked in a specious intelligibility.

An Endeavour to make the Reader understand the Meaning of a Formula describing all Phenomena in terms of Matter in Motion.

In order to assist those who are unacquainted with the subject, I have printed a diagram illustrative of the theory of Evolution. The representation is in the form of two cones connected at the apex. The upper one represents the unknowable, the absolute, the first cause which Mr. Spencer treats of in his first book; the lower one represents the knowable. The only manifestation of absolute force, or first cause, or of the unknowable, is as the antecedent or cause of matter in motion. Once constitute matter in motion, then from the indestructibility of matter and the continuity of motion, everything else follows, and the first cause, absolute force, or whatever you like to call it, is done with altogether. There is no connection between the cone, so to speak, of the unknowable and the cone of the knowable except at the apex, and the apex is matter in motion and the formula of Evolution—namely, the redistributions of matter in motion. There are no outside lines of connection or influence. The materials for evolution once constituted, evolution proceeds and dissolution succeeds in enormous but interminable cycles in the future, and so far from our being in a first era of evolution, there may have already preceded us an eternity of enormous rhythms of evolution and dissolution; so that between the apex of the upper cone and the apex of the lower cone there may be placed as many of these courses of alternate eras of evolution and dissolution as any one

may fancy, each of them taking millions or billions of years to complete its rhythm. But—and this is the most important thing to understand—within the lower cone, and in all preceding and succeeding cones, there is nothing but matter in motion, rates of motion, shapes, sizes, and combinations and recombinations of these—matter in motion to start with, matter in motion all through.

I will now endeavour to correct an erroneous view of Evolution which is sometimes entertained, or which leads to its being viewed in a favourable light. It is that view of it which understands it simply as a generalisation of the modes of force. This view seems to recognise bodies as having properties, and almost recognises different kinds of forces. Thus the properties of bodies, such as specific gravity, chemical affinities, thermic relations, &c., are supposed to be inherent, and forces are sometimes spoken of as being entities with qualities of their own, such as magnetism, electricity, &c. But such notions are utterly out of place in connection with any theory of Evolution, for these properties of bodies are only modes of motion, and these forces are only modes of motion, all of them having to be accounted for by Evolution. Some seem to accept the nebulous condition as the starting-point, but such a point is an arbitrary one, just as much as any later point that others might wish to start from, and those who do so are Developmentalists, and not Evolutionists. Thus Dr. Drysdale, who takes such a decided stand as an Evolutionist, holds an imperfect theory, in that he believes in the inherent properties of matter, and only allows force = motion an influence in relation to these properties; not allowing, apparently, that these properties are only rates and directions of motion, and having a previous history of their combinations. I derive this from his work

on the "Protoplasmic Theory of Life," page 216. He says :—

"Throughout the world of variety of chemical compounds, in no case is mere force, or 'that which is expended in the production of motion,' the determining cause of any form, shape, or specific affinity. I may conclude by illustrating, with the diagram formerly given, the above views of the subordinate nature of force in the development of the secondary properties of matter, and its dependence upon the determining powers of the inherent properties of matter in all cases :—

The properties of matter according to its kind	Force, in all its forms, probably
=	=
Determining powers	Motion

Action or work."

The necessity for keeping in view this so-called "radical distinction between property and force" is corroborated by quotations from Mr. James Croll and from Professor Tyndall, the latter to the effect that "energy is conditioned by its atomic machinery." Whether Dr. Drysdale has changed his views or not since 1874 I do not know, but it seems to me that many others besides himself think that it suffices to start from a nebula composed as described to constitute an all-comprehensive philosophy. But any one starting from that, as any one starting from the commencement of life or any other arbitrary point, is a Developmentalist and not an Evolutionist.

I would strenuously impress upon every one wishing properly to understand the formula of Evolution that there is nothing in the universe but matter, *i.e.*, extension in various rates of motion and combinations of motion. There is no light, no colour, no hot or cold, no smell or flavour, only rates of vibration of ether or molecules. I don't

know how far I may go in saying what there is not, without getting into an entanglement; but of this we may be quite certain, that there is nothing but matter in motion, and all qualities and properties of matter are merely differentiations of shapes or sizes, and differentiations of rates and directions of motion, and the complex combinations of these. What we call them are the names of our modes of consciousness of them.

Conclusion of the Argument.

My task so far has been to show that both from the formula and definitions, as well as from the explanation of evolution and dissolution furnished by Mr. Spencer, the philosophy is simply and purely one of the combination and recombination of ultimate units, having equal mutual motions of attraction and repulsion. The first compound is, say, into atoms, the next into molecules, the next into liquid and solid states and molar motion, the next into organic and various complications. But the great point to bear in mind is, that there is nothing imported into the problem at any stage but what was there at the first. All that we have at the first is matter in motion, and that is all that we have at the last. Now, passing over certain primary difficulties already sufficiently discussed, viz., the law of gravitation, the distribution and permanence of the elements, all of which might possibly be explained, what we are bound to assert from the postulate is, that the only differentiations of which matter in motion is capable are size and shape, and different rates, and, perhaps, directions of motion. Therefore, all the combinations and recombinations of units are capable of being expressed in terms of shape, size, and rates and

directions of motion; that is to say, in terms of geometry and arithmetic.

Can this be done? And the question I propose is not one that might have been proposed with regard to the science of astronomy after the laws of sidereal and planetary motion had been discovered. The answer to such a question would have been: Yes, it is only a matter of time and labour; we can see clearly that the task is possible. My question is, Is it possible in this case? Can we express protoplasm in terms of size and shape, and rates and directions of motion? Can we express genesis and adaptation and heredity in terms of matter in motion? Can we describe organism in such a way? Can we explain emotion, thought, and consciousness in terms of matter in motion? On the Evolution theory we are bound to do so. The charge against it is that it is merely a mechanical theory; and though I did not think so at first, I find on examination that, notwithstanding the disclaimers of Book I., and the use of the mysterious terms "force" and "forces" in Book II., it really is so; and being so, the constitution of the universe, including life, organisms, consciousness, thought, emotion, ought to be capable of mechanical expression; it only requires time and study to work it out.

But I maintain that this cannot be done, and until it is done we cannot allow Evolution to take rank as an exhaustive theory of the universe, whatever merits it may otherwise possess.

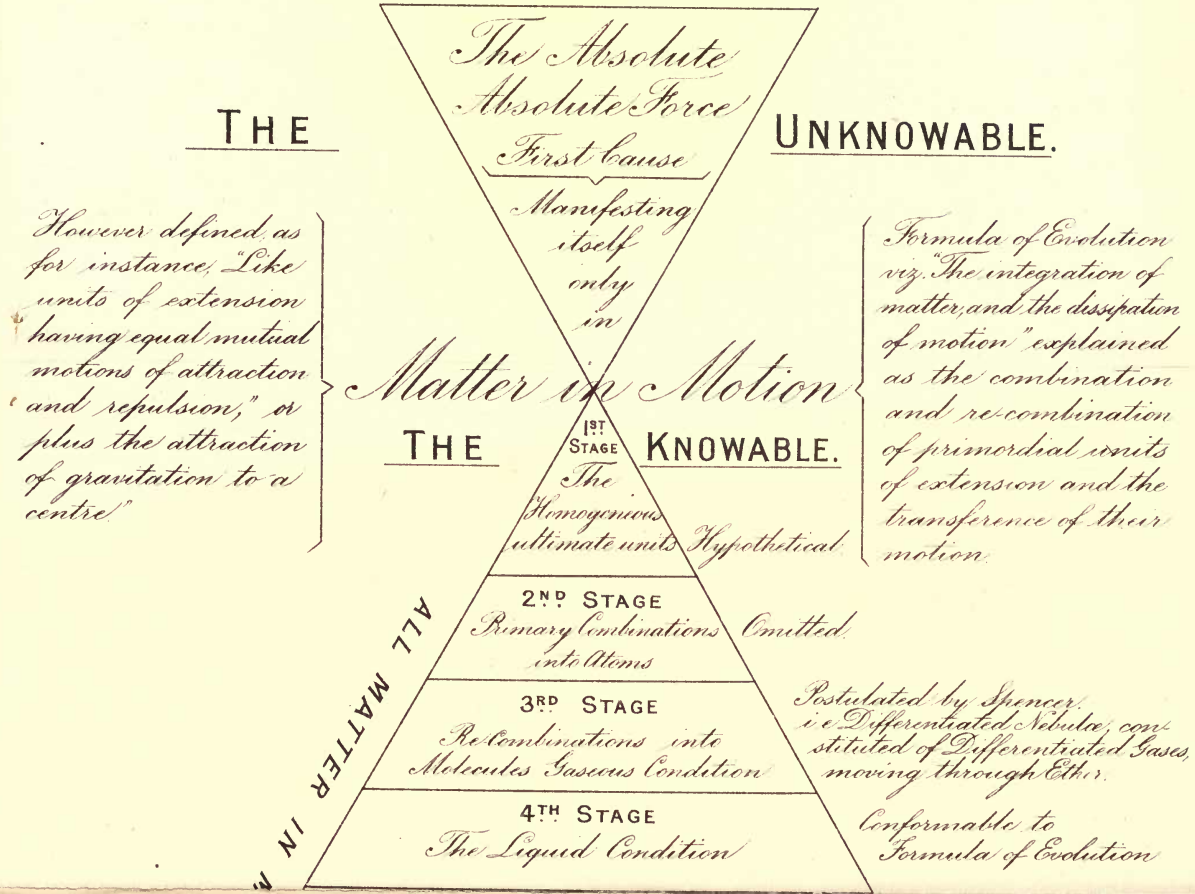
To conclude, the summary of the criticism is this: that since Evolution is not able to apply its laws to an explanation of the origin and continuance of the seventy or eighty so-called elements, and since Evolution is not able to express life, heredity, adaptation, growth, consciousness,

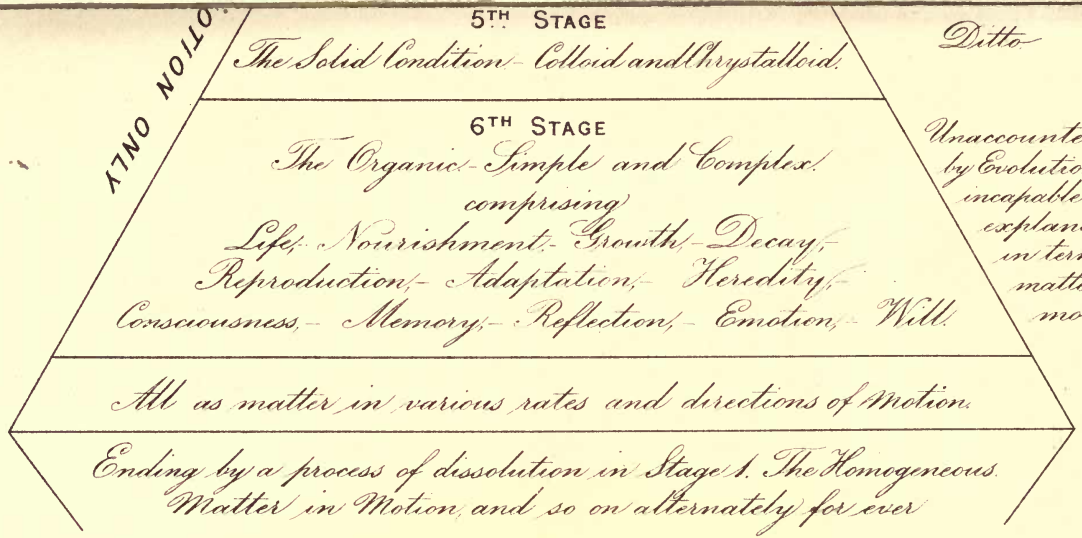
thought, and emotion in terms of matter in motion, in so far it fails as an exhaustive theory of the universe.

I am aware that Mr. Spencer would repudiate this criticism as unfair, on the ground that the position I assign him is too mechanical and materialistic—a position which he repudiates in the letter from which I have already so largely quoted.

He says, "The common uses of the words 'mechanical' and 'mechanist' are such as inevitably call up in all minds the notions of visible masses of matter acting on one another by measurable forces and producing sensible motions." His remarks in continuance show the inadequacy of such notions, for science now recognises motions of matter which are not sensible nor measurable, and producing motions which are not sensible nor measurable. But we must note that they are not insensible nor immeasurable on account of difference of nature, but on account of our incompetency. However much removed from our recognition and manipulation of them by reason of their minuteness, matter is matter still, and motion is motion; and if within our reach, there is not the minutest of either of them that could not be described in terms of geometry and arithmetic. If this is not materialistic I do not know what is. but this charge and its repudiation I deal with elsewhere.

Diagram illustrating the Formula of Evolution.




MOTION ONLY
5TH STAGE
The Solid Condition - Colloid and Chrystalloid.
Ditto
6TH STAGE
The Organic - Simple and Complex.
comprising
Life, - Nourishment, - Growth, - Decay, -
Reproduction, - Adaptation, - Heredity, -
Consciousness, - Memory, - Reflection, - Emotion, - Will.
Unaccounted for by Evolution and incapable of explanation in terms of matter in motion
All as matter in various rates and directions of Motion.
Ending by a process of dissolution in Stage 1. The Homogeneous.
Matter in Motion, and so on alternately for ever

PART III.

AN INQUIRY AS TO THE INTELLIGIBILITY AND SUFFICIENCY OF MR. SPENCER'S FORMULA, WITH THE INCLUSION OF THE TERM "FORCE."

It will have been observed that in the preceding part of this criticism I have employed the term "matter in motion," and have avoided the use of the word "force," although it appears so prominently in the pages of Mr. Spencer's work. This has not been accidental, but by design, indicating as it does one of my main criticisms of Mr. Spencer.

I can logically take up one of two positions. The first recognises matter, whose properties are merely those of extension, which are capable of being described in terms of geometry and arithmetic. I can also recognise as the sole active properties of matter its modes and rates of motion —the motion, that is to say, of ultimate units, atoms, molecules, or masses, also capable of measurement.

The second position recognises matter and its activity or activities—matter as endowed with force or forces.

Let us consider the second position first. If we merely recognise the activity or activities of matter, we adopt a term which is comprehensive enough, but is not in the least explanatory or unificatory. For what does it mean? Does it mean that matter has any other kind of activity than is exhibited in motion, or that there is any other kind of motion or activity of matter than that which is capable

of communication by impact or contact, or otherwise according to the laws of mechanics? If by the activity of matter is meant no more than this, then we have an explanation which, if correct, unifies all phenomena and renders them all intelligible. But if we only mean the recognition that all changes are the activity of matter, we merely apply a word that covers or includes all those changes in a general term, but affords no explanation or constructive unification.

And if we speak of matter as endowed with forces, we are in the same position. We recognise differentiated forces, but fail of unification. And if we recognise, as Dr. Drysdale recognises, matter endowed with properties which are put in motion by force, we lose ourselves in mysticism. And, in fact, in either of these two latter cases, we do not know what we mean when we talk of forces, or of matter having properties set in motion by force. But the researches of the last quarter of a century have identified all forces, and we have the doctrine of the correlation of forces, and the corollary of the conservation of energy or the persistence of force.

Mr. Spencer, accepting the modern doctrine of the conservation of energy or the persistence of force, apparently unifies forces into one force; but what I want to know is, does he mean more than this, viz., that matter which is composed of space-occupying units, having shape and measurement, has any other active property than that of motion, capable also of being measured, and capable also of being augmented or diminished by transference to or from other matter, and of entering into relations according to shape, size, and modes and rates of motion, with other matter, thus forming atoms, molecules, and masses in cosmical relations?

If by "force" this is what is meant, viz., the motion of matter, I can understand it; if more than this is meant, I do not understand it. Can Mr. Spencer express it in a mathematical formula or not?

For information on this subject I referred to Magnus' "Elementary Mechanics," and I find that

$$s = t\,v$$

is the fundamental proposition of uniform motion.

Also that

$$v = t\,f$$

is the algebraical expression of uniform acceleration of motion.

In dynamics I find that

$$P = M\,\rho$$

as the fundamental equation of Dynamics,

$$F = M\,\frac{d\,v}{d\,t}$$

But these all relate to aggregated bodies and presume the law of gravitation. They refer simply to matter and motion.

It may be said that Mr. Spencer assigns force as the unknown and unknowable cause of matter and motion. If so, it is equal to its results, and we can judge of it and measure it by its results, and we need only deal with its resultants.

Having disposed of forces—*i.e.*, differentiated permanent forces as all resolvable into force—we call it the unknown and unknowable. Does this mean that it is in its origin unknown and unknowable, or that it is now to us unknown and unknowable? If the former, we agree at once. The origin of matter and force is unknowable. If the latter, then there are two or three matters to discuss.

Force is known only by its manifestations. Its manifestations are matter in motion. Has it any other manifestations? Is it an ever-present cause or a primal cause only?

If a primal cause only, then, when it has once constituted the mass of primordial units, and endowed them with motion, and perhaps gravitation, it is done with, and can be relegated to Book I. on the unknowable, and dismissed from philosophy altogether, which is complete without it.

But if an ever-present cause, then, if it is an augmenting or diminishing cause, either of matter or of the motion of matter, philosophy is impossible unless it is in uniform or rhythmical rate of increase or diminution. But if, as an ever-present cause, it increases or diminishes irregularly, or endows matter or motion with properties that are not measurable, then also philosophy is impossible. And if there be a law of increase or diminution, and this law is unknown or unknowable, then again philosophy is impossible.

But these propositions, I understand, are not admitted by Mr. Spencer, who contends for the uniformity of the quantum of matter and of the quantum of motion, and I do not think he admits of interference of cause in the addition of any other properties to matter or motion.

But if force is an ever-present cause of matter and of the motion of matter, and these are uniform in quantity, and affect one another in their relations of co-existence and sequence only, in accordance with their properties of size, shape, mode, and rate of motion, then the statement that force is the ever-present cause of them limits the operations of force to their manifestations, and though we may still say that we do not know force in itself (what-

ever that means), we do know force, inasmuch as we do know all its manifestations. If it has any others, they do not concern the cosmos, and therefore in a philosophy which is an exhaustive theory of the changes of the cosmos it has no place. A cause is only equal to its effects. If we know the effects, we know the cause. If there is nothing in the effects of force but matter in motion, we know force so far as it is necessary for the purposes of philosophy to know it, and we also know that it thereby becomes a useless term.

If in a philosophy which unifies our knowledge and accounts for all changes in the cosmos we admit the term Force, we can only admit it on a comprehensible definition, in which case its definition takes its place. But if we admit it, and state that it is unknowable, then as a term of an explanation it is sheer nonsense to introduce it, for it would render our explanation and our philosophy altogether vain. All philosophies so far have been

Philosophy = Special Philosophy + the Unknowable.

And the algebraical representation of the Evolution philosophy, if force is unknowable, is

Evolution = $M M^n$, or else Evolution = $M M^n x$.

A philosophy which introduces x, the *unknowable*, into its terms, can scarcely claim to be a complete unification of *knowledge*.

After this preliminary explanation of the grounds of my criticism, it is my task to examine the main course of Mr. Spencer's argument in its exposition in Book II. on the Knowable.

This criticism may appear very curt and summary, and therefore it may seem wanting in due respect to one of our leading thinkers; and my own feelings would dictate

an exhaustive and detailed criticism. But it is obvious that this would require a book almost as large as that which I criticise. Therefore, if I am somewhat summary in my remarks, it will be because I am obliged to be concise.

Of Chapter I.

Philosophy Defined.

I have no objection to this chapter, the summary of which is—

"Knowledge of the lowest kind is ununified knowledge; science is partially unified knowledge; philosophy is completely unified knowledge."

I would merely remark, that since knowledge is not yet commensurate with the totality of the changes of the cosmos, any philosophy must be of a tentative character; and if we would include in it all the past changes which are implied in the present constitution of the cosmos, that application of it must be of a somewhat speculative character.

But if philosophy is only completely unified actual knowledge, it does not mean that it is an unification of all past changes of the cosmos, which, even if knowable, are, as a matter of fact, unknown, and therefore do not form part of the body of knowledge.

At the same time, we must not omit to bear in mind the much more ambitious claim made for philosophy by Mr. Spencer, p. 541—

"A philosophy stands self-convicted of inadequacy if it does not formulate the whole series of changes passed through by every existence in its passage from the imperceptible to the perceptible, and again from the perceptible to the imperceptible. If it begins

its explanations with existences that already have concrete forms, or leaves off while they still retain concrete forms, then manifestly they had preceding histories, or will have succeeding histories, or both, of which no account is given; and as such preceding and succeeding histories are subjects of *possible knowledge*, a philosophy which says nothing about them *falls short of the required unification.*"

Of Chapter II.

The Data of Philosophy.

See p. 157.—"In brief, our postulates are:—An unknowable power; the existence of knowable likenesses and differences among the manifestations of that power; and a resulting segregation of the manifestations into those of subject and object."

Only the two latter data are treated of in this chapter. The first datum, "an unknowable power," is the theme of Book I. Our criticism before expressed is this:—Since philosophy is an unification of the knowable, and the knowable comprises all the manifestations of the unknowable, the datum of 'an unknowable power' simply means the recognition of the unknowability of the force or power which originally set those manifestations going, or which also keeps them going, but in such unchanging relations that neither any supposition as to it being one or the other, or any such supposition at all, adds anything to our knowledge, nor explains anything, nor unifies anything.

Of Chapter III.

Space, Time, Matter, Motion, and Force.

I do not think it essential to the argument to criticise considerable portions of this chapter, though I do not wholly agree with them.

Space I do not regard as an entity, but as merely an abstraction of relations of distance.

In like manner, Time is not an entity, but an abstraction of relations of successions of changes.

Matter, p. 166.—"Hence the necessity we are under of representing to ourselves the ultimate elements of matter as being at once extended and resistent: this being the universal form of our sensible experiences of matter, becomes the form which our conception of it cannot transcend, however minute the fragments which imaginary subdivisions produce."

Motion, p. 168.—"A something that moves; a series of positions occupied in succession; and a group of co-existent positions united in thought with the successive ones—these are the constituents of the idea."

Force.—Force is said to be the ultimate of ultimates. Mr. Lewes defines it as the activity of matter, without promulgating a formula as to the nature of that activity being an unification of all activities. Mr. Spencer posits force as the primordial experience. It is difficult to make out whether he is speaking of the history or genealogy of knowledge, or of the constitution and history of the cosmos. Our experience is the succession of states of consciousness, whether faint or vivid. We have experiences of resistance (matter), and we have experiences of change (motion), and we have experiences of the combinations of matter and the combinations of motion. Need we go beyond this, and say that these are manifestations of something else, and call that something else force? There is nothing gained by doing so; it seems both gratuitous and useless.

He says (p. 169):—

"Thus all other modes of consciousness are derivable from experiences of force; but experiences of force are not derivable from anything else. Indeed, it needs but to remember that consciousness consists of changes to see that the ultimate datum of con-

sciousness must be that of which change is the manifestation; and that thus the force by which we ourselves produce changes, and which serves to symbolise the cause of changes in general, is the final disclosure of analysis."

I do not feel any necessity, for my part, when I recognise changes in my consciousness, to acknowledge the existence of a something of which these changes are a manifestation. I recognise the indestructibility of matter and the continuity of motion, and the uniformity of sequence amongst changes, and am thus led to seek amongst anterior states for the sequence I experience; but I see no necessity for positing a something of which these states and sequences are manifestations. It is useless and unwarranted.

But it is said, "the force by which we ourselves produce changes . . . is the final disclosure of analysis," and "it serves to symbolise the cause of changes in general."

To take the latter clause first, what is predicated is the "cause of changes in general." Are we to consider all changes to be evolution, *i.e.*, the integration of matter and the dissipation of motion, or dissolution, *i.e.*, the disintegration, of matter and the resumption of motion? If so, then all changes are of matter in motion, and the cause looked for is the cause of these changes. But admitting that we look for the cause of any particular change in the state of things immediately preceding that change, and of all changes in the same way, we are thrown back into infinite time and the study of the homogeneous before there was any change if we wish to discover the "cause of changes in general."

As to the force by which we ourselves produce changes serving to *symbolise* this cause of all changes in general, it can only mean either that the experiences of matter and motion which constitute ourselves enables us to under-

stand matter in motion elsewhere, and the nature of their relations; which, considering that we do not yet understand ourselves or the nature of consciousness, I deny. Or it means that the experiences of will and volition we possess symbolise an original will and volition, which is a theory well worthy of consideration; but, as a matter of science, if its only manifestations were constituting matter and setting it in motion, and is a constant and unvarying factor in the universe, it may practically be left out.

Is force objective or subjective? If taken to be the former—and since it is said to have existed anterior to consciousness, it is reasonable to regard it as such—then it can only have been the unknown original or constant present cause of the totality of matter and motion, and is only interpretable in the terms thereof.

If taken to be the latter, how is it to be described? Evidently not in nervous tremors, for those are motions of matter, and truly objective. Is it the consciousness of these nervous tremors? But mere consciousness is not force. Force implies a power applied and a result. Consciousness does not imply activity.

If consciousness is a force, then the question arises, Is it a force that is interchangeable with the physical forces? or is it a force that is not so interchangeable? Do different nervous tremors resulting in correspondent reflex movements, and of which there is a consciousness, receive any modification or influence from this consciousness?

We do not even suggest any reply to these questions.

To consider now the first clause of our quotation. "Thus all other (*i.e.*, than a single impression of force) modes of consciousness are derivable from experiences of force; but experiences of force are not derivable from anything else." Consciousness consists of changes. A mode

of consciousness means a consciousness which differs from some other consciousness. Mr. Spencer says these modes of consciousness are *derivable from* experiences of force. I suppose he means *are* experiences of force. But these experiences of force are not derivable from anything else. Certainly not if they are experiences of force. But he said that consciousness consists of, or is the experience of, changes. Where does Mr. Spencer get his force from? We only recognise changes, and perhaps degrees of change. Surely force is an idea added to the primordial experience of consciousness, and is not the primordial experience.

We next come to the algebraical representation of the subject. If matter and motion are represented by x and y, and force is represented by z, we may ascertain the values of x and y in terms of z, but the value of z can never be found. This looks very exact and scientific, but I would like the operation performed so as to be able to understand it. Does it mean that $x+y=z$? If so, then, if the value of x and y are known, we know the value of z, or it is known so far as it is a factor in the cosmos, and for all practicable purposes, if z is the ultimate of ultimates, $x+y$ are equal to it, and may stand in its room as the ultimate of ultimates.

Mr. Spencer goes on to speak of an undecomposable mode of consciousness. Can any mode of consciousness (the word "mode" seems to me superfluous) be decomposed? There is a consciousness of seeing articles in a room. This may be regarded as a complex consciousness, and may be decomposed into, so to speak, its separate parts. But is each separate part decomposable? I have a consciousness of co-existence, and I have a consciousness of succession. I have a consciousness of change. If I lift an article I have a consciousness of tension of the muscles,

and I have a consciousness of resistance of the floor on which I stand. These are all simple items of experience, and I call them by certain names. The only one I call by the name of force is that of lifting, but muscular tension is no more primordial than taste or the sensation of breathing. Beyond this the idea of force is a growth of varied and multiform experience, and, as used by Mr. Spencer with respect to preconscious existences, is a general term covering the terms "matter" and "motion."

Mr. Spencer adds that all other modes of consciousness may be decomposed into experiences of force. I presume he means experiences of motion, *i.e.*, experiences of nervous shocks and vibrations, and cerebral molecular motion.

But speaking of this undecomposable mode of consciousness, which I presume to be consciousness of force, "cannot be itself the power manifested to us through phenomena has already been proved" (sect. 18).

This means that the *consciousness* cannot be the power which is consciousnessed. Therefore there is a force which produces the changes of matter and motion of which we are conscious. This we have already considered. But what is this consciousness? It cannot be the force or the power cognised. Mr. Spencer, in fact, does not say that it is. But he does not say what it is, nor how included in the formula of Evolution.

Force he describes in very indefinite language, and we reserve the consideration of it till the next portion of our criticism. We must notice here a distinction that is drawn between some "unknown force which is the correlative of the known force." Leaving out the "correlative," I merely draw attention to the phrase "known force." We are studying the book on the Knowable, and I would like to know what is the known force. Is it merely the con-

sciousness of change, or the consciousness of muscular tension, or the consciousness of results of matter in motion, or, stepping outside consciousness, is it matter in motion in relation with matter in motion? Surely a *known force* is capable of definition and description.

Let me now ask a few questions. Does the scope of philosophy include times anterior to and subsequent to the existence of organised and conscious beings?

If so, did force exist before, and will it exist after, such a period? It is to be presumed that there was a time when neither man nor any other sentient being existed.

Now it would simplify matters if we could know the state of affairs under these conditions. Was there anything in the totality of the cosmos but a certain quantum of matter and a certain quantum of motion? If not, then the changes in the cosmos might require a philosophy which would unify the explanation of their changes and account for their differentiations, but it would be a philosophy which would be limited, in terms of its formula, to matter and motion; and if the word "force" were introduced, it would simply be as the unknown original cause, or primarily constant quantity, which kept in existence the quantum of matter and motion.

What was force anterior to consciousness? What will it be subsequent to consciousness?

Force, indeed, seems to have come into existence with consciousness. Is it another name for consciousness? It would really seem to be so—the consciousness, *more or less forcible*, of change.

Page 171.—"An unknown cause of the known effects, likenesses, and differences among these known effects, and a segregation of these effects into subject and object—these are the postulates without which we cannot think."

It is here said that we cannot think without postulating an unknown cause of the known effects which we call phenomena. I do not see that this is essential to thinking. I can recognise phenomena and modes of consciousness, and confine my thinking to their known relations of co-existence and sequence without concerning myself with the unknown cause, which I apprehend Mr. Spencer to place right away in the beginning of things, or else to be a constant unvarying quantity, commensurate with, and behind, as it were, the known, in which latter case it is simply to be ignored.

Of Chapter IV.

The Indestructibility of Matter.

I have to offer no adverse criticism to the theory of the indestructibility of matter. The following questions suggest themselves, however. Does matter exist which has lost all its individual motion? Does matter exist which has lost all gravitation? Is the rotary motion of an ultimate unit a motion or a force? Is the excursive motion of an ultimate unit to be described as a motion or a force? Is the motion of each ultimate unit towards every other unit a motion or a force? And consequently, is the movement of every mass of units towards other masses at rates inversely to the square of their distance to be described as a motion or a force? This is very important.

Is force arrested motion. Is our consciousness of force the consciousness of arrested motion? Is all consciousness the consciousness of arrested motion? Is equilibrium a balance, not of forces, but of motions?

In the further progress of our criticism we are in con-

siderable difficulty from an incapacity to attach any definite meaning to Mr. Spencer's use of the word "force," and to his employment of the term "forces." Since we understand him to limit the manifestations of force to matter and motion, we can only understand him to mean by "force" matter in motion; by "forces," specially recognised modes of matter in motion; and by such terms as "combinations of forces," "special relations of different quantities," as shapes and rates and modes of motion, either etherial, atomical, molecular, molar. Thus interpreted, force is merely a shorthand term of useful application.

Thus, when the piece of gold (p. 178) is found to weigh less, we postulate "that the quantity of matter is finally determinable by the quantity of gravitative force it manifests." Should we not say "by the quantity of arrested motion"?

Page 179.—"Thus, then, by the indestructibility of matter we really mean the indestructibility of the *force* with which matter affects us." I presume matter exists independently of its affecting us, and therefore its definition is independent of the term "force."

Of Chapter V.

The Continuity of Motion.

Page 184.—"Motion can never be lost, but can only be transferred." This is the keynote of the chapter.

In accordance with the foregoing criticism, however, we find much to which we demur. For instance (pp. 187, 188):—"It remains to be pointed out that the continuity of motion, as well as the indestructibility of matter, is really known to us in terms of force." The inquiry naturally

arises, "What are the *terms of force?*" We know the word force, but we do not know what it means, and thus we are referred from the known to the unknown. The terms of motion are the terms of arithmetic and geometry, but force defies all terms.

A consideration of the next chapter, however, will decide our estimation of this one.

Of Chapter VI.

The Persistence of Force.

Page 189.—"What is the force of which we predicate persistence?"

"It is not the force we are immediately conscious of in our own muscular efforts; for this does not persist."

We here come upon the consideration of a most difficult matter, our decision upon which will decide the value of Mr. Spencer's philosophy.

Viewed in accordance with the line of thought hitherto pursued, the remark to be made would be this. We would say that it is not the force we are immediately conscious of, for that does not persist. Therefore, when the human race ceases to exist, and the whole animal and vegetable kingdoms come to an end, the force that would still persist would be a force unrelated to consciousness or feeling. And similarly anterior to vegetable and animal life—*i.e.*, to consciousness or feeling—we have to think of the force that then persisted unrelated to consciousness. What are we to say of it? Only this, that it was a fixed quantity, and that it operated in one of two ways —(1.) That it was the original cause of matter in motion, with perhaps gravitation; (2.) That it was a constant

quantity keeping them going. And also, that since its results are constant in measurable quantities of matter and measurable quantities of motion, these latter are sufficient expression for the state of affairs, without any reference to the unknown cause, force, which is a metempirical phrase to be eliminated from philosophy. It would also seem that since force is a constant quantity, and was fully manifested in matter and motion anterior to feeling, there was none left to manifest itself in feeling except by the transformation of some other of its manifestations, *i.e.*, matter or motion into feeling. Are we to understand that this is intended to be taught? Or are we to conclude that consciousness and force are indissolubly connected, and that effort and muscular tension are also involved, and that before consciousness there was no force?

"I am conscious" is primary. Then we notice differences amongst our consciousnesses, and we are conscious of exerting personal effort and muscular tension. Here consciousness of force comes in, and we are conscious of resistance to our force, and we think of exterior force. But do we not thereby think of it in terms of consciousness, and would it not be, no consciousness no force, whereas matter in motion would still exist and persist? The origin or cause of matter in motion is unknowable, and to this those who are inclined may give the name of force so long as they do not confuse the measurable matter and motion which are its known functions by any vagueness derived from the unknowable.

True, the question may be asked, Are not the motions of gravitation and of attraction and repulsion to be put down to force? You may, so long as you do not use the term in a scientific explanation (for it does not explain any-

thing), but put it separate in the introduction, and confine the treatment of the subject to that which is measurable, and which will afford explanations.

But let us examine Mr. Spencer's argument more in detail. After the example of raising an object from the ground (p. 189), he says: "We are compelled to admit that force, as it exists out of our consciousness, is not force as we know it;" but, "Hence the force of which we assert persistence is that absolute force of which we are indefinitely conscious as the necessary correlate of the force we know."

The argument is this: We are conscious of the exertion of force, therefore there is a correlative force against which we exert ourselves. We call it an absolute force, I suppose, because it exists—*i.e.*, acts—independently of our consciousness of it. This force, in the instance given, is gravitation, which denotes, I suppose, a mode of interrelation of matter in motion stateable in terms of measurement. Other names are given to other modes of interrelation of matter in motion which are also measurable.

But as to the cause. Of the how and the why of these modes of interrelation of matter in motion we know nothing, and so long as these modes are explainable according to the harmonies of shapes and sizes, and of rates and modes of motion, we may safely ignore, from a purely scientific and philosophic point of view, all these questions.

The formula of Evolution is founded on this supposition, and the doctrine of the correlation and transformation of forces implies it.

But if such an explanation is insufficient, then we may perhaps be obliged to recur to force, or even to a will corresponding to that of which we are conscious, to eke out the explanation of the universe. But in this case we do not reach a *definite,* intelligible explanation of the universe

—one by which we could ideally construct it out of the homogeneous.

"Thus, by the persistence of force, we really mean the persistence of some power (*force?*) which transcends our knowledge or conception; . . . that which persists is the unknown cause of these manifestations." The cause unknown *but the results all known*, and therefore no confusion arises, and a formula of philosophy possible; or else the results *not all known*, and a philosophy and universal formula of explanation impossible.

But the tenor of Mr. Spencer's argument is, that a formula of philosophy is possible, and therefore that all the results of the unknowable force are knowable. The unknowable force is thus eliminated from philosophy; and throughout his exposition of evolution and dissolution, when he uses the term "force," it is to be understood as a kind of shorthand term for "matter in motion," for they are the only known functions of the absolute force, and are all stateable in terms of mathematics and geometry.

With this understanding we accept the doctrine of the persistence of force, limiting it, however, to its known functions.

But if we include consciousness in force, and acknowledge it to be one of the interchangeable forces included in the persistence of force, then we shall not be able to recognise an intelligible formula of Evolution.

Of Chapter VII.

The Persistence of Relations amongst Forces.

The persistence of force means, then, the persistence of the functions of force; that is to say, matter in motion.

There is a quantum of matter and a quantum of motion, and however much the motion of some matter is accelerated or retarded, it is only in corresponding retardation or acceleration of the motion of other matter, and the sum of matter is constant. This is the persistence of force.

What are forces? It is to be presumed that, in accordance with harmonies of shape and motion, some matter in motion enters into combination with other matter in motion, forming differentiated aggregates. Is this the meaning of a force or forces? I cannot make anything else out of it.

Is heat a force? It is called by scientists, I believe, "a mode of motion." I believe light, electricity, magnetism, are all called modes of motion. I suppose gravitation also is a mode of motion. The atomic theory would go to show that chemical affinity is due to modes of motion.

In any case, it would scarcely be contended that they are different forces, since it has already been established that there is only one force. Forces, then, can only be a colloquial term, and means differentiated matter in motion, or differentiated modes of motion of matter.

The persistence of relations amongst forces, as thus explained, will be readily admitted. Since the quantum of matter and motion is constant, there is no interfering cause, and the relations of the shapes, sizes, modes, and rates of motion are as constant as $2 + 2 = 4$, and that the three angles of a triangle are equal to two right angles.

Of course, if there is any interference—anything else put into the universe—then the explanations founded upon the persistence of force or of its relations (uniformity of sequence) would not be valid.

The persistence of relations among forces negatives the idea of any other new relations amongst them than

those of size, shape, rate or mode of motion, or of the aggregates of them, since matter and motion are the only functions of force, and the only functions recognised in the formula of Evolution; and thus the persistence of relations amongst forces is hostile to the evolution of any new kind of relation, such as feeling or consciousness, and all the phenomena of biology, psychology, and sociology that are dependent upon the new factor.

Of Chapter VIII.

The Transformation and Equivalence of Forces.

The same question naturally arises in this as in the last chapter — What are forces? I have defined them as differentiated aggregates of matter in motion. With this definition one may accept and understand the doctrine of the interaction, transformation, and equivalence of forces.

As a manifestation of something else as a form or mode of force, the doctrine is incomprehensible, for force itself being unknowable, the interactions of the unknowable must be incomprehensible.

But the difficulty is in the language employed, not in the processes of nature and in their comprehension. If light is turned into electricity, we acknowledge the general fact that matter in motion in one mode has altered its mode of motion, and certain other matter in motion has concomitantly altered its mode of motion, but that the amount of motion remains the same. As, for instance, of two factors a and b, having motion $2m$ and $4m$ respectively, then

$$a\ 2m + b\ 4m = a\ b\ 6m;$$

but if from some causal relationship there be a transference of motion, then

$$a\ 3m + b\ 3m \text{ is still } = a\ b\ 6m$$

and

$$a + b\ 6m = a\ b\ 6m.$$

These are all measurable quantities of matter, *a* and *b*, and measurable quantities of motion, and by their measurement they are known to be equivalent. And how is force known to be equivalent except by measurement, and how is force measurable otherwise than as matter and motion? The only transference is a transference of motion, not of the indefinite something force, but of measurable motion.

If we pass over this chapter somewhat briefly, it is not for want of interest, but that it does not in principle call for remark, interpreting some of the words employed in accordance with the foregoing criticism. Into some of the illustrations given I am not qualified to go, and my main object does not seem to require that I should do so.

That part of the chapter which treats of vital phenomena is the most puzzling, for while we see the dependence of an organism upon the motions—or matter in motion—of its environment, and thus recognise the transformation of matter in motion into other matter in motion, there still appears to be something about the process very peculiar; for instance, that from the same raw material forming the food of men and animals such different results should follow, such different memories, habits, instincts, and in all of them that fact of an entirely different order from the constituents of the food, viz., consciousness.

In carrying on the argument to mentality and to sociology, as Mr. Spencer does in this chapter, it would

appear that an entirely different meaning attaches to the term "force" and "forces" to that which applies to the matter in motion of inorganic bodies due to the considerations previously detailed.

Hitherto we have spoken of force as the unknown cause of the known or knowable functions of matter in motion which are stateable in terms of measurement—*i.e.*, in terms of mathematics and geometry. When we introduce life and the facts of consciousness, of waste and repair, generation, heredity, modifiability, &c., we have phenomena which cannot be thus represented; and if we speak of them as forces, we use that word with an entirely different meaning, although these "forces" may be supposed to be derived from the "forces" of inorganic nature. And although we discern in the activities of organisms and of societies the same characteristics of modes of activity—as, for instance, uniformity of sequence, movement in the line of least resistance, &c.—we accept the facts as items of weighty import; but this acceptance does not blind us to the defect of connection which we have just pointed out. The transformation and equivalence of force admitted is not recognised to be the same as the transformation and equivalence of force as between heat and gravitation; and even if it is admitted, it is so with a plus, which plus would seem to be a plus of a different kind to shape, size, mode or rate of motion, of a different nature to the changes by which all the other "forces" are accountable.

With regard to this Mr. Spencer states (p. 217):—

"How this metamorphosis takes place, how a force existing as motion, heat, or light can become a mode of consciousness, how it is possible for aerial vibrations to generate the sensation we call sound, or for the forces liberated by chemical changes in the brain to give rise to emotion, these are mysteries which it is

impossible to fathom. But they are not profounder mysteries than the transformations of the physical forces into each other."

Really this is most puzzling. We are given a formula which shall account for all changes, and we are now brought to a change which cannot be accounted for—a mystery! The very end and object of our studies brought to nought, and even the transformations of the "physical forces"—viz., aggregates of matter in motion—into each other, which we thought had been theoretically explained as the harmonies of shape and size, mode and rate of motion, are pronounced mysteries equally profound!

The philosophy which explains everything by a formula says of these questions (p. 218):—

"They have simply the same insolubility as all other ultimate questions. We can learn nothing more than that here is one of the uniformities in the order of phenomena."

Philosophy, or an intelligible formula that from the homogeneous shall enable us ideally to construct all the changes of the universe, appears, then, to be impossible.

Of Chapter IX.

The Direction of Motion.

In this chapter Mr. Spencer seems to be starting *de novo*. Sections 74 and 75 take us to the beginning of things and the ultimate constitution of the universe. For criticisms upon them I refer to the second part of this examination.

The key to the chapter is the last paragraph of sect. 75.

"As a step towards unification of knowledge, we have now to trace these general laws throughout the various orders of change which the cosmos exhibits. We have to note how every motion takes place along the line of greatest traction, of least resistance,

or of their resultant; how the setting up of motion along a certain line becomes a cause of its continuance along that line; how, nevertheless, change of relations to external forces always renders this line indirect; and how the degree of its indirectness increases with every addition to the number of influences at work."

With the reservation that no account has been given of the origin of the organic or of organism, of consciousness or mind, there is no objection to the application of the proposition to the motions of life and sociology, although some very nice questions as to individual volitions might arise; as, for instance, when the choice lay in the direction of the greatest resistance.

Of Chapter X.

The Rhythm of Motion.

To me a novel doctrine, and beautifully explained. I, however, understand "force" to be a shorthand expression for aggregates of matter in motion.

Of Chapter XI.

Recapitulation, Criticism, and Recommencement.

"Sect. 92. To resume, then, we have now to seek a law of composition of phenomena, co-extensive with those laws of their components set forth in the foregoing chapters. Having seen that matter is indestructible, motion continuous, and force persistent—having seen that forces are everywhere undergoing transformation, and that motion, always following the line of least resistance, is invariably rhythmic—it remains to discover the similarly invariable formula expressing the combined consequences of the actions thus separately formulated."

Page 277.—"The law we seek, therefore, must be the law of *the continuous redistribution of matter and motion.* . . . The question to be answered is, What dynamic principle, true of the metamorphosis as a whole and in its details, expresses these ever-changing relations?"

Here I notice a great obscurity, due to a change in the terms. *The law we seek,* must be the law of the continuous redistribution of matter and motion. Waiving any criticism of the word "law," and accepting it as an expression of uniformity of action, we read the sentence thus:—"The formula we seek must express the continuous redistribution of matter and motion." We notice that we do not aim at seeking the cause or origin of matter and motion, nor the cause of gravitation, nor a constructive formula starting with them, but only a formula or sentence that will cover the description of the changes of the universe, from a state of homogeneity or of less heterogeneity to the state as we see it now.

But the object is restated and changed when it is said that "the question to be answered is, What *dynamic principle* . . . expresses these ever-changing relations?" What is a dynamic principle? and does it ever express anything? I must state that, after the closest consideration and best endeavours to understand what a "dynamic principle" is, I am utterly unable to form the least notion.

I must, therefore, fall back upon that which I can understand by "the continuous redistribution of matter and motion." Having thus realised the object, I hold it over for a few chapters, when I will recur to it, to see how that object has been attained.

Of Chapter XII.

Evolution and Dissolution.

The first paragraph is to the uninitiated a very great puzzle indeed. I do not know whether to put it down to intrinsic faultiness of statement or to my own incapacity. But I do not think that any ordinary reader of good intelligence would be able to make anything out of it, and one would suppose that a book should be written so as to be understood by such an one.

Let us go into detail. Mr. Spencer says:—"An entire history of anything must include its appearance out of the imperceptible and its disappearance into the imperceptible." This implies a percipient, and renders the history of anything dependent upon the existence of a percipient. But it is evident that the changes of matter in motion are not dependent upon a percipient. Mr. Spencer is conscious of this difficulty, and says:—"Unless on the assumption that it acquired a sensible form at the moment of perception, and lost its sensible form the moment after perception, it must have had an antecedent existence under this sensible form, and will have a subsequent existence under this sensible form. These preceding and succeeding existences under sensible forms are possible subjects of knowledge; and knowledge has obviously not reached its limits until it has united the past, present, and future histories into a whole."

The question then arises, What is a sensible form existent apart from perception? This is important as a necessary demarcation of the limits of investigation. All sensible forms that we know are formed of matter and motion—all their properties are sizes, shapes, and motions. Are we, then, to conclude that every combination of matter and

motion is a sensible form, or only such of them as could be sensible if there were the human perceptions to perceive them, ignoring all others? This latter would seem imperfect, as different men and races have different ranges of perception, and some individuals of the race have no perception of light, colour, or sound, and yet the sensible forms of which they are ignorant exist to others, and are a subject of possible knowledge. We, therefore, seem forced to assign as the scope of all possible knowledge the range of all past and future changes of matter and motion, quite irrespective of the limitations of perceptibility and sensible forms.

In the second sentence of the section Mr. Spencer speaks of "a concrete form." What is a concrete form? Is not a concrete form the combination of position and motion of two ultimate units having definite motions into an atom differentiated from the ultimate units and from other combinations thereof? If not, then what are the limits and what is the meaning of "concrete forms"? But if so, then "be it a single object or the whole universe, any account which begins with it in a concrete form or leaves off with it in a concrete form is incomplete, since there remains an era of its knowable existence undescribed and unexplained."

But we have again a reference to the unknowable and to Being conditioned so as to act on our senses, and the question is put, How came it thus conditioned? and how will it cease to be thus conditioned?

Now, it will be acknowledged at once that the unknowable has no meaning, and we proceed to inquire as to the meaning of Being so conditioned as to act on our senses. We want to know what Being is? what is meant by it being conditioned? and how it was done? These, perhaps,

seem severe questions. In framing an answer to them in my own mind, I understand being to be undifferentiated matter in motion. I take conditioned to be the differentiation; and as to how it was done, I suppose by gravitation, or the motion of every unit towards every other unit or to its neighbouring unit. Beyond that one cannot go.

But Mr. Spencer says "so conditioned as to act on our senses." This seems to me to be putting the cart before the horse. I presume the conditioning was done long before the senses were formed. The question rather is, How came the senses to be conditioned? How came we to be conscious of the perceptible and of sensible forms?

Moreover, if the scope of philosophy is independent of perceptibility, it is independent of the limitations of concrete forms, and is bound to account for all changes from the homogeneous.

We now approach the formula which shall consolidate philosophy, and gain an idea as to what that formula shall relate; and on perusing sect. 94 the reader will see that it relates to matter and motion only.

"Sect. 94. Already in the foregoing paragraphs the outline of such a formula is foreshadowed. Already in recognising the fact that science, tracing back the genealogies of various objects, finds their components were once in diffused states, and pursuing their histories forwards, finds diffused states will be again assumed by them, we have recognised the fact that the formula must be one comprehending the two opposite processes of concentration and diffusion; and already, in thus describing the general nature of the formula, we have approached a specific expression of it. The change from a diffused imperceptible state to a concentrated perceptible state is an integration of matter and concomitant dissipation of motion; and the change from a concentrated perceptible state to a diffused imperceptible state is an absorption of motion and concomitant disintegration of matter. These are truisms. Constituent parts cannot aggregate without

losing some of their relative motion; and they cannot separate without more relative motion being given to them. We are not concerned here with any motion which the components of a mass have with respect to other masses; we are concerned only with the motion they have with respect to one another. Confining our attention to this internal motion, and to the matter possessing it, the axiom which we have to recognise is that a progressing consolidation involves a decrease of internal motion, and that increase of internal motion involves a progressing unconsolidation.

"When taken together, the two opposite processes thus formulated constitute the history of every sensible existence under its simplest form. Loss of motion and consequent integration, eventually followed by gain of motion and consequent disintegration—see here a statement comprehensive of the entire series of changes passed through: comprehensive in an extremely general way, as any statement which holds of sensible existences at large must be, but still comprehensive in the sense that all the changes gone through fall within it. This will probably be thought too sweeping an assertion, but we shall quickly find it justified."

Sect. 97 should be read carefully. It contains a definition and explanation of the use and meaning of the words "evolution" and "dissolution." Mr. Spencer specifies what he does mean and what he does not mean in the use of them. Thus, throwing aside all other meanings, the signification he attaches to the word "evolution" is the integration of matter and the concomitant dissipation of motion. It will be noted that the word "force" does not occur in the definition.

But after all the care expended in the definition of evolution and dissolution, it is all vitiated by the concluding paragraph.

"While, then, we shall by dissolution everywhere mean the process tacitly implied in its ordinary meaning—the absorption (transference ?) of motion and the disintegration

of matter; we shall everywhere mean by evolution the process which is always an integration of matter and dissipation of motion, but which, as we shall see, is in most cases much more than this."

The confusion is caused by the last few words. What evolution was defined to be is then not complete; it is in most cases much more than what it was said to be. Surely a curious definition this. The antithesis of dissolution, after all, is not perfect. Dissolution is dissipation of matter and transference of motion, but evolution is something more than the opposite process. And as a matter of fact, it will be found that in the process of dissolution as described by Mr. Spencer he keeps pretty well to his limitations of the words "matter and motion," and in the few cases in which he uses the word "force," it might easily be substituted by the words "matter in motion;" whereas in his description of the processes of evolution there is a constant recurrence to that occult word, which, represented by the symbol x, stands for anything the reader likes to fancy.

Dissolution then is—

$$m^{2\,m}\ m^{m}\ m^{4\,m}\ m^{m} \text{ changing into } \begin{cases} m^{m}\ m^{m}\ m^{m}\ m^{m} \\ m^{m}\ m^{m}\ m^{m}\ m^{m} \end{cases}$$

Evolution is—

$$\left.\begin{matrix} m^{m}\ m^{m}\ m^{m}\ m^{m} \\ m^{m}\ m^{m}\ m^{m}\ m^{m} \end{matrix}\right\} \text{ changing into } \begin{cases} m^{2\,m}\ m^{m}\ m^{4\,m}\ m^{m} \\ \qquad\qquad + \mathrm{F} \end{cases}$$

In this representation m stands for matter, the small m for motion, and the numerals for quantities of motion. F symbolises force, and it would be better if Mr. Spencer had used it instead of the whole word throughout his exposition, as it would more correctly represent the indefinite character of its value.

In sect. 105, however, I find that Mr. Spencer recurs to

this "something more," and the something more that he refers to is compound evolution, which is technically nothing more than varied relations of matter in motion.

Of Chapter XIII.

Simple and Compound Evolution.

This is a very important chapter, and requires very careful study. I do not know that we can object to the description of compound evolution by means of secondary changes in the process of concentration and dissipation.

Sect. 103, however, should be well examined. It relates to organic matter, *i.e.*, protein, of which the distinctive peculiarity "consists in the combination of matter into a form embodying an enormous amount of motion at the same time that it has a great degree of concentration."

This, in the first place, does not conform to the expressed law of evolution, which is the concentration of matter and the concomitant dissipation of motion, but as it recognises merely changes of matter in motion, we are willing to accept it without objection.

But what is the meaning of "motion locked up"? Of course it cannot mean motion not going on. That would be a flat contradiction; just the same as speaking of a thing whose existence is suspended. It would have gone out of existence, but it is ready to come into existence again. It means, I suppose, that there is a great amount of molecular or atomic motion actually *going on* in the interior of the mass, or even in the interior of the molecule, which does not affect the relation of the mass or the molecule with its environment.

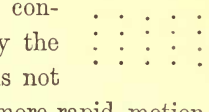
Page 298.—"Hence, as the characters of elements, though

disguised, cannot be absolutely lost in combinations, it is to be inferred that the protein molecule concentrates a comparatively large amount of motion in a small space."

The characters of the elements are shapes, sizes, modes and rates of motion. When they enter into combinations with others, the result is change of motion. Is this what is meant by "disguised"? The motion in any case is certainly not lost, but the inference is, therefore, not that it is still there unchanged, but disguised so that it cannot be perceived; but that it has been transferred or compounded, and is a factor with others in a resultant motion.

We have here the curious and new notion of a concentration of motion. We have heard hitherto of a concentration of matter: the concentration of motion is new. It means, I suppose, that if these dots represent molecules moving in the limits of the space assigned, that

by some means these limits might be reduced as under; only the law of Evolution, that the concentration of matter is accompanied by the dissipation or transference of motion, is not



complied with in this case, but that a more rapid motion through the smaller spaces is set up instead, and thus motion may be said to be concentrated. I do not know whether this is justifiable or not, but since it introduces no new factor, I am willing to admit that it may be so: at the same time it seems to me that as the properties of an atom or molecule, beyond its mere shape and size, consist only in the speciality of its motions, that if these are changed it ceases to be what it was. However, there may be intricacies of relationship of matter in motion which we are as yet unable to explain.

What is the meaning of nitrogeneous compounds ab-

sorbing heat? Does it mean that the molecules move more quickly, or that the interstitial ether moves more rapidly, or that there is an increase in the quantity of it? Of course, in any case, the absorption of heat must mean the increase of motion of something. Mr. Spencer calls it "insensible motion in a free state—the motion we call heat." Does "motion in a free state" mean motion not of matter? If so, how can that be? In any case, whether sensible or not, it must be motion of something, and that something in relation to environment, even if only to intermolecular environment.

Mr. Spencer, in this chapter, does not attempt to account for the organic or for organism; and as I have already criticised the attempt that he does make elsewhere, it is not necessary for me to dwell upon this matter. The argument drawn from the comparative bulk of the constituents of the human body, if free and uncombined, when compared with their bulk in combination, is obscure as to the inferences to be drawn, and even if we admit the inference drawn by Mr. Spencer, which is not unwarranted —very reasonable, in fact—we may do so on the safe ground of the relationships of matter in motion, though their organisation remains unexplained. But there is a plus, an unknown factor, which has entered into the process. So in the continuation of the argument into organic development, after this plus or unknown factor has made its appearance, the argument, allowing for this plus, still holds good in the formation of those secondary changes which are called compound evolution.

We would further suggest a question as to the origin of compound evolution. For if we start with "the homogeneous," and find that by simple evolution a mere process of concentration takes place, accompanied by a differentia-

tion and combination of ultimate units until a certain equilibrium is effected, then we arrive at the end of simple evolution.

But how does compound evolution arise?

Mr. Spencer says, p. 287: "Where the only forces at work are those directly tending to produce aggregation or diffusion, the whole history of an aggregate will comprise no more than the approaches of its components towards their common centre and their recessions from their common centre." As I understand the formula of Evolution, there are no other forces than those referred to, and therefore, starting from "the homogeneous," this is the whole history that can result from the formula of Evolution. If we start from a mass of homogeneous units, and the law of action and reaction as equal and opposite, I do not see how any other history is possible.

But Mr. Spencer goes on to describe compound evolution, and to describe the circumstances under which it will arise. These circumstances are *complex conditions* already implying a precedent compound evolution. But this precedent compound evolution is wholly unaccounted for. The statement, or argument—if it be one—simply begs the question. How compound evolution can arise out of simple evolution is not shown, and therefore, again, we are at a loss to account for the origin of compound evolution.

In fact, it is very evident that a complex or differentiated state is requisite for a compound evolution. How to account for this complex and differentiated state, from which only compound evolution—that is to say, the state of things as we find them now—is only to be produced, the statement of Evolution by Mr. Spencer fails to show, and, therefore, as a philosophy proposing to account for the

whole history of things, from the imperceptible to the perceptible, proclaims its own inadequacy.

The fact of the matter is, Mr. Spencer starts, not from the homogeneous, but from the hypothesis of an indefinite tract of ether interspersed with nebulous clouds, composed of what we know as the seventy or eighty elements in a vaporous condition, but how produced and why retaining their characteristics, he does not attempt to show; and from this hypothesis he works out the processes of Evolution, but it is clear that it is not a complete philosophy; it is not Evolutionism as defined, but Developmentalism, taking as its starting-point a very remote stage, but, nevertheless, just as arbitrary as that of any one else who starts at a later stage.

Of Chapters XIV., XV., XVI., and XVII.

The Law of Evolution.

Here I think I may save time and trouble by a general criticism. These chapters are very interesting and very instructive, whether the particular formula I am criticising is valid or not.

In each chapter a certain conclusion is arrived at, forming a cumulative exposition, each item of which, worked out separately and in full detail, is summarised into one important characterisation of the process of Evolution.

Page 396.—"The formula finally stands thus:—Evolution is an integration of matter and concomitant dissipation of motion, during which the matter passes from an indefinite, incoherent homogeneity to a definite, coherent heterogeneity; and during which the retained motion undergoes a parallel transformation."

"Evolution is an integration of matter and concomitant dissipation of motion."

To this, however, there is a most important exception in the case of nitrogeneous compounds, where, as we found, there took place a "concentration of motion."

Again, if consciousness is included in Evolution—that is to say, if the change from unconscious matter to conscious matter has to be accounted for by Evolution—then the concentration of matter and dissipation of motion, or the alternation of the process, does not account for it.

"During which the matter passes from an indefinite, incoherent homogeneity to a definite, coherent heterogeneity."

It will be evident, in looking through these chapters, that Mr. Spencer does not start from a state of homogeneity, and therefore his formula is wrong, unless he is prepared to assert a state of perfect homogeneity at the commencement of Evolution, and to argue therefrom. This position elsewhere he would seem to adopt, and has already, in the first part of this criticism, received our consideration. But in the chapters now under review it will be seen that the advance in all cases is from the less heterogeneous, and not from the homogeneous.

"During which the retained motion undergoes a parallel transformation."

In this passage there is some obscurity of expression, as it seems difficult to apply some of the terms to motion. Thus there is no indefinite motion nor incoherent motion; but there are motions of bodies more or less in definite and permanent relation to each other, and we can understand that the progress made is from the homogeneous, separate, and individual motions to combined motions, and intricately related motions, and diversities of relations of combinations.

In our examination of chapter ii. we found that Mr. Spencer set before himself the problem the solution of which we have just been considering. Let us now consider that problem, and see if it meets with an equal solution.

Mr. Spencer says (chapter xi., p. 274):

"The decomposition of phenomena into their elements is but a preparation for understanding phenomena in their state of composition as actually manifested. To have ascertained the laws of the factors is not at all to have ascertained the laws of their co-operation. The question is not how any factor—matter, or motion, or force—behaves by itself or under some imagined simple conditions; nor is it even how one factor behaves under the complicated conditions of actual existence. The thing to be expressed is the joint product of the factors under all its various aspects. Only when we can formulate *the total process* have we gained that knowledge of it which philosophy aspires to."

The argument is elaborated in sect. 92, p. 276. "To resume, then, we have now to seek a law of composition of phenomena co-extensive with those laws of their components set forth in the foregoing chapters."

These components, I suppose, are matter (*i.e.*, units of extension and resistance), motion (*i.e.*, equal mutual motions of attraction and repulsion), force (*i.e.*, the unknowable cause of matter in motion).

"Having seen that matter is indestructible, motion continuous, and force persistent—having seen that forces" —(*note "forces," a differentiation of matter in motion roughly called by that name, and implying the attainment of a certain stage in evolution*)—"are everywhere undergoing transformation, and that motion, always following the line of least resistance, is invariably rhythmic, it remains to discover the similarly invariable formula expressing the combined consequences of the actions thus separately formulated."

Page 277.—"The law we seek, therefore, must be the law of the continuous redistribution of matter and motion." (*Note, omitting force and forces.*) "Absolute rest and permanence do not exist. Every object, no less than the aggregate of all objects, undergoes from instant to instant some alteration of state. Gradually or quickly it is receiving motion or losing motion"—(*Note, moves more quickly or moves more slowly, as other aggregates move more slowly or more quickly*)—"while some or all of its parts are simultaneously changing their relations to one another. And the question to be answered is—What *dynamic principle*, true of the metamorphosis as a whole and in its details, expresses these ever-changing relations?"

Here force is discarded, and the subsequent reply in the formula of Evolution and dissolution omits it, although its employment in the singular and the plural is still retained, with a very confusing result, as if in the redistributions of matter and motion some outside force or forces not included in them were perpetually interfering with their processes.

And I must here endeavour to remove any misapprehension arising from the meaning of the word "evolution," as seeming to imply more than the formula I have several times quoted. It is taken to mean sometimes a process of "unfolding," but there may be some who call themselves Evolutionists, because they believe that all successions of things are processes of growth or unfolding, as if from a germ—something like the development of a plant, or an animal, or a society. All such notions and associations, however true they may be, are not to be identified with the doctrine of Evolution as expounded by Mr. Spencer, and it is that alone that I am dealing with. There is no more a process of unfolding in the formula of Evolution we are dealing with than is expressed in the relations of the

size and rates of rotation of an engine-shaft, and the sizes and rates of motion of all the wheels and cog-wheels of the machinery. The notion of unfolding or development is utterly foreign to the formula. It is physics, it is mechanics from first to last, and the formula cannot be amended without radically altering the character and nature of it and its processes.

Page 327.—"Evolution, then," he says, "under its primary aspect, is a change from a less coherent form to a more coherent form, consequent on the dissipation of motion and integration of matter."

And again, page 285: "Evolution, under its simplest and most general aspect, is the integration of matter and concomitant dissipation of motion, while dissolution is the absorption of motion and concomitant disintegration of matter."

I think an improved statement would be: "Evolution is the integration of ultimate units into definite and specific relations of an increasingly complex character, which process is accompanied by a loss of rates of motion, which is transferred in a quantitative degree in acceleration of the rates of motion of other units or combinations of units, during which aggregates of matter pass," &c.

But however this may be, the terms "force" and "forces" are not included in the terms of the definition, and therefore I think that in the subsequent working out of the theory of Evolution they are quite out of place, and the cause of much confusion in the mind of the reader. The confusion is this: one is apt to think that there is after all in Evolution an element of mystery, something that cannot be gauged and measured, something that cannot be put down geometrically and the number of its vibrations counted. Surely in any sound system, perfectly

cohesive and complete, the terms of the all-embracing formula are sufficient for its own exposition.

Either, then, Mr. Spencer has committed the grave literary fault of confusing his readers by the use of terms not included in his formula—a literary fault capable of correction—or in the working out of his system he has found his formula insufficient—a still graver objection. For if the formula is insufficient, the whole key to the secrets of the universe is lost, and we find ourselves wandering in a labyrinthine puzzle. Which is it?

What is required? A correction of the exposition or a correction of the definition? If it is necessary to predicate any special forces other than that constituting matter and motion, and presiding over its concentration at the outset of Evolution, let it be done.

I do not presume to say that Mr. Spencer is wrong; I only presume to speak of the impression his book produces upon an ordinary mind in its endeavour to understand clearly what is meant. I have found great difficulty in following the thread of the argument. The book is like the process of Evolution itself; we never know where we are; we seem to slip from one thing into another so easily, that in the transmutation and connection of words we often have a difficulty in making out our position at all.

In this instance we are duly and solemnly impressed with the associations of the unknowable in connection with the word "force," which henceforward we surround with an element of mystery, and when we afterwards meet with it in the exposition of Evolution, in the formula of which it is not included, we seem to have joined company again with a mystical companion from whom we had in thought parted with for ever, and whose image remained

only in our minds as a reminiscence of the last shadowy dream of kindly, old-fashioned superstitions.

It seems to me that the words "force" and "forces" should have been strictly defined in their employment in the description of Evolution, or that there should have been an intermediate book between the Unknowable and the Knowable, giving a formal and final account of the use of the terms. If force is the cause of matter, and the cause of the motion of matter, it is only equal to its results; and if we know its results, we know it as we only can know it. If its results are matter in motion in various combinations—if we take account of all matter and all motion, and all combinations thereof—we know all we can know; and even if force is the cause of them, it becomes to us indifferent. *It is no factor in our exposition.*

It would take a long paper to apply this criticism in detail right through the chapters on Evolution. I cannot do more than indicate it. It may be my fault, but I must confess I cannot understand a good many applications of the terms "force" and "forces," as in the expressions "surplus force," "excess of force," &c.; and the predication of eras, when the attractive forces predominate, and alternate eras, when the repulsive forces predominate, I cannot quite realise in thought from wondering what has become of the others in the meantime.

My objection is to the employment of the terms "force" and "forces" in the book on the Knowable and in the exposition of the theory of Evolution. To say the least of it, systems of philosophy ought to be worked out in terms of their own definitions. They ought to be worked out like Euclid. If Euclid changed his definitions in the elaboration of his theorems and problems, instead of constantly referring

back to axioms and definitions, no satisfactory result would be arrived at. And Mr. Spencer in his statement of the formula of Evolution says nothing about "force" or "forces."

Of Chapter XVIII.

The Interpretation of Evolution.

How are we to approach the criticism of this chapter? The subject-matter of it is a problem.

"Sect. 147. The task before us, then, is that of exhibiting the phenomena of Evolution in synthetic order. Setting out from an established ultimate principle, it has to be shown that the course of transformation among all kinds of existences cannot but be that which we have seen it to be. . . . In other words, the phenomena of Evolution have to be deduced from the persistence of force. As before said: 'To this an ultimate analysis brings us down; and on this a rational synthesis must build up.' This being the ultimate truth which transcends experience by underlying it, so furnishing a common basis on which the widest generalisations stand, these widest generalisations are to be unified, by referring them to this common basis, . . . we have similarly to affiliate the universal traits of Evolution, by showing that, given the persistence of force, the redistribution of matter and motion necessarily proceeds in such a way as to produce them."

The formula of Evolution is:—"Evolution is an integration of matter and concomitant dissipation of motion, during which the matter passes from an indefinite, incoherent homogeneity to a definite, coherent heterogeneity, and during which the retained motion undergoes a parallel transformation."

The problem as stated is, "Setting out from an established ultimate principle," &c., "in other words, the phenomena of Evolution have to be deduced from the persistence of force."

The question is, I suppose—What state of affairs at the first will account for the state of affairs at the last?

We have, then, to start with an indefinite, incoherent homogeneity of matter and motion. Homogeneity we have already considered, and we found it consist of a mass of ultimate units of like size, shape, and motion. But we were forced to predicate of it a certain shape, viz., spherical, in order to attain our idea of homogeneity. An equal relation of motion implies similarity of space relationship, and this is most nearly approached in a sphere, since there is only one central result of motion instead of many. This, however, is definiteness, and it is coherency. We seem therefore obliged to deny that the homogeneous is indefinite and incoherent. This is a criticism, however, that ought to have been brought forward in the last chapter.

Now to this state of homogeneity we have to apply the principle of the persistence of force and see what comes of it? And as it is very difficult to imagine homogeneity, and as it is difficult if not impossible to frame a conception of force and therefore of the persistence of it, it is a problem that eludes mental effort to apply the principle of the persistence of force to homogeneity so as to produce the known condition of things. If it is said that we do not know force, we are asked to explain the known by the unknown, and to include in knowledge to make it more known that which is utterably unknowable — to deduce the known from the unknown—to produce something out of nothing—to unify knowledge by verbal mysticisms.

We have already considered this subject, and came to the conclusion that if we know all the effects of force, we know force. The known effects of force are matter and motion, or, more properly, matter in motion. We also know

that these are constant quantities, and to that fact we may, if we like, give the name of the persistence of force; and if from this we can deduce all the traits of evolution, and account for all changes in the cosmos, we unify philosophy.[1] But we must take care fully to realise to ourselves and always to bear in mind that the persistence of force means nothing more than the constancy of the quantum of matter and of motion.

Very well, then, can we on the ground of the constant quantity of matter in motion deduce from it, on its application to the homogeneous, all the known changes of the cosmos?

In the first part of our criticism we tried to do so, and failed.

But how does Mr. Spencer set about to prove that the persistence of force accounts for all changes? In this way.

In chapter xix. he advances the theory of the instability of the homogeneous. As just remarked, we have in the first part of our criticism considered this, and found it a failure.

However, let us consider Mr. Spencer's argument in sect. 155, in which he undertakes to show "that this general truth is demonstrable *à priori*."

"We have to prove specifically that the instability of the homogeneous is a corollary from the persistence of force."

Now how does one set about getting a corollary? I thought a corollary was a natural and inevitable conclusion of thought from the terms of a proposition, and if I try to frame a proposition the terms of which shall describe the homogeneous, I cannot see that it contains any cause of

[1] But if we do not know all the effects of force in the cosmos, then philosophy is impossible.

change, nor can I see that the persistence of force (*i.e.*, the constancy of the quantity of matter and motion) should be the cause of instability or change. On the contrary, the corollary that I should draw from the constancy of the quantity of the matter and motion would be the permanency of the established relations. If, on the other hand, I imagined the inconstancy of the quantums as opposed to the permanence and persistence of force, I could naturally draw the corollary of instability and change. But the variability of the quantity of matter and motion is denied. The permanence, constancy, and persistence seem to me to preclude change.

What is *a priori* reasoning? I should have thought the above was, if there is any such process.

Mr. Spencer undertakes to demonstrate the instability of the homogeneous *a priori*. But he sets to work inductively, and adduces a variety of instances where the homogeneous is found to be unstable. Is this *a priori* reasoning? Is it a *deduction* from the persistence of force—*i.e.*, the constant quantity of matter and motion?

However, to take the argument on its own merits, Mr. Spencer supposes a mass of matter and another piece of matter striking it. He takes a body upon which radiant heat is falling. Then he takes a force and forces, whatever these may be, and shows how changes are produced by their interaction. He speaks of the results of two sets of factors.

Now, I ask is this the homogeneous? Does any number of bodies homogeneous in themselves, and subject to a variety of motions such as heat, constitute the homogeneous? Does any argument drawn from relations of the heterogeneous throw any light upon the nature of the homogeneous? Does it constitute an *a priori* proof of the instability of the

homogeneous from the constancy of the quantity of matter in motion?

Mr. Spencer continues (p. 428) by arguing that, "even apart from the action of any external force, the equilibrium of a homogeneous aggregate must be destroyed by the unequal actions of its parts on each other."

Then follows a very good argument if for "parts" is read "units," which I suggest, not to alter the argument, but to render it more clear, since "parts" might be taken to mean "quarters" or "tenths," or any aggregate of units.

"That mutual influence which produces aggregation (not to mention other mutual influences) must work different effects on the different parts, since they are severally exposed to it in unlike amounts and directions. This will be clearly seen on remembering that the portions of which the whole is made up may be severally regarded as minor wholes; that on each of these minor wholes the action of the entire aggregate then becomes an external incident force; that such external incident force must, as above shown, work unlike changes in the parts of any such minor whole; and that if the minor wholes are severally thus rendered heterogeneous, the entire aggregate is rendered heterogeneous." There is another little flaw here, I perceive. The part is regarded as a minor whole, having parts which are modified. It would be better to regard the change produced as one of motion, viz., the motion of the ultimate unit. This argument relates then to the homogeneous made up of like units and equal motions. Now all this was considered in the first part of our criticism, and we are not making progress. We considered a spherical mass of like units having motions of equal mutual attraction and repulsion, and got a total movement in the mass of alternate concentration and retrocession, nothing more.

Motion implies instability in a certain sense, but the rhythms of concentration and expansion, being regular, are stable relations and produce no definite coherent combinations.

The question is, Does the constancy of the quantity of matter and motion imply change? Mr. Spencer has not shown that it does.

The next question is, Does the supposition of the homogeneous, *i.e.*, a spherical mass of like units having equal mutual motions of attraction and repulsion, imply change or differentiation? I think not, but, if so, it ends eventually in equilibration.

Mr. Spencer, on page 429, makes a representation of the homogeneous, but as the idea of infinity is introduced, the supposition is, as he says, inconceivable.

We have dwelt thus long on the interpretation of evolution, or the synthesis of evolution, and its first step from the homogeneous, as we consider it of vital importance in the study of a philosophy which professes to account for all changes. The first step is always the most difficult, as well as the most important.

Our conclusion is, that, as a matter of thought and argument, the instability of the homogeneous is not deducible as a corollary from the persistence of force—*i.e.*, the constancy of the quantity of matter in motion. And since all the further changes of Evolution are dependent upon this, then no other change or characteristic of Evolution is a logical corollary from the persistence of force.

Of Chapter XIX.

The Instability of the Homogeneous.

This chapter has already received our attention, and passing over the two next chapters, we examine chapter

xxii. next, because we argue that from the homogeneous an "equilibrium" is arrived at before "a multiplication of effects."

Of Chapter XXII.

Equilibration.

Given the homogeneous and granted concentration, this concentration would proceed until an equilibrium of motion was attained. An equilibrium of motion once attained is represented algebraically thus

$$m\, m^n = m\, m^n$$

and no further disturbance of relation is possible.

This is a corollary from the constancy of the quantity of matter in motion, and the consequent persistency of the relations of matter in motion.

To suppose any other matter in motion which shall disturb it is to suppose something coming into existence out of nothing, and to deny the constant quantity of matter in motion.

Therefore an equilibrium once set up remains for ever, and no further change is possible.

An equilibrium is, however, stateable in two ways.

If we say that an equilibrium is rest—that is to say, no motion—we would seem to say that all motion ceases, which is a denial of the proposition that motion is continuous, and an assertion that motion goes out of existence. One motion cannot cancel another. The only equilibrium of motion can be alternation.

We are, therefore, forced to suppose that the equilibrium established must be an equivalent alternate motion.

This agrees with the axiom that all action is equal and opposite. The equilibrium established would, therefore, be an alternate and equal concentration and retrocession.

This is an equilibrium, and since no extra matter and motion can come into existence to disturb it, it will go on for ever.

And supposing a state of very complex heterogeneity, even then, according to Mr. Spencer, we are ever progressing towards a state of equilibrium, which, once attained, there does not seem any possibility of further disturbance.

This is a long and interesting chapter, and I do not see any necessity for a detailed criticism. The above seems to me a correct summary of the position, and the correct corollary to be drawn from it. I think the reader will find it fully corroborated by a perusal of sect. 176 in this chapter. I have taken this chapter out of its order in the work in order to present the first difficulty in the synthesis of Evolution which we are engaged upon, for if we shortly arrive at an equilibrium or perfect balance of matter in motion in their interrelations, we come to a full stop.

Of Chapter XX.

The Multiplication of Effects.

I object very much to the first paragraph of this chapter. It is an instance of loose writing throughout.

"To the cause of increasing complexity set forth in the last chapter we have . . . to add another. . . . Even in the absence of the cause already assigned, it would necessitate a change from the homogeneous to the heterogeneous."[1]

We read the following paragraph very carefully to see how the homogeneous can be rendered heterogeneous, and find that the homogeneous referred to is not the homo-

[1] Mr. Spencer speaks of a conflict between force and matter. This would seem to be an oversight, only that it is reprinted upon page 432.

geneous at all, but heterogeneity—that is to say, differentiated concrete bodies in relation with external forces, so this argument falls to the ground.

Our general criticism of the chapter follows naturally from the great objection made on page 111, viz., that, after giving a definition of Evolution, which contains the two factors matter and motion, although Mr. Spencer had proposed to include three, viz., matter, motion, and force; yet when he comes to the synthesis of Evolution he picks up the omitted factor, and works out the synthesis as if it had been included in the definition.

Thus, if we refer to our diagram, it is as if he had narrowed everything down to the formula placed at the apex, and had afterwards opened out a supplementary channel between the upper cone and the lower one. In addition to this, if consciousness be not accountable as matter in motion, a second channel might have to be opened lower down in the lower cone.

The reader must carefully bear in mind that, according to the definition of Evolution, there are only two factors to be taken into account in the synthesis of Evolution, viz., matter and motion. Therefore when, in this chapter on the multiplication of effects, he comes upon the terms "force" or "forces," with or without a variety of adjectives, such as "a single force," "forces that widely diverge," "forces differing in their kinds," he is bound to translate their processes and relations into terms of matter in motion, expressible in shapes, sizes, modes, and rates, by geometry and arithmetic.

And we must also bear in mind that the multiplication of effects, however produced, and however complex they may be, by the terms of the definition of Evolution can only be a multiplication of the relations of matter ir

motion: that is to say, no new kind of force or quality can find its way amongst them. For, given shape and size, and given mode and numbers of rates of motion, it is possible to calculate the universe. The whole cosmos is merely an arithmetical and geometrical problem. There is no new factor introduced. Or if there is, the formula of Evolution is wrong.

Of Chapter XXI.

Segregation.

My criticism on this chapter follows on the same lines as the last. The general proposition is this, and is quite acceptable if the word "motion" be substituted for the word "force."

"That in the actions and reactions of force and matter an unlikeness in either of the factors necessitates an unlikeness of the effects, and that in the absence of unlikeness in either of the factors, the effects must be alike."

Of Chapter XXIII.

Dissolution.

This chapter was very fully considered at the commencement of the criticism.

Of Chapter XXIV.

Summary and Conclusion.

In the last paragraph of page 541, Mr. Spencer makes a clear and uncompromising statement of the claims of philosophy, which we have referred to in the course of this criticism, and which we have quoted at length on page 2.

In the two succeeding paragraphs, page 542, he gives an equally definite statement of the factors by which all phenomena are to be explained.

"By these considerations we were brought within view of the formula. For if it had to comprehend the entire progress from the imperceptible to the perceptible, and from the perceptible to the imperceptible; and if it was also to express the continuous redistribution of matter and motion, then, obviously, it could be no other than one defining the opposite processes of concentration and diffusion in terms of matter and motion. And if so, it must be a statement of the truth that the concentration of matter implies the dissipation of motion, and that, conversely, the absorption of motion implies the diffusion of matter.

"Such, in fact, we found to be the law of the entire cycle of changes passed through by every existence; loss of motion and consequent integration, eventually followed by gain of motion and consequent disintegration. And we saw that, besides applying to the whole history of each existence, it applies to each detail of the history. Both processes are going on at every instant; but always there is a differential result in favour of the first or the second. And every change, even though it be only a transposition of parts, inevitably advances the one process or the other."

We cannot help thinking that Mr. Spencer confuses a *description* of the general processes of changes with the *explanation* of them. An explanation would be such as this: Given a quantum of ultimate units in motion, certain facts of mutual relation of size and shape, mode and rate of motion, then there will result from the harmonies or discordances of them certain definite changes, *i.e.*, combinations and recombinations into aggregates having complex relations, which, although practically incalculable, are nevertheless comprehensible, and we would be able to understand how the state of affairs at the first necessitated all subsequent changes. A description, however, does not afford such an insight or furnish us with an organon for

construction, but admitting any number of original factors, simply finds that all changes of them are either into definite combinations or dissolution of combinations. So that we can frame a formula which shall be a *description* of processes, but yet not form an explanation of them.

It is just possible that the unification of knowledge that Mr. Spencer claims is not to be sought for in the formula of Evolution, but in the expression "the persistence of force."

Page 549.—"But the fact which it here chiefly concerns us to remember is, that each of these laws of the redistribution of matter and motion was found to be a derivative law—the law deducible from the fundamental law. The persistence of force being granted, there follow as inevitable inferences 'the instability of the homogeneous,' and 'the multiplication of effects;' while 'segregation' and 'equilibration' also become corollaries. And thus discovering that the processes of change formulated under these titles are so many different aspects of one transformation determined by an ultimate necessity, we arrive at a complete unification of them—a synthesis in which Evolution in general and in detail becomes known as an implication of the law that transcends proof. Moreover, in becoming thus unified with one another, the complex truths of Evolution become simultaneously unified with those simpler truths shown to have a like affiliation, the equivalents of transformed forces, the movement of every mass and molecule along its line of least resistance, and the limitation of its motion by rhythm; which further unification brings us to a conception of the entire plexus of changes presented by each concrete phenomenon, and by the aggregate of concrete phenomena, as a manifestation of one fundamental fact—a fact shown alike in the total change and in all the separate changes composing it."

But then we do not understand the persistence of force, and therefore "the unification" does not "bring to us a conception of the entire plexus of changes presented by

each complete phenomenon . . . as a manifestation of one fundamental fact."

The only definite idea capable of enabling us to form such a conception is by interpreting persistence of force into constancy of quantity of matter in motion, and this we have found fails in some respects of the required unification.

In sect. 194, Mr. Spencer says, page 556: "Before proceeding to interpret the detailed phenomena of life, and mind, and society in terms of matter, motion, and force, the reader must be reminded in what sense the interpretations are to be accepted." It appears from this that the phenomena of life, mind, and society are not to be interpreted by the stated formula of Evolution, which mentions only matter and motion. They are to be interpreted also in terms of force, whatever the terms of force may be, and which are not given anywhere in the work. We are therefore invited to enter upon an inquiry, and to use a word and terms of a something, the first of which is undefined and asserted to be undefinable, and the second of which (the terms) are not given.

The only terms which we can by implication give to force are matter and motion; yet, since they are two of the three factors given, the third of which is force, they would thereby seem to be excluded as terms of force.

If matter and motion were the terms of force, then the theory would be materialistic; but Mr. Spencer goes on to repudiate this sense of his interpretations of the phenomena of life, mind, and society. Therefore the terms of force must include more than the terms of matter and motion, which are the two factors in the stated formula of Evolution. This being the case, since what this "plus" is is not given, nor the terms of it, it will naturally seem to

follow that all the subsequent interpretations of phenomena in the volumes on Biology, Psychology, and Sociology are vitiated by this initial defect.

The final paragraph of the chapter will be considered in the third part of this criticism.

Summary of Criticism.

My object throughout this criticism has been to show that there has been a vital discrepancy between Mr. Spencer's formula of Evolution and the exposition of the steps that lead up to it, on the one hand, and the synthesis deducible from it, on the other.

The formula of Evolution is framed upon the mutual relations of two factors, viz., matter and motion, or matter in motion. The preceding argument and the succeeding synthesis both include force.

It follows from this either that the formula should be amended so as to include force, or that the exposition and synthesis should be amended so as to exclude it.

We have endeavoured to amend the synthesis so as to make it conformable to the formula, and having done so, we find two or three insuperable difficulties, viz. :—

Firstly, A probable one—in the initial change from the homogeneous.

Secondly, In the change from the first equilibrium and the distribution and permanence of the so-called elements.

Thirdly, In the change from the unconscious to the conscious, with its consequent phenomena of organism and life.

Fourthly, The contradictory phenomena of the concentration of motion in nitrogenous compounds.

From which we conclude that no explanation of the universe based only upon the two factors matter and

motion is able to account for all the changes in the cosmos. Let us, however, see if we can amend the formula of Evolution so as to introduce the term "force."

"Evolution is an integration of matter and concomitant dissipation of motion (which are themselves manifestations of a persistent force), during which," &c. But it is evident here that the parenthetical interpolation is merely explanatory of the antecedents of Evolution, and not of its sequences, as given in the following part of the formula, and our first attempt fails.

Or we might say:—

"Force constitutes matter, and those motions of attraction and repulsion which it manifests, and Evolution, is," &c. But this again only relates to the antecedents of Evolution, not to its sequences.

If we wish to get it into the sequences we would have to say, "Evolution is an integration of matter and concomitant dissipation of motion, and in which force" does something—what shall we say?—interferes occasionally to disturb equilibrium, or to endow protein or protoplasm with consciousness?—"and during which," &c. But this is an indefinite formula, and falls short of the requisite unification of knowledge, for knowledge means definite comprehension and not vague fancies; besides, it does not say what that persistent force is doing when it is not so occupied.

It may be that this is the most complete formula that we can reach; but if so, it would intelligibly assert, on the face of it, an unknown power and deny the possibility of a perfect philosophy.

Therefore, if we seek to amend the formula of Evolution so as to include force, we insert in it a term to which we can attach no definite meaning, and the formula and its

application (since it contains an unknown quantity) does not afford complete explanations, but confesses an element of mystery.

But since Mr. Spencer expressly claims that Evolution accomplishes all that it is required of a philosophy to do, viz., to unify and account in an intelligible formula for the history of all changes in the cosmos from the beginning to the end, we are obliged to declare that both the formula and the exposition are insufficient, and that the Evolution philosophy is in both respects a failure.

But acknowledging that Mr. Spencer himself admits an unknowable element, it is to be demanded of him whether this unknowable is to be placed at the beginning of things as the constitutor of matter in motion, or is to be regarded as a constant quantity merely keeping them going; in either of which cases, as we have seen, since we have all its effective functions, it may be omitted from the formula and the exposition; or, if it is now, or ever has been, an interfering power of unknown functions, in which case a formula of philosophy is impossible.

Or is this force to be regarded as having known functions, but which are not expressible in terms of matter and motion, but, nevertheless, regular in their modes of operation—a discernible element, having other functions than matter in motion, and expressible, say, as consciousness, from which factor, perhaps, by known laws of sequence, the phenomena of organism, life, mind, and society might follow.

This is a supposition that, in the present state of human knowledge, we are unable to realise to ourselves, *i.e.*, form a clear conception of, and therefore for the present cannot be accepted as the formula of philosophy which is to account for all changes of the universe.

Whether such a thought forms the germ of a future philosophy or not, whether it is really the correct expression of Mr. Spencer's philosophy or not, we cannot determine. But in the meantime we are obliged to declare that, in spite of Mr. Spencer's attempt, such an unification has not yet been successfully made.

PART IV.

AN ATTEMPT TO FRAME A FORMULA AGREEABLE TO MR. SPENCER'S EXPOSITION OF EVOLUTION, AND AN INQUIRY AS TO ITS INTELLIGIBILITY AND SUFFICIENCY AS THE FORMULA OF PHILOSOPHY.

HAVING started by stating the problem of philosophy to be the framing of an intelligible formula, which from a state of homogeneity should account for all the changes of the universe, we found that the formula propounded by Mr. Spencer, although intelligible, was insufficient. We next attempted an amended formula which should comprise the term "force," a term so constantly brought forward by Mr. Spencer in his treatment of the subject, and we found that no intelligible formula could be stated which included it. We now purpose an attempt to frame a formula which shall be agreeable to Mr. Spencer's exposition of the changes of the universe, and which shall have constructive efficiency in that exposition, so that by its formulation the problem of philosophy shall be solved.

The only way that I can see for avoiding the material and mechanical limitations of the formula is not by the introduction of the term "force," which we have seen to be impracticable, but by the elimination of the terms "matter" and "motion," or by the inclusion of a third factor, viz., "feeling" or "consciousness."

Let us try the first proposal, when the formula would

read thus (the italics indicate the omissions and the capitals the substitutions):—

"Evolution is (*the*) integration (*of matter and the concomitant dissipation of motion*), during which (*the matter*) EVERY EXISTENCE passes from an indefinite, incoherent homogeneity to a definite, coherent heterogeneity, and during which (*the retained motion*) THE ACTIVITIES undergo a parallel transformation."

It may be objected to this amendment that it is not an alteration of meaning. But here activity is meant to include consciousness, life, reproduction, heredity, &c., which are not included in the term "motion." This formula would leave the origin of matter and motion and consciousness unexplained—it would simply formulate the results of their integration.

And I put it forward as the only formula I can frame which nearly expresses Mr. Spencer's exposition of Evolution.

Respecting the word "integration," I apprehend it means concentration, or perhaps more correctly combination, or entering into permanent relations or definite combination.

Let us see how the amended formula corresponds with the exposition of Evolution.

Sidereal Evolution, sect. 108, corresponds with the original formula and with the amended one.

Geologic Evolution, sect. 109, also corresponds with both.

Organic Evolution is omitted by Mr. Spencer in his "First Principles," and has had to be considered separately by ourselves. Our conclusion was that the original formula was insufficient to account for it, since there is something more in it than matter (extension) and motion (rates or modes), but the amended formula is applicable to it, since the term activities includes more than motion.

Further Organic Evolution, sect. 110, sets out with the statement that every organism is an integration, because all its constituents were once scattered. These constituents being absorbed into the organism, and perhaps adding to its growth, is a process of integration. This is undoubtedly an integration of matter, although it is not a dissipation of motion. (See sect. 103.) The cause of the integration and of the particular modes of it is not given, which is a very important omission. But as an organism is something more than an integration of matter, according to harmonies of shape, size, mode or rate of motion, it does not come within the original formula, although it may be included in the amended formula.

The formations of separate organs in the embryo are called "secondary integrations," but how these particular modes of secondary integrations are brought about is not stated. Surely they are more than integrations; they are structural integrations, and what is the cause of the structure? Anything more than harmonies of size, shape, modes or rates of motion? If so, then the first formula is not applicable, though the latter may be. These so-called "secondary integrations" comprise all the organs of the bodies of animals and of the bodies of plants.

We have next "integrations by which organisms are made dependent upon one another. We may set down two kinds of them—those which occur within the same species, and those which occur among different species." A case of the first kind is that of gregarious animals. There is a certain degree of combination; they hunt in packs, and form bodies united by co-operation. I suppose this might be called integration, and, since animals are made of matter, it would be an integration of matter;

but it would not be due directly nor indirectly to integrations arising from the harmonies of size, shape, mode, or rate of motion; nor can I make out in the constitution of a herd of buffaloes or a hive of bees, if they are cases of integration of matter, where there is any corresponding loss of motion. It seems a case of an utterly different kind to those referred to in the original formula of Evolution.

Page 315.—"How organisms in general are mutually dependent, and in that sense integrated," surely adds a new meaning to the word. The *interdependence* of plants and animals, and of different species of plants and plants, and of animals and other animals, surely cannot be called a process or state of *integration of matter*, however otherwise we might apply the word. And in any case, where is the corresponding dissipation of motion? What motion has been lost, and to what has it been transferred?

Super-Organic Evolution, in sect. 111, a case is given in the formation of tribes out of wandering families, the amalgamation by conquest or otherwise of these tribes into larger ones, and of these again into nations. The higher combinations being relatively stable and well organised.

This is integration, but is it the integration of matter and concomitant dissipation of motion spoken of in the formula? Is there any dissipation of motion? and is the integration not of a different kind to that referred to in the formula, *i.e.*, due to other causes than gravitation the complex results of combinations due to harmonies of size, shape, mode and rate of motion?

But there is another instance. There is the integration into groups. These are of two orders—the regulative and the operative: the former comprising the

governmental, administrative, military, ecclesiastical, legal, &c.; the latter comprising the industrial groups, the manufacturing, the artisan, the agricultural, &c.

It seems a great stretch of the use of the term to call this "integration of matter and concomitant dissipation of motion." It may truly be regarded as integration of men, or integration of industries and occupations, and may, therefore, come within the amended formula, but not within the original.

But we are to go further, and are asked to consider the cases of language, science, and the arts, industrial and æsthetic.

Sect. 112. Language is described as an evolution, and, since evolution is integration, we have to ask, Is it an integration of matter? But we cannot say that language is matter, and must, therefore, say it is an integration of motion. But is there such a process as the integration of motion? It is not hinted anywhere that there is. We are told that the "retained motion undergoes a parallel transformation," *i.e.*, from "an indefinite incoherent homogeneity to a definite coherent heterogeneity." But this is not integration of matter with a concomitant dissipation of motion.

But Mr. Spencer does not say whether he speaks of matter or of motion. He speaks of words: "Originally the words used for the less familiar things are formed by compounding the words used for the more familiar things. Thus long words are formed, but since for convenience they get contracted in use into short ones," &c. This is integration. But integration of what? and how does it get within the formula?

The same process takes place in the tenses and cases, and with respect to the general construction of language

Sect. 113. "The history of science presents facts of the same meaning at every step. Indeed, the integration of groups of like entities and like relations may be said to constitute the most conspicuous part of scientific progress. A glance at the classificatory sciences shows us that the confused incoherent aggregations which the vulgar make of natural objects are gradually rendered complete and compact, and bound up into groups within groups." At the same time there is an integration of all the sciences by means of wider generalisations, ending in the Evolution philosophy itself.

We have to repeat the question, Is this so-called integration of science "an integration of matter and concomitant dissipation of motion"? We are now speaking of men's thoughts, not of matter, and we suppose not of motion. We consider that these processes are not included in the original formula, although they may be included in the amended one.

Sect. 114. "Nor do the industrial and æsthetic arts fail to supply us with equally conclusive evidence." The progress from isolated rude tools to highly complex machinery is said to be a process of integration. Is it of matter, and is there a concomitant dissipation of motion?

And in painting there is a progress from miscellaneous depicting to a proper co-ordination of parts.

So also there is progress from the incoherent and the fragmentary to the co-ordinated and coherent in the history of music and literature.

As to these we ask the same question.

Mr. Spencer, in summing up, sect. 115, says: "Evolution, then, under its primary aspect, is a change from a less coherent form (*of what?*) to a more coherent form (*of what?*), consequent on the dissipation of motion and

integration of matter." In answer to the queries, are we to say matter and motion, or the former only? That is to say, the integration of matter and concomitant dissipation of motion results in a change from the less coherent to the more coherent form of matter, and to differentiation of motion of matter.

Mr. Spencer says this is the universal process through which all sensible existences pass, including the solar system, the earth, organisms, societies, language, science, art.

What is the concomitant process with integration of society, thought, language, science, industry, and art? Evolution is stated to be a double process, viz., an integration and a dissipation. We can understand that with the integration of matter there is a concomitant dissipation of motion. With the integration of the above what dissipation is there? It is an integration of matter; is it a dissipation of matter, or is it a dissipation of motion, or an integration of motion? We cannot even frame a hypothesis. We can understand the economy of motion in shortening a long word into a monosyllabic one, but that is not a dissipation or transference of motion from one body to another; or have we an integration which has no concomitant process?

Our criticism amounts to this, that the cases mentioned, though perhaps integrative processes, are not all of them integrative processes of matter, and therefore do not come within the formula of Evolution, though they might be comprised within the amended formula.

But this amended formula being vague, and not specifying the nature of the activities referred to, is itself on that account insufficient as a formula which shall unify philosophy. It has no power of synthesis which, from a

given state of the cosmos, shall enable us to explain and ideally construct the cosmos as we know it.

We are therefore forced to introduce a third factor, and this third factor is supposed to be feeling or consciousness?

The question then arises, Was this third factor in the homogeneous at the beginning, or was it added at a certain stage and made dependent upon certain conditions?

The problem of philosophy, as already stated, requires "from a state of homogeneity," &c. We would therefore be obliged to predicate consciousness as a property of the ultimate units. We have already seen that it cannot be a development or product of the two factors already acknowledged, viz., matter (extension only) and motion. We must also acknowledge that consciousness is neither matter nor motion, else it could be described geometrically and mathematically, although the consciousness is the consciousness of them. We are therefore forced into the predication of consciousness as a property of the ultimate units.

On this supposition are we able to suppose a transference of consciousness in the same way as there is a transference of motion. If so, then some matter would become less conscious, while other became more conscious. There would be a sum total or fixed quantum of consciousness in the same way as there is a fixed quantum of matter and a fixed quantum of motion.

Carrying the inquiry further, we would have to ask how the changes of consciousness could be affected by integration of matter. It would still have to be recognised that gravitation to a centre (however explained) would be the original disturbing movement from the homogeneous. This would be followed by integration

of matter and concomitant dissipation of motion. The question arises, What would become of the consciousness? Would it accompany the motion? The degree of consciousness is, so far as we know it, in proportion to the activity of motion rather than to the integration of matter. Yet this involves us in difficulties, for we cannot say that heat, light, &c., are conscious. Organism is the requisite for self-consciousness. For self-consciousness we require both complex integration of matter and great amount of motion.

Although we can understand the shapes and sizes of matter, and although we can understand the transference of motion, and can form for ourselves a tolerably correct notion of the formation of complex and still more complex molecules, we cannot imagine the method or manner of the transference and concentration of consciousness; we can only suppose it to go with increased complexity, which is increased multiplicity of ultimate units in a molecule and increased activity of them; so that the formula would have to include in it the phrase, "and during which also the consciousness undergoes a parallel transformation."

There is, however, an alternative supposition, viz., that the third factor is an added factor. This alters the ground of philosophy altogether. On this supposition the cosmos is not a constant quantity, but every now and again receives an accession of something entirely new. In this case we have to provide a formula for each stage, or else a formula for the new factor conformable to the operative conditions of the others which is not quite so revolutionary.

On this latter supposition, we know not how many additions may have been made, nor what can still be added.

This excludes the notion of growth or development from the homogeneous, although it may not exclude the notion of growth from the homogeneous with various additions. In this case the formula would have to correspond.

However accounted for, we have to make a fresh start from highly complex molecules which are also conscious.

The inquiry thereupon ensues, What results from the consciousness of a molecule? Is it in any respect an active factor in subsequent changes? It has not been regarded as an active factor in all anterior changes. It has hypothetically accompanied the integration of matter and concomitant dissipation of motion, and has itself become more intense when the integration of matter has gone on with an increase of motion in the same molecule, but it has not been a modifying factor. We may, if we like, suppose that the harmonies of shape, size, and mode and rate of motion, which cause combination, also cause pleasure, and that disassociation causes pain, but since those combinations and disassociations are entirely dependent upon the relations of the shapes, sizes, and motions, the consciousness of them has not been an active factor. Consequently, no degree or complexity of such combinations or disassociations, however much they may intensify the pleasure or the pain, will allow of these pleasures and pains having an influence upon the result.

We are, therefore, forced to the conclusion that if consciousness was an original factor in the homogeneous, it must always have been an active and not a passive factor, for the active cannot come out of the passive. The difficulty, then, is to state what was the activity of the consciousness of matter. *How* it could affect the motion of matter it is impossible to imagine. If, in the recom-

positions of matter and motion, it came in as an outside, untransformable force, it could only influence these recompositions by altering shape or size, or by increasing or retarding motion, but these are, by the supposition, fixed quantities, and we are now supposing a case of creation or extinction of matter or of motion which is not allowable.

And even if we suppose that consciousness and motion are transformable, it would seem to imply that consciousness is motion and motion consciousness. But consciousness cannot be described geometrically or mathematically, and therefore is untransformable into motion.

We are again obliged to beg the whole question of consciousness anterior to highly complex molecules, and postulating consciousness of them, we have to inquire the value of it as a factor in subsequent recompositions. We have also to leave undecided its mode of action, so that the question of motion of matter shall remain constant and unchanged.

We can only postulate as the function and active property of consciousness, as the unit of our factor, a pleasure at harmonious combination of shape, and size, and motion, and a pain at disharmony. We also have to postulate a continuity of consciousness along with continuity of complexity.

The secondary problem, then, would be from these postulates respecting consciousness to work out the development of organisms, their adaptations and changes, their compositions, morphology, differentiations, biology. Also memory, transmission of impressions, molecular wear and tear, and reconstitution, generation. heredity, &c.

But it will have been noticed that we are in this assuming a most important position, and most unjustifiably, viz., that consciousness can influence, modify, and

affect motion without being motion or adding to the quantum of motion.

Now, some such view as this, it seems to me, must be taken of the development of life from organic molecules, which we have already seen are insufficient, if considered merely as complex molecules formed only from harmonies of shape, size, and motion. And, in fact, it really appears to be Mr. Spencer's position, if we read carefully his chapter on the "Substance of Mind" in vol. i. of his "Principles of Psychology."

In it he distinctly states that there is more in organisms made up of molecules formed by harmonies of shape, size, and motion, than matter and motion. If this is so, then his formula of Evolution, which only recognises these two factors, must be insufficient to account for this plus, and the amended formula which transcends these limitations must be adopted.

PART II.—CHAPTER I.—*The Substance of Mind.*

Page 151.—"It is possible, then—may we not even say probable—that something of the same order as that which we call a nervous shock is the ultimate unit of consciousness, and that all the unlikenesses among our feelings result from unlike modes of integration of this ultimate unit."

Page 153.—"A conceivable solution is afforded by this hypothesis of two problems, which, in its absence, seem entirely insoluble. How is it possible for feelings so different in quality as those of heat, of taste, of colour, of tone, &c., to arise in nervous centres closely allied to one another in composition and structure? And how, in the course of Evolution, can there have been gradually differentiated these widely unlike orders, and genera, and species of feelings? Possible answers are at once supplied if we assume that diverse feelings are produced by diverse modes, and degrees, and complexities of integration of the alleged ultimate unit of consciousness. If each wave of

molecular motion brought by a nerve fibre to a nerve centre has for its correlative a shock or pulse of feeling, then we can comprehend how distinguishable differences of feeling may arise from differences in the rates of recurrence of waves, and we can frame a general idea of the way in which, by the arrival through other fibres of waves recurring at other rates, compound waves of molecular motion may be formed, and give rise to units of compound feelings, which process of compounding of waves and production of correspondingly compounded feelings, we may imagine to be carried on without limit, and to produce any amount of heterogeneity of feelings."

It will be seen here that consciousness is not regarded as a mode of motion. The unit of feeling is a feeling of motion of matter, but is not the motion itself, nor a motion at all. It is, therefore, not contained within the terms of the formula of Evolution, and is not to be accounted for by it. And since it is not motion, we cannot see that it can modify or affect motion in any way. The only way in which motion can be affected is by motion, and since consciousness is not motion, it cannot affect or modify it (volition). Consciousness is simply a consciousness of motion and its reactions. We do not see even how it can be a registration of them (memory). If consciousness were motion, then all motion is transformable into it and *vice versa*, and it could be described mathematically and geometrically. But if it caused motion without being motion, then the quantum of motion is not constant.

It is sufficient, however, to note that consciousness is not included in the formula of Evolution, and that the integration of units of feeling is not an integration of matter nor a mode of motion. It would have to come under the amended formula.

In sect. 61 of the *Psychology* Mr. Spencer exhibits a

parallel between the compositions of matter and the compositions of mind.

In the first place, he dwells upon the results of physical analysis as pointing to the conclusion that all matter, as we know it, is built up of ultimate similar units, and continues:—

"If, then, we see that by unlike arrangements of like units all the forms of matter, apparently so diverse in nature, may be produced; if, even without assuming that the so-called elements are compound, we remember how from a few of these there may arise, by transformation and by combination, numerous seemingly simple substances strongly contrasted with their constituents and with one another, we shall the better conceive the possibility that the multitudinous forms of mind known as different feelings may be composed of simpler units of feeling, and even of units fundamentally of one kind. We shall perceive that such homogeneous units of feeling may, by integration in diverse ways, give origin to different though relatively simple feelings, by combination of which with one another more complex and more unlike feelings may arise; and so on continuously."

We confess ourselves somewhat at a loss here to understand the word "integration," as applied to units of feeling. We can understand two ultimate units of matter (extension only) in motion, from their harmonies of shape, size, and motion, entering into combination when brought by gravitation into contact, but we cannot understand one ultimate unit of feeling being combined with another. If it means constant association, in the manner of the association of ideas, it only means that there is the constant impression produced by the constant cause—the uniformity of feeling produced by uniformity of complexity of motions *so long as they continue;* but there is not any cause of continuance of impression after the cause has ceased, and therefore no cause of revivability of an

absent impression from association with a present one with which it is usually accompanied. Feeling or consciousness, from the nature of the supposition made, is utterly passive—the mere consciousness of passing motions.

In sect. 62 we have a very excellent discussion of the relations of matter and mind, in which it is shown that the latter cannot be represented in terms of matter and motion. If by object is meant matter and motion, and if by subject is meant feeling or consciousness, as we suppose Mr. Spencer means, then (p. 157), "So far from helping us to think of them as of one kind, analysis serves but to render more manifest the impossibility of finding for them a common concept—a thought under which they can be united. Let it be granted that all existence distinguished as objective may be resolved into the existence of units of one kind. Let it be granted that every species of objective activity may be understood as due to rhythmical motions of such ultimate units; and that among the objective activities so understood are the waves of molecular motion propagated through nerves and nerve centres. And let it further be granted that all existence distinguished as subjective is resolvable into units of consciousness similar in nature to those we know as nervous shocks; each of which is a correlative of a rhythmical motion of a material unit, or group of such units. Can we, then, think of the subjective and objective activities as the same? Can the oscillation of a molecule be represented in consciousness side by side with a nervous shock and the two be recognised as one? No effort enables us to assimilate them. That a unit of feeling has nothing in common with a unit of motion becomes more than ever manifest when we bring the two

into juxtaposition, and the immediate verdict of consciousness thus given might be analytically justified were this a fit place for the needful analysis. For it might be shown that the conception of an oscillating molecule is built out of many units of feeling, and that to identify it with a nervous shock would be to identify a whole congeries of units with a single unit."

It would even seem from this that the unit of feeling and the unit of motion, to say nothing of the unit of matter, are not all comprehended in the "Persistence of Force," for the unit of feeling has nothing in common with the unit of motion.

In the following chapter, on "The Composition of Mind," Mr. Spencer shows the parallelism which exists between the evolution of mind and the evolution of matter —that is to say, there goes on subjectively a change "from an indefinite, incoherent homogeneity to a definite, coherent heterogeneity." But it is a parallelism only, and cannot be included in the terms of the formula of Evolution. Mental action is not the integration of matter and concomitant dissipation of motion, but the continuous differentiation and integration (?) of *states of consciousness.*

We now request the reader's attention to two points.

First, we would remind him of the problem of Philosophy with which we started, and of the formula of Evolution which was adduced as the solution of it, and ask him if that formula after the above extract can be held to contain an explanation of mind, of consciousness, of units of feeling? If not, then the formula fails as a solution of the problem of Philosophy.

On the other hand, if we amend the formula of Evolution as now proposed, viz., by the exclusion of the words matter and motion, the formula contains as its principal

idea whatever is meant by the word integration or is implied in the use of it, and the three factors are matter, motion, and feeling.

In this case the formula might be made to contain all the factors constituting the substance and activities of the universe, and might denote the general characteristic of the process of differentiation and recomposition, but it would have no constructive value; it would not enable us, that is to say, by its application to the homogeneous, to account for and build up the universe as we know it.

We are, therefore, compelled to conclude that, even upon the more extended field of three factors, however admirable and valuable the work which Mr. Spencer has undertaken for the elaboration of a synthetic philosophy, the amended formula is not valid as a solution of the problem of Philosophy. There may be a likeness of process and an inter-dependence, but we have not reached a constructive organon.

We must, however, do Mr. Spencer the justice to state, that although he holds these views as to the units of feeling, he still adheres to his view of Evolution as explained in "First Principles." It seems to us a contradiction; nevertheless, it is fair to him to state that he does so.

For this read sect. 55 in the "Principles of Biology," in which it is claimed that Evolution is continuous.

". . . Evolution being a universal process, one and continuous throughout all forms of existence, there can be no break, no change from one group of phenomena to another without a bridge of intermediate phenomena."

Geology is a continuation in detail of astronomy.

"The separation between biology and geology once seemed impassable, and to many seems so now. But

every day brings new reasons for believing that the one group of phenomena has grown out of the other. . . . The chasm between the inorganic and the organic is being filled up."

Page 138.—"Biology is a specialised part of geogeny, . . . and psychology is a specialised part of biology."

From this it would appear that we have nothing more in at the last, *i.e.*, psychology, than we had at the beginning, viz., matter and motion. The only difference is in the degree of complexity and differentiation and the complexity of the relations of aggregates of matter and motion. But Mr. Spencer, as we have seen, states that feeling or consciousness is inexpressible in terms of matter and motion, and hence the contradiction.

We are therefore forced to suppose that Mr. Spencer holds some tacit theory of development—a theory not merely of Evolution proper as defined sect. 97, p. 285, of "First Principles." "As ordinarily understood, to evolve is to unfold, to open and expand, to throw out, to emit; whereas, as we understand it, the act of evolving, though it implies increase of a concrete aggregate, and in so far an expansion of it, implies that its component matter has passed from a more diffused to a more concentrated state—has contracted. . . . We are obliged . . . to use evolution as antithetical to dissolution."

It is true, as pointed out by us, p. 103 of this criticism, that Mr. Spencer says, "All we can do is carefully to define the interpretation to be given to it;" but he winds up by saying that evolution is *not* merely antithetical to evolution, that it is, in fact, *more* than the antithesis of dissolution.

"While, then, we shall by dissolution everywhere

mean the process tacitly implied by its ordinary meaning—the absorption of motion and disintegration of matter—we shall everywhere mean by evolution the process which is always an integration of matter and dissipation of motion, but which, as we shall now see, is in most cases much more than this."

At the time we thought that the "much more" was conformable to the formula of Evolution, which only recognises two factors, matter and motion, and meant only the complexities of the relationships of the molecular and molar aggregates of matter and motion. But it now occurs to us that the "much more" must be the evolution of a new factor, which is not merely a relation of matter and motion, but a something of a different nature. If this is the theory, we ought to be informed, and the formula should be made to correspond.

It is sometimes said of two combinable substances, that if we know their properties we cannot know thereby the properties of their combination. But I maintain that if the properties of hydrogen are expressible in terms of geometry and mathematics, and the properties of oxygen are expressible in the same way, then the properties of the compound, water, are also capable of being worked out beforehand by any one who has the data. In the same way, if any one seeks to hide the evolution of consciousness under this plea, we reply that any one who has the data of the shapes, sizes, and motion of the atoms that constitute organic molecules can work out and state in terms of geometry and mathematics its property of consciousness in the same manner that the dynamic problem of water can be worked out and expressed. No new factor is introduced. If a new factor is introduced, then the theory and formula of Evolution must be changed so

as to account for the introduction, or failing to account for it, must admit it as an interfering factor, the origin of which is unknown.[1]

To conclude this part of our criticism, we find that the task we undertook, viz., to construct a formula which should express Mr. Spencer's exposition of Evolution, results in either a formula which omits naming the factors of the cosmos, and simply describes the general nature of their changes, though it does not disclose the law of their relations, or else it must include a third factor, viz., feeling, in which case again it does not disclose the law of its relations with the other factors. But both these formulas are vague and of no constructive efficiency. They both leave the problem of philosophy unsolved, and, properly speaking, are neither sufficient nor intelligible.

[1] Observe on p. 109 the loose manner of using the word "factor." "The *new factor* which differentiates chemistry from molecular physics *is the heterogeneity* of the molecules with whose redistribution it deals." If heterogeneity is a new factor, what are the functions of the factor?

PART V.

CRITICISM OF THE BOOK ON "THE UNKNOWABLE."

On the Relativity of all Knowledge.

THE doctrine of the Relativity of Knowledge appears to be this:—

After the establishment, in the course of evolution, of organisms with nerves and nervous centres, and the consciousness of nervous tremors which are made up of the little shocks which are the units of feeling, there supervened a knowledge or memory of them, and afterwards an integration of the knowledge of these consciousnesses by means of a process of distinguishment and grouping. Then arose the fact of the representation of these differences and likenesses by means of symbols, that is to say, names.

Knowledge is therefore said to be relative, because it is the knowledge of the manner in which the environment is related to us. We are ourselves the product of the environment, and our knowledge of our relations with it is the sum of our knowledge.

But knowledge is also relative because all our knowledge consists of the relations of things between themselves, or rather between different items of knowledge.

Knowledge includes two factors—that which knows or is conscious, and that which is known or is consciousnessed. Without either of these there would be no knowledge. Knowledge, therefore, is relative.

Naming is only legitimate when of actualities, or if founded upon actualities. Actualities are only either—

Matter, Motion } or combinations thereof,

and

Modes of consciousness.

Now, since naming is a mark of differentiation, a name implies more than the individual application of it. The name "apple" denotes the apple and implies other things that are not apples. Hence, all names are correlative. They denote the individual or group, and imply all others of the group or of the totality.

Thus "man" implies either all other objects or all other animals.

Thus "redness" denotes a particular sensation or a certain rate of motion, and correlates all other sensations of the same sort, or all other rates of motion that are received upon the eye.

So "hard" correlates all other feelings of pressure, and "round" correlates all other shapes.

All names, then, are relative, that is to say, all but one class of names, viz., the class of names relating to the totality of things. One thing comprised in a totality implies the rest. The totality implies only its constituents, and if relative, is relative only to the knower.

Let us consider them.

The cosmos.	The total.
The universe.	The whole.
Existence.	The sum.

These have no correlatives outside themselves, only to the contained, or to that part of the contained which cognises it.

The total implies the factors; the whole implies the parts; the universe, the cosmos, implies its constituents and nothing more. Existence is another name for the cosmos. If it has smaller applications in the singular number, and refers to particular combinations of matter and motion at particular times, its correlatives are other existences at the same or other times.

It may be said that existence implies non-existence, and that this is the true correlative. We reply that we are not dealing with words except as the representatives of things and experiences. A denial of existence is a denial of our consciousness, but we are only dealing with our consciousness and its products, and if we deny our consciousness, then all knowledge comes to an end and no names are required. A denial of existence is not an assertion of a positive non-existence, but simply an assertion of non-consciousness.

So, then, the correlative of "something" is not "nothing," but "other things." The correlative of "existence" is not "non-existence," but "co-existence." Non-existence is not a state or quality or relation of an object, and cannot be stated in terms of matter or motion or consciousness, which are the contents of all knowledge.

So names of groups regarded in one respect imply the individuals of their group, and in another respect all those which are not of their group. But, properly speaking, correlation is a term of differentiation rather than of likeness. When groups get so large that there is no differentiation, then there are no correlative terms. When

names include everything there is no differentiation and no terms of correlation. There is nothing to correlate with, and there is no requisition for a correlative term.

Let us now consider the term

"*The Relative.*"

Mr. Spencer applies it thus. We only have a knowledge of "The Relative." And since all knowledge is relative, he calls all known or knowable things, and all experiences of consciousness, "The Relative." Now, in what does this use of the term differ from "The Cosmos" or "The Universe"? It equally with them denotes the sum total of existence and all the included aggregations and modes of activity. It accentuates perhaps as a part of that totality of existence the inclusion in it of conscious beings, but it does not differ from them in the sum of its contents. Its correlative will, therefore, be (if it has any) all related things.

But Mr. Spencer argues that the correlative of "The Relative" is the non-relative. Now this is to be dealt with on the same lines as the term "Existence," as having for its correlative the term "Non-existence." We know of nothing that is not relative; we make use of the name "The Relative" not to mark off one class of experience from another class of the same sort, in which case any selected name implies the rest; but to express the totality of things, in fact, the cosmos, and to indicate specially either its knowability to us or its interdependence throughout, and if this special limitation implies marking off, it marks off only that which is not known or cannot be known.

Of the existence of any non-relative we do not know. It is beyond the pale of our knowledge.

But Mr. Spencer goes further, and gives a name to the non-relative, and calls it

"*The Absolute.*"

His argument in the matter we will consider presently. We would first enter a protest against the illegitimate naming of abstractions.

Generalisation is the naming of groups of aggregates or of states of consciousness.

Names such as redness, liquidity, &c., are not abstractions, properly so called, but generalisations, partly of states of consciousness, partly of the external causes of those states of consciousness.

Abstractions are such as vitality, space, time, &c.

Gravitation, heat, magnetism, &c., properly speaking, are only modes of motion of something. And these modes of motion are capable of geometrical and mathematical expression. Vitality differs from these, and is only the naming of a process or group of processes. It is nothing in itself. It is a useful term, and marks off these perfectly distinguishable processes from processes which are non-vital.

Space is an abstract of relations of distance, and of our experience of these relations. But it is not a real. It is a non-entity. It does not imply non-space, but the totality of distance relations. It is a convenient term, but it is only an abstraction.

So time is an abstract of the relations of sequence. No sequences, no time. Time is a non-entity, but a very convenient abstract term. It is the total of sequences, and its correlative is not non-time but groups of sequences.

There are no real antinomies. Every name means

only itself, and by implication every other. No name implies non-existence. One item of knowledge implies itself and its differentiation from all other items of knowledge.

Mr. Spencer, in his reply to Sir William Hamilton, admits that the whole correlates not with another whole or aggregate, but with its parts, which is an exactly similar view, and I ask the reader to co-ordinate the relative in the same way.

The relative, therefore, is equivalent to the knowable, and comprehends both the objective and the subjective. It is a name of the cosmical class, and implies nothing but what it contains. If any, its only implication is the correlative.

With these preliminary considerations let us now examine Mr. Spencer's chapter *On the Relativity of all Knowledge.*

Statement of the Argument of the Chapter, with detailed Criticism.

The argument of the chapter is this:—

"If, respecting the origin and nature of things we make some assumption, we find that through an inexorable logic it inevitably commits us to alternative impossibilities of thought; and this holds true of every assumption that can be imagined.

"If, contrariwise, we make no assumption, but set out from the sensible properties of surrounding objects, and, ascertaining their special laws of dependence, go on to merge these in laws more and more general, until we bring them all under some most general laws, we still find ourselves as far as ever from knowing *what it is which manifests these properties to us;* clearly as we seem to know it, our apparent knowledge proves on examination to be utterly irreconcilable with itself."

The assumption lying at the basis of this quotation is

that, given the contents of knowledge, as consisting of matter, motion, and perhaps consciousness, these, although sufficient factors to account for and explain all that is contained in our knowledge, are insufficient to explain, firstly, their origin, and secondly, their own nature. They are only appearances. There is *a something* of which these are the manifestations. There is a reality existing behind these appearances which we can never know.

Leaving out of the question the origin of things, let us inquire what is meant by this supposition of a reality underlying appearances of which matter, motion, and consciousness are but the manifestations. The question that naturally arises is, why we should form such a supposition at all. If we know sufficient of matter, motion, and consciousness to explain and account for all sequences, knowledge is complete.

It is only when we come to inquire backwards for the set of activities called causes immediately preceding certain others, and so on as far back as imagination can carry us—first, perhaps, to the origination of consciousness, and then still further back to the origin of the primal state of homogeneousness in the constitution of the sphere of like units, having equal mutual motions of attraction and repulsion, that the mind fails to understand. Its realities are its states of consciousness, and the causes of them in the environment. It does not regard them as appearances at all, for they are the only realities. It sees no necessity for the gratuitous assumption that they are not real, but only manifestations of a reality. It is for those who say so to prove it.

The question as to origin we will deal with hereafter. But if we simply confine ourselves to the contents of

knowledge we recognise no unknowable reality. If it is unknown and if it is unknowable it is not real. Since all knowledge is relative, real is a relative term, and means existence in relation to us and to other reals, the whole forming part of the universe of sequences, and therefore all reality is knowable. To speak of an unknowable reality is therefore a contradiction of terms. The unknowable, if anywhere, is at the beginning of matter and motion and consciousness.

Mr. Spencer says that "human intelligence is incapable of absolute knowledge." He uses this word in two senses; in one sense as equivalent to perfect or perfectly, in the other as relating to an unknowable reality called the absolute. In either case the remark is true.

However, Mr. Spencer's first object agrees with our views. He undertakes to show in this chapter that we can have no knowledge except of those things which are related to us and to each other.

He undertakes to show this by a consideration, firstly, of the product of thought, and, secondly, by a consideration of the process of thought.

An examination of the product of thought results in this:—

"For if the successively deeper interpretations of nature which constitute advancing knowledge are merely successive inclusions of special truths in general truths, and of general truths in truths still more general, it obviously follows that the most general truth, not admitting of inclusion in any other does not admit of interpretation. Manifestly, as the *most* general cognition at which we arrive cannot be reduced to a *more* general one, it cannot be understood. Of necessity, therefore, explanation must eventually bring us down to the inexplicable."

All this is undoubtedly true.

The same result is arrived at from a consideration of the *process* of thought.

This is worked out partly by means of an extract from Sir William Hamilton, who maintains the relativity of knowledge, and concludes that "the *absolute* is conceived merely by the negation of conceivability."

It is a mere blank, in fact. It is unthinkable, for if we think of it, it must be in relation, even if it be only as an unknown reality manifesting itself to us in matter, motion, and consciousness, and if it is in relation to the relative it is itself relative.

Mr. Spencer follows up by a long quotation from Mr. Mansel, in which the argument against the conceivability of the absolute is admirably stated.

"The absolute, on the other hand, is a term expressing no object of thought, but only a denial of the relation by which thought is constituted. To assume absolute existence as an object of thought is thus to suppose a relation existing when the related terms exist no longer."

In sect. 25 Mr. Spencer introduces a very clever argument, showing that life and mind being the establishment of correspondences with the external world, can only allow of knowledge (which is part of life and mind) comprising a knowledge of these correspondences and relations. Therefore all knowledge must be relative. "If, then, life in all its manifestations, inclusive of intelligence in its highest forms, consists in the continuous adjustment of internal relations to external relations, the necessarily relative character of our knowledge becomes obvious."

Sect. 26.—But although Mr. Spencer quotes from Sir William Hamilton and Mr. Mansel approvingly, and enforces their arguments by a very cogent one of his own,

the effect of which is to reduce the absolute to a negation, he nevertheless thinks it involves a grave error.

The logic he considers perfect if the premiss be correct. But he considers that the premiss excludes an all-important fact.

"To speak specifically:—Besides that *definite* consciousness of which logic formulates the laws, there is also an *indefinite* consciousness which cannot be formulated. Besides complete thoughts, and besides the thoughts which, though incomplete, admit of completion, there are thoughts which it is impossible to complete, and yet which are still real, in the sense that they are normal affections of the intellect."

Then follows some imperfect reasoning. In the first place, there is a want of continuity in the argument, for Mr. Spencer does not go on immediately to explain what he means by

"Normal affections of the intellect,"
of which
"Indefinite consciousness,"
"Incomplete thoughts,"

are the affections.

No doubt this is taken up afterwards, and in the meantime we merely make a note of it.

Mr. Spencer next says—

"Observe, in the first place, that every one of the arguments by which the relativity of our knowledge is demonstrated, distinctly postulates the positive existence of something beyond the relative. To say that we cannot know the absolute is by implication to affirm that there *is* an absolute. In the very denial of our power to learn *what* the absolute is there lies hidden the assumption *that* it is, and the making of this assumption proves that the absolute has been present to the mind, not as a nothing, but as a something."

The case is this: one party states that all knowledge

is relative—*i.e.*, of things to us and to one another. The term "the relative" is then invented, which is, in reality, only equivalent to "the cosmos," or "the totality of things." Then there is an erroneous impression derived from the naming of things according to their differentiations, as implying the existence of things that differ from them in respect of the absence of the special characteristic which is the signification of the given name; that such an implication extends to the totality of things, and that, therefore, "the relative" implies the existence of "the non-relative." The next step is to convert this negative term into a positive one, viz., "the absolute." The final step is when one party, denying the existence of "the absolute," uses the words, "We cannot know the absolute," is replied to by saying, "Then you admit the absolute exists?"

It is as if one said "Nothing exists." Here is a substantive and a verb. A substantive—*i.e.*—Something—exists; what is the name of that something? Its name is Nothing. Then something is nothing and nothing is something, and whatever it is it exists.

The test is, what does it do? How do we know of its existence? Let us have a description of it.

It is equally possible of

"The absolute exists"

as of

"Nothing exists."

The use of the negative sign is apt to be misleading. In the series 0, 1, 2, 3, &c., the figure nought stands for nothing. Yet it is there, and it is made use of. In the first place, as thus twenty and nought is twenty, *i.e.*, 20. It is also used as a remainder $1 - 1 = 0$. It is convenient to treat it as a something. We use it with the

verb "is," and, therefore, according to Mr. Spencer in his criticism of the employment of the word "absolute" in the same way, this nought is nothing, is something.

"The noumenon everywhere named as the antithesis of the phenomenon is throughout necessarily thought of as an actuality. It is rigorously impossible to conceive that our knowledge is a knowledge of appearances only, without at the same time conceiving a reality of which they are appearances; for appearance without reality is unthinkable."

In the first place, I do not know what phenomenon and appearances are in the Evolution philosophy. We have in it modes of consciousness, and we have matter and motion and their combinations. I suppose appearances relate to our modes of consciousness in correspondence with the environment. I suppose phenomenon, if it differs from the above, to apply to the relations of matter and motion irrespective of consciousness. The word "appearances," then, correlates the consciousness and the matter in motion, and the term "phenomenon" correlates matter and motion, or certain combinations thereof. In the former case the appearances imply something which is apparent, viz., matter in motion. "Things in themselves" are found to be not yellow and heavy and hot, &c., but matter and motion and our consciousness of them. Mr. Spencer has himself succeeded more than any one in explaining "things in themselves," although he has not explained consciousness.

Mr. Spencer concludes "an argument, the very construction of which assigns to a certain term a certain meaning, but which ends in showing that this term has no such meaning, is simply an elaborate suicide." The reply is, that we shall henceforth refuse to take a term which is found both unnecessary and misleading. We

shall be wary of inadvertently adopting it again, and shall neither use the terms "the relative" nor "the absolute," but confine ourselves to stating that all knowledge is of consciousnesses and their causes in the environment, viz., certain combinations of matter and motion.

Mr. Spencer next proposes "to analyse our conception of the antithesis between relative and absolute."

He says, "It is admitted that . . . the relative is itself conceivable as such only by opposition to the irrelative or absolute."

Sir William Hamilton says that there are cases where correlatives are merely negations, and these cases are not realities; therefore, the relative does not imply the positive existence of the non-relative or the absolute.

Our view of the matter was given at the beginning of the chapter, in which we said that wholes are only correlated to their parts, and that the term "the relative" is a whole, and, if it has any correlative, it is "the correlative" and not "the absolute." We, therefore, do not admit that "the relative" is itself conceivable as such only by opposition to the irrelative or absolute.

The difficulty is got over by recalling the process of naming. Naming is the distinguishment by symbols of differentiations of items of knowledge. Names denote specific differences of known objects, or modes of consciousness, or their relations. Therefore names only correlate with names of the known, not with the unknown.

Knowledge is of matter, motion, and consciousness only, and their relations. Names are only valid and have a meaning in respect of these. All valid names are limited to these. It is true we sometimes give names to imaginaries, to false ideas, and to abstractions treated as reals, such as force, vital principle, &c., but such mistakes

have to be rectified. Thus names being distinctive are bound to correlate, but can correlate with nothing but that from which the object or relation has to be distinguished, and this is obliged to be known or else it could not be distinguished, and the correlation cannot extend beyond the limits of the knowable, *i.e.*, matter, motion, consciousness, or their relations. It cannot extend to anything not known.

As knowledge extends the necessity for naming extends.

If, then, we say of anything that it is finite or limited, we recognise that it has boundaries known to us in contradistinction to those objects which have no known boundaries. The correlative in this case is not infinite or unlimited, but nescience of limits. The things are known, but not their limits. From these we mark off the things we know as having limits by calling them limited or finite. Names always correlate with other knowledge, never with the unknown. The correlative of a relative name must be a relative, and both must be in the sphere of the known in order to be able to be distinguished and thereby named.

It is only from a knowledge of both that difference is recognised, a name given and a correlation determined. There can be no such process between the known and the unknown, and, therefore, there can be no correlation between the known and the unknown.

Since all knowledge is relative to ourselves, it is limited to our powers of knowing. If an ant says of a forest it is infinite, it is because it is beyond its power of cognition. We know it to be limited, but say that the universe of stellar systems is infinite. But we do not know. The term is relative to ourselves. It means that we are

ignorant of limits in distinction from those objects we know as limited. Hence the correlative of finite is nescience of limits. So of the order of sequences. We can only personally cognise the sequences of less than one hundred revolutions of the earth round the sun, and history only records those of a few thousands of them. Beyond these limits we do not know. We say of our experience that it is limited. But the correlative of Finite Time is not Infinite Time, but nescience of the limits of sequences.

We cannot say of space and time that they are infinite or endless. We cannot grasp the meaning of these words. They are unrepresentable in thought. We can only say of them that we know no limits. Again, then, the correlative of finite and limited is nescience of limits.

Speaking of space and time, we must again say that they are mere abstractions and not reals. Without objects and sequences there could be neither space nor time. They are only abstractions of relations and have no correlatives.

What, then, is this Absolute? When we say of it that it is non-relative, what do we mean? Non-relative to us, or non-relative to the cosmos? or that it is a word that has no correlative? But, as a word, its correlative is the relative; so it is said. Does it mean that it is not related to our consciousness or knowledge? Then we know not that there is such an existence, and having no reason to suppose it, we drop the suggestion of it out of our minds at once. Or does it mean that it is not related to the cosmos? Then, again, it is utterly beyond our knowledge, and there is no utility in the hypothesis.

But it is said to have manifestations. If so, it is re-

lated to its manifestations, and is therefore relative; and through its manifestations it is known to us, and therefore it is relative to us; and it is therefore not The Absolute.

But absolute force is mentioned. This characterises absolute, and makes it relative to the cosmos and to us, and it is no longer the absolute. And again the passage occurs, "The absolute force of which we are conscious." Surely if we are conscious of it it is not absolute but relative.

Let us now consider Mr. Spencer's argument on p. 90. He says—

"Our notion of the limited is composed, firstly, of a consciousness of some kind of being, and, secondly, of a consciousness of the limits under which it is known. In the antithetical notion of the unlimited the consciousness of limits is abolished, but not the consciousness of some kind of being. It is quite true that in the absence of conceived limits this consciousness ceases to be a concept properly so called; but it is none the less true that it remains as a mode of consciousness. If, in such cases, the negative contradictory were, as alleged, '*nothing else*' than the negation of the other, and therefore a mere nonentity, then it would clearly follow that negative contradictories could be used interchangeably; the unlimited might be thought of as antithetical to the divisible, and the indivisible as antithetical to the limited. While the fact that they cannot be so used proves that in consciousness the unlimited and the indivisible are qualitatively distinct, and therefore positive or real, since distinction cannot exist between nothings. The error . . . consists in assuming that consciousness contains *nothing but* limits and conditions, to the entire neglect of that which is limited (*unlimited?*) and conditioned (*unconditioned?*). It is forgotten that there is something which alike forms the raw material of definite thought, and remains after the definiteness which thinking gave to it has been destroyed."

The question then is, What is this raw material of

consciousness and thought which, by having boundaries, is recognised as limited, but which, not having boundaries, must be called unlimited? Is it an indefinite consciousness which is not capable of analysis? It appears to me that this raw material can only be regarded, first, as the cosmos of matter and motion, and that it is indefinite according to the inadequacy of the correspondence between the inner activities and the environment, more particularly in the case of the infant from imperfection of growth to a normal standard; and, secondly, in the adult from want of education in the Evolution philosophy. But when this is learned there is no *raw material*, however much there may be of unorganised knowledge. Though we cannot grasp the boundaries of the cosmos, nor make our experience coeval with the whole history of its changes, we know that these cosmos and these changes are of matter and of motion, which are definite and comprehensible. And when we speak of the limited and of the nescience of limitation, we speak of definite objectivities, and not of an unknowable, and the conversion of such nescience into an absolute is a fault of reasoning.

Mr. Spencer says, however—

"Now all this applies by change of terms to the last and highest of these antinomies—that between the relative and the non-relative. We are conscious of the relative as existence under conditions and limits; it is impossible that these conditions and limits can be thought of apart from something to which they give the form. The abstraction of these conditions and limits is, by the hypothesis, the abstraction of them *only;* consequently there must be a residuary consciousness of something which filled up their outlines; and this indefinite something constitutes our consciousness of the non-relative or absolute. Impossible though it is to give to this consciousness any

qualitative or quantitative expression whatever, it is not the less certain that it remains with us as a positive and indestructible element of thought."

When we think of that which is limited and conditioned, we are obliged to think of matter and motion. We can only think of matter and motion as of a mass of ultimate units having shape, size, and modes and rates of motion. When we would go further back than this, and ask what it is that has motion, we say it is matter. When we ask still again what is matter, we say extension, *i.e.*, that which has shape and size and resistance. Beyond this we cannot go. The answer that Mr. Spencer would apparently give would be, "It is the absolute." There must be a something that is possessed of extension, resistance, shape, and motion. This something must have a name. It is the absolute. If we accept his answer, we remark that this absolute is conditioned and limited specifically, and in its totality by the totality and conditions of matter; that it corresponds in every way with the definitions of matter. It is an interchangeable term with matter, and therefore superfluous and misleading. The indefinite something is no more than our obscure appreciation of matter, and is admitted to be what Mr. Spencer claims: "A positive and indestructible element of thought." But it is not the absolute; and by its very title it cannot possibly be an element of thought, for every element of thought is related to an object of thought.

Mr. Spencer proceeds to show that if we do not admit the absolute we cannot think of the relative. He says that contradictories cannot be known except as in relation to each other. We ask, are correlated words contradictories? "And thus the relative can itself be con-

ceived only by opposition to the non-relative. It is also admitted, or rather contended, that the consciousness of a relation implies a consciousness of both the related members."

We notice here that the *adjective* "relative," as applied to our *knowledge* of the objective, to distinguish it from a hypothesis of knowledge which is not relative, or to knowledge which is beyond our reach—as, for instance, the whole of the past—*is changed into a noun*, "the relative," in which case it is equivalent to "the cosmos." And so, as the relative cannot be thought of without thinking of the related, then we are bound to think of the related term in accordance with the laws of the relations of the terms of wholes, viz., its component parts that make up the cosmos or its equivalent, the relative. Mr. Spencer says also that consciousness of a relation implies a consciousness of both the related members, but if the relative implies the absolute, then the latter, being present in consciousness, is a something that can be consciousnessed, is in relation to that which is conscious of it, and is therefore not "the absolute" or "non-relative."

Mr. Spencer next proceeds to show that both Sir William Hamilton and Mr. Mansel "distinctively imply that our consciousness of 'the absolute,' indefinite though it is, is positive and not negative." This assertion respecting them appears to be justifiable, but it is certainly inconsistent. However, as they have already clearly proved along with Mr. Spencer that we can know nothing beyond "the relative," not even that there is anything beyond "the relative," we must count it for nothing, particularly as the statement is not reasoned out as presented by Mr. Spencer. At the same time, Mr. Spencer himself maintains the existence of "the absolute," and we confine

ourselves to his arguments. We may ask—What is the meaning of "positive"? Is it not an actuality in relationship with another actuality? If so, to say that "the absolute" is positive is to say that it is relative. When the absolute becomes positive it commits suicide.

But the belief in the "positive character of our consciousness of the unconditioned" is rendered more certain by other considerations. We cannot conceive of space and time as limited or unlimited, nevertheless "there is yet in our minds the unshaped material of a conception." So, also, we cannot form a circumscribed idea of cause, "and we are consequently obliged to think of the cause which transcends the limits of our thought as positive though indefinite." "The momentum of thought inevitably carries us beyond conditioned existence to unconditioned existence; and this ever persists in us as the body of a thought to which we can give no shape."

We reply that there is no entity called space; all we know is matter and motion: and there is no entity called time; all we know is sequence. The relations of the former, size, shape, and distance, give rise in us to the abstraction "space," and the relations of the latter give rise in us to the abstraction "time;" neither is there an entity called cause, the sequences of events being determined by the combinations of matter in motion in relation to other matter in motion.

There is, it is true, a momentum of thought, but it carries us back, not to unconditioned existence, which means "nothing," but to a question as to final causes—what caused the matter and the motion? The reply is, we cannot know. But this is not the body of a thought; it is a mere blank.

Mr. Spencer next goes on to discuss real existence,

concluding, "Yet, as we cannot expel the entire contents of consciousness, there ever remains behind an element which passes into new shapes. The continual negation of each particular form and limit simply results in the more or less complete abstraction of all forms and limits, and so ends in an indefinite consciousness of the unformed and unlimited." Here Mr. Spencer is speaking of the state of our minds, not of the objective world, and to this state of our minds he would make the objective world correspond. We must say that we fail to accomplish what Mr. Spencer asks us to do. We can imagine the solar system dissolved, and the whole cosmos reduced to its original ultimate units, but we cannot think of these ultimate units as having no shape or size. It is just as unthinkable to think them out of existence as to think them into existence. And as to the quantity of them, we cannot think of it otherwise than as limited, however vast; and if we are to call this "the absolute," it simply means the primal cosmos.

Mr. Spencer may well ask (p. 94)—

> "How can there possibly be constituted a consciousness of the unformed and unlimited, when, by its very nature, consciousness is possible only under forms and limits?
>
> "Such consciousness is not, and cannot be, constituted by any single mental act, but is the product of many mental acts. In each concept there is an element which persists. It is alike impossible for this element to be absent from consciousness, and for it to be present in consciousness alone; either alternative involves unconsciousness—the one from the want of the substance, the other from the want of the form. But the persistence of this element under successive conditions *necessitates* a sense of it as distinguished from the conditions, and independent of them."

Here we have a substance, viz., matter, and we have it variously conditioned in shape, size, mode and rate of

motion, and the question reverts to the identification of matter or ultimate units, or the homogeneous, with "the absolute," as before discussed.

But Mr. Spencer would assist us by an illustration. We are asked to take away from the notion of a piano the conception of strings, hammers, dampers, pedals, and visual appearance. By doing so we get an indefinite notion of general existence. "By fusing a series of states of consciousness, in each of which, as it arises, the limitations and conditions are abolished—there is produced a consciousness of something unconditioned." We are asked, in fact, to follow out the process of dissolution, and when we have arrived at ultimate units, which is the notion of "general existence," we are asked to think these away, and the remainder will be in this case

Something unconditioned = the absolute = nothing.

"This consciousness is not the abstract of any one group of thoughts, ideas, or conceptions, but it is the abstract of all thoughts, ideas, or conceptions. That which is common to them all, and cannot be got rid of, is what we predicate by the term existence. . . . It remains as an indefinite consciousness of something constant under all modes. . . . The distinction we feel between special and general existence is the distinction between that which is changeable in us and that which is unchangeable." But we are not conscious of anything that is unchangeable, and general existence is only the totality of things; we have no consciousness of something constant under all modes; and as to an "abstract of thoughts, ideas, and conceptions," we cannot understand what is meant. It is evidently a purely mental process relating to thoughts

and modes of consciousness, and does not relate to the constitution of the cosmos.

Page 96.—"The contrast between the absolute and the relative in our minds is really the contrast between that mental element which exists absolutely and those which exist relatively."

What is a mental element? What is meant by its existing? How does it exist relatively? And what is meant by its existing absolutely?

With respect to the latter question, it is evident that, if it exists as a mental element at all, it does not exist out of relation, and, therefore, not absolutely.

It is very evident that the absolute that Mr. Spencer argues for is identical with the primal state of matter in motion, in relation, under limits and conditions to our consciousness. We know that things do not exist as we know them, viz., as red, hot, sweet, loud, &c., and that even the relations of aggregates of matter and motion, which cause the vibrations, &c., which affect us, and to which we give these names, themselves are differentiations from a primal state of matter; and it is either this primal state, or the same as involved in the totality of existence, that gives rise to the notion of general existence, or the absolute, or that which persists under changeable forms, and thus we can understand with Mr. Spencer in the concluding sentence of the chapter "how impossible it is to get rid of the consciousness of an actuality underlying appearances, and how from this impossibility results our indestructible belief in that actuality."

What that actuality is we have already seen. It is not the absolute—a fiction utterly unworthy of credence—but the ultimate units of matter and motion.

On Ultimate Scientific Ideas.

Science is systematised knowledge. Knowledge consists of a more or less perfect cognition of the knowable. Ultimate ideas of the knowable are those of the most general character, and are naturally the factors dealt with in the formula which generalises the relations or history of the knowable. We, therefore, naturally refer to the book on "The Knowable" for an estimate of ultimate scientific ideas. We are surprised to find them treated of in the book on "The Unknowable."

The formula of Evolution, which sums up all knowledge, is this, "Evolution is an integration of matter and concomitant dissipation of motion, during which the matter passes from an indefinite, incoherent homogeneity to a definite, coherent, heterogeneity, and during which the retained motion undergoes a parallel transformation."

Now this formula, being placed in the book on the knowable, is supposed to have an intelligible meaning—to be capable of being known and understood. Otherwise it could not be advanced as a formula which is capable of explaining the history of the universe. And each of its terms is to be supposed to have a definite meaning, otherwise what is the use of it?

The ultimate scientific ideas, then, are matter and motion.

Let us consider for a moment the nature of knowledge.

Life is defined as the continuous adjustment of inner and outer relations. Mind as part of life is regarded as the establishment of correspondences between inner and outer relations. The absence of one end of a correspondence precludes knowledge. There must be the twofold

relation. These correspondences are called actualities or realities, and are the only actualities and realities that we know.

To the objective as well as to the subjective parts of these correspondences we give names as well as to the inter-relations of each within itself.

Consequently, the term matter has a definite meaning, and the term motion has a definite meaning, and thereby only can the formula of Evolution be intelligible and valuable.

What are these meanings? They are given in Book ii. chap. iii., and have already been considered by us in the course of our criticism.

But Mr. Spencer says in the chapter now under consideration that they, with the notions of space, time, and consciousness, are incomprehensible.

But after all, it is only the subject-matter of the last chapter over again. What we include in the terms we know, and, therefore, we know what we mean by the terms. But somebody thinks, we know not who, and we know not why, that there ought to be something else in the terms, and that something else we do not know and cannot understand. But it must have a name, and it is to be called noumenon, or the absolute, or essence, or some name which, having no meaning, shall be fitted as near as possible to represent that which has no existence.

This will be seen by a consideration of sect. 21, in which Mr. Spencer says, "Ultimate scientific ideas, then, are all representative of realities that cannot be comprehended." He says we cannot understand "that which remains behind" nor the "intrinsic nature" of phenomena. "Force, space, and time pass all understanding;" he "can give no account either of sensations themselves

or of that something which is conscious of sensations;" "in its ultimate essence nothing can be known." So also in "time" there is an impossibility of thought both in the remote past and as to the extreme future. And again, "objective and subjective things he thus ascertains to be alike inscrutable in their substance and genesis."

From this it would appear that there is a matter, motion, space, time, and consciousness which we do understand, because they come "within the range of experience," and which are included in the formula of Evolution and its subsequent exposition; and there is another set which we do not understand, because we are prevented by our "impotence in dealing with all that transcends experience." Or it may be better stated that the matter, motion, &c., that we do know are manifestations of a presumed something that we do not know; and we are thrown back upon the discussion contained in the last chapter.

However, we come to this as a conclusion: that ultimate scientific ideas are within the domain of the knowable, and that when we make use of the words matter, motion, &c., we mean something definite and expect to be understood.

If we say that the ultimate ideas contained in the knowable are not knowable, why are they retained in the knowable? But ultimate scientific ideas, to be ideas and to be scientific, must be known, and it is a mistake to class them with the unknowable.

If we say that they are only manifestations of something else which we do not know, and which may have other manifestations which we do not know, such a something is beyond the pale of science and is not an ultimate scientific idea.

And if we say that we cannot account for the genesis of things or of consciousness, this confession of ignorance cannot be converted into an ultimate scientific idea.

Ultimate scientific ideas, then, are comprehensible, else they would not be scientific, *i.e.*, knowable. Mr. Spencer says that they are "all representative of realities that cannot be comprehended."

It is true that beyond the ultimate we know nothing. All beyond is hypothesis. We do not even know enough to say that the matter and motion that we do know are manifestations. All is a blank.

On Ultimate Religious Ideas.

As "religion" is a word of very wide and vague meaning, it is capable of definition and application in a great variety of ways, according to the discretion of the writer.

To us it appears to involve two items. Firstly, an idea, and, secondly, an emotion to which this idea is related.

This emotion has been very variously directed with more or less of logical guidance, and sometimes with none at all. And it is an emotion associated with other emotions producing very complicated results.

It is not, however, our purpose to write an essay upon the subject, but only to bring out our view of the intellectual element of the object contained in all the great and predominant manifestations called religious.

And it appears to me that this main idea has been the recognition of external non-human will.

The association of action with individual will, with design and intention, is one of the earliest experiences of infancy. So in the infancy of the human race all such activities and variations of activities, especially of those

that are unexpected, except, perhaps, those uniformities of nature which daily familiarities have caused to be taken as a matter of course, have presumably been associated with manifestations of external will.

There would be accessory causes of such beliefs, as so carefully shown by Mr. Spencer and Mr. Tylor in their expositions of the growth of a belief in the existence of spirits of departed chiefs, &c.

In monotheism, as in polytheism, the hopes and fears, the religious adoration and theological teachings, all centre round the supposed relations of human wills with the Divine Will, and in accordance with the belief in the extent of the relation between the human wills and the Divine Will have been the variations and perturbations of religion.

And even when the Divine Will has been placed back in its relation to the human right away at the beginning of things or at the beginning of humanity, still the religious sentiment found its legitimate object, more particularly if a constant though purely spiritual communion was recognised.

And even pantheism finds a shadow to cling to in a Being that, although working itself out, is doing so to a well-ordered end.

But when pantheism takes the form of a blind development anywhere, anyhow, and towards no specific end, and the human will forms no part of a relation to another will, then the legitimate religious idea, as defined and justified at the commencement of this section, has escaped from the mind. There may be vague hopes and aspirations left which will make the intellect frame for its satisfaction some vague object, but the essential point of a religion is gone.

But if this is denied, and it is said that we have no right so to limit the use of the term religion, we would point out that although there may be a justification of the varied use of an indefinite word, there is in this case a *marked departure* in the employment of the term. There is a distinct change of the intellectual position in this respect, that there is no longer any relation of will to exterior will. And even although there may be a desire for a conformity to human will and for harmony with the grand course of things, there is no personality in the relationship. The object of the sentiment is not a personality—an individual. There is a marked change of intellectual attitude.

And this idea of a relation to an external will will be found, I think, to be the main idea which, on the part of religion, has been in conflict with that progress of science, or the systematisation of knowledge and of events which forms the gist of the next chapter.

The Conflict.

To the extent that men have believed in invisible, external, personal wills, to that extent have they adapted their conduct thereto, in the same manner that they have adjusted their actions to visible external personalities. These invisible beings have been supposed to possess likings and antipathies, and to have required propitiation and deference. They have been regarded as taking an interest in human affairs and in the conduct of individuals; to be capable of displeasure and vindictiveness, and susceptible to persuasion. The character of these invisible beings has depended for the most part upon the intellectual calibre and moral advancement of different peoples, but in all cases they have been regarded as sus-

ceptible to pleasure and displeasure, and in accordance therewith to have dealt with the fates of individuals and nations.

It is obvious that the non-recognition of this authority on the part of any individual or individuals would naturally cause displeasure on the part of the rest of the community in much the same manner as high treason against the head of the state. A defiance of the power of the invisible personalities would shock the educated associations of awe and veneration; it would render a defence of their invisible friend or ruler urgent, the fear of involving the community in the offences of the one, the fear of others being led away into similar dangerous courses, would all combine to resist and condemn any innovations of thought which would largely bring the course of events into the class of scientific order, and remove them from the domain of external personal power.

And this has been the nature of any conflict there has been between science and religion.

It is true that the conflict has been rendered more dignified, and perhaps, at the same time, made more intense, when the invisible external will has been regarded as possessing universal power, and as being related to humanity as a moral lawgiver, more particularly when associated with the doctrine of eternal damnation as the consequence of the merited displeasure of that being. But the conflict has always been essentially of the same character, viz., as to the extent to which events are attributable to natural orders of sequence, and the extent to which they are amenable to a Divine interference.

Nor has the conflict been uninfluenced by collateral considerations. Grave and serious persons could not view without alarm any innovations which might do

away with the groundwork and authority of good conduct. Without a lawgiver, without a system of rewards and punishments, where would be the majesty and the imposing force of moral law? and where would be the incentives to a virtuous life and the deterrents from a vicious one?

Such has been the nature of the animus against the advances of science. On the part of science there has been no animus, but the simple advance of inevitable logic.

The result has been the continually increasing limitation of the area of activity of an invisible external will and an increased recognition of the extent of a natural order of sequences.

Any Reconciliation?—Statement of the Difficulty.

The question arises, How does religion view the Evolution theory? If we adopt the formula of Evolution, then all events of the universe are accounted for by the integration of matter and the concomitant dissipation of motion, and there is no room left for an external will. This notion is simply abolished. There is no religion left at all in the sense in which we have been using the term.

It is true that the sentiment which has attached itself to the external personality may be transferred to some other object, some abstraction called the universe or humanity, and so afford satisfactory exercise for the natural sentiment, but the intellectual function is totally changed, and it is that only with which we have to do. It is that which has been the essence of the conflict.

Mr. Spencer's Solution of it.

But Mr. Spencer advances a hypothetic reconciliation.

Every religion is regarded by him as a theory of the origin and order of things.

Page 44.—"Now every theory tacitly asserts two things; firstly, that there is something to be explained; secondly, that such and such is the explanation. Hence, however widely different speculators may disagree in the solutions they give of the same problem, yet by implication they agree that there is a problem to be solved. Here, then, is an element which all creeds have in common. Religions diametrically opposed in their overt dogmas are yet perfectly at one in the tacit conviction that the existence of the world with all it contains and all which surrounds it is a mystery ever pressing for interpretation. On this point, if on no other, there is entire unanimity."

This soul of truth underlying the grossest superstitions is found to be "the constituent which may be claimed alike by all religions," and in every respect answers to proper requirements.

It is "the vital element in all religions," for it is the element which survives every change, and thus is capable of including even atheism within the definition of religion.

The vital element of religion is, however, very variously expressed, as thus:—

Page 44, line 6—"A problem to be solved."
„ 44, „ 11—"A mystery ever pressing for interpretation."
„ 45, „ 14—"Inscrutableness of creation." ("Thus, while other constituents of religious creeds one by one drop away, this remains and ever grows more manifest, and so is shown to be the essential element.")
„ 45, „ 23—"The omnipresence of something which passes comprehension" ("that most abstract belief which is common to all religions").
„ 46, „ 6—"A far more transcendent mystery, . . . not a relative but an absolute mystery" (whatever an absolute mystery may be).

Criticism thereof.

Now, if this is to be accepted as the essential element of religion, a reconciliation with science is easy and obvious. For what are the pursuits of science but an endeavour to ordinate and systematise knowledge, leading up in the end to an endeavour to embrace all knowledge in a comprehensive formula, and then to ask what beyond that?

In fact, all through the chapter on ultimate religious ideas religion is only science in disguise. What is treated of is the scientific or knowing element in religion; the only speciality about it being that it is concerned with the wrong end. It occupies itself with the beginnings of the universe. It is scientific speculation. It endeavours to explain the universe, and, separated from the religious sentiment, its hypotheses are simply and purely intellectual speculations, as is the Evolution theory.

Taken in this point of view, religion and science are identical and require no reconciliation. In fact, they have in this respect never been in conflict.

It is as if two people going to law may be said to be fundamentally agreed in that they both admit that there is a problem to be solved; they only differ in the minor point as to the possession of a certain amount of property. So any two people having any dispute may be said to be agreed in this, that there is a problem to be solved, and thus anything can be reconciled to anything.

But it may be well asked what is the value of such a reconciliation?

But a different basis of reconciliation is adduced, viz.:—

"If religion and science are to be reconciled, the basis

of this reconciliation must be this deepest, widest, and most certain of all facts: that the power which the universe manifests to us is utterly inscrutable."

This idea is worked out in chapter v.

In the first place, the absolute is asserted to be a necessary datum of consciousness. This is the basis of agreement we set out to seek. Various modes of science agree in the assertion of a "reality utterly inscrutable in nature," and in it "religion finds an assertion essentially coinciding with her own."

Religion from the very first has always acknowledged a mystery. It has constantly done battle for the doctrine "that all things are manifestations of a power that transcends knowledge."

Science is obliged to acknowledge the same ultimate truth, in that, however much it may succeed in formularising knowledge, and thus succeed in affording explanations of sequences, it can never get beyond a certain point. If from the homogeneous, made up of matter and motion, it can explain the universe, it cannot explain the existence of that matter and motion nor the fact of the mutual relations of matter and of motion, and, therefore, it is obliged to suppose an initiatory power that transcends knowledge.

We do not ourselves see the practical value of such a reconciliation. What is the value of a mystery, of a problem to be solved, of an inscrutable power that only manifests itself to us in the formula of Evolution as applied to the homogeneous? It is of no scientific value. If we ask, Has it a religious value? then, since in Mr. Spencer's view this question would mean, Has it any value in explaining the origin of things? we would reply, It has no value in this respect. But if we mean religion as

heretofore defined by ourselves, then again we would reply, It has no value. It is no item of knowledge; it is no item in our emotional nature; it is no item in our environment to which it is necessary to adapt ourselves. Its interest to us is *nil.*

It is only of value when we begin to attach to it any definite ideas of personality, or regard it as possibly containing such an idea. Then indeed it becomes a matter of interest to us, and resumes its place as an object of religious importance, taking religion as defined by us.

Possible Modes of Reconciliation.

It would not be difficult to enumerate the possible modes of reconciliation between the identification of the Inscrutable Power with personality, and the ultimate conclusions of science as expressed in the formula of Evolution. And this is the reconciliation that is asked for by the mass of mankind permeated by religious ideas. The very abstract agreement proposed by Mr. Spencer is regarded as a reduction to vacuity.

Such modes of reconciliation would divide themselves into classes.

1. Theories of personal origin, with intention and forethought, with an ultimate relation to human personalities.

2. Pantheistic theories, in which, in some way, the original personality is related to some or all human personality.

3. Theories of an original constitution of the cosmos and of its order, according to the formula of Evolution, and subsequent Divine communion with human personalities.

4. Theories similar to the last, with the addition of more or less Divine intervention in the natural order of

things, going even so far as to give a revelation of the Divine will and purposes.

It is not, however, our business to consider these. We mention them only as indicating the kind of reconciliation that is required in respect of a settlement of the actual conflict that has taken place throughout all ages in the names of science and religion, and to show how far off is Mr. Spencer's solution from solving the difficulty as it exists and has existed in the minds of men.

Dynamism.

But if we are to exclude from our consideration altogether any belief in an invisible external will, either at the beginning, the present, or the end, and if we are to take consciousness as itself but a mode of matter and motion, then we have to accept the formula of Evolution as the all in all.

Such a result would most profoundly affect the hopes, the aims, and the conduct of mankind.

It would not be fair to advance adverse criticism of Mr. Spencer's "Principles of Morality" before publication, although their nature can to some extent be foreseen. But it would seem, *prima facie*, that the work will fundamentally alter the grounds of moral obligation.

If, as we surmise, conduct will be regarded as the adjustment of organisation and environment, then the completeness of this adjustment is the aim of individual endeavour. To this aim all others must be subordinate. All the old notions of conscience, duty, &c., must give way. They themselves will derive their only authority therefrom as part of a social organism.

One is naturally inclined to ask, What will be the

result on individuals of the promulgation of this doctrine, and, in the course of time, what would be the result on society at large?

In this matter I am but expressing the vague fear of an unknown future. I must own also that in doing so I am departing from the main theme of my criticism, which is the formula of Evolution as accounting for the cosmos, as we know it.

Conclusion.

Our task of criticism may now be considered as complete. It might have been made longer, and it is not out of any disrespect that the many important points have been treated so summarily. It has been our object to be as concise as possible. The criticisms are such as came up in our endeavour to understand and master the full scope of Mr. Spencer's book. We submit them for the consideration of the students of the new philosophy.

PART VI.

THE FOREGOING AS AFFECTED BY MR. SPENCER'S "REPLIES TO CRITICISM."

On the completion of the foregoing criticism I read carefully Mr. Spencer's "Replies to Criticism" (Essays, vol. iii.), in order to see if any of the points had been already discussed, and I find that the question as to The Absolute and one or two other matters call for a few further remarks.

The Absolute.

The question as to The Absolute seems to me all verbiage—I say it with due respect—to be a discussion of no practical application or value—to savour too much of old metaphysical treading out the chaff.

The discussion seems to arise from the proposition "All knowledge is relative." Now this is no doubt true enough. It is the realisation of a certain truth in our own minds in its enunciation, but it does not seem to lead to anything else except in the hands of mystics. It simply asserts the fact of a correspondence between the knower and the known—the subject and the object—and presumably of relations amongst the items of the object. But immediately thereupon the mystic calls The Known and its interrelations The Relative. After all, it is *knowledge* that is being spoken of and its relativity, not The

Relative or The Known. But if we admit The Relative, it is so from the fact of its being known, and its correlative is The Knower.

But if we say The Relative implies the Non-relative, here it seems to me we have a something—an entity actually growing out of a word. We have an entity to which we give a name, and out of this name we construct another entity of which we had no idea beforehand; a piece of word-jugglery that I cannot understand. It can be replied to by similar verbal ingenuities; for if The Absolute—another name for the Non-relative—is made correlative with The Relative, it is put into a relation and ceases to be absolute, *i.e.*, non-related.

But the question really seems to be, Is there an "inscrutable Force" of which all things are manifestations? If so, why call it by such a name as the Absolute and rely upon verbal subtleties for its proof? But Mr. Spencer thinks, upon other grounds, there is such an "inscrutable Force."

His argument is this. We are able to account for and ideally construct the whole universe on the application to the homogeneous of the formula of Evolution, which contains the two factors "matter" and "motion." These are the ultimate scientific—*i.e.*, knowable, comprehensible — ideas, otherwise the formula would be valueless as an unification of knowledge. This matter and this motion are fixed quantities, and work out all subsequent developments purely from interrelations and combinations due to primal gravitation or motion towards each other.

But after all, he says, we cannot understand matter and motion "in their ultimate natures" (Essays, vol. iii. p. 258). I must say that I do not know what this

means. It seems to me that, if I understand the interrelations of matter and motion and their combinations, I understand their natures. I know their value as factors in Evolution, and it is quite gratuitous to say that they have any other natures, and quite valueless. What is the meaning of "ultimate nature" and "things in themselves"?

Mr. Spencer says, "Essays," vol. iii. p. 262:—"I have contended . . . that the consciousness of that which is manifested to us through phenomena is *positive* and not *negative*." I truly admit with him that that of which we are conscious is positive and not negative. But of what are we conscious? Nothing but motion, or matter in motion, or matter and motion, whichever is the best way of putting it. The modes of consciousness differ, for the combinations and modes of matter and motion are so varied, but our consciousness is limited to these. Even if we take consciousness of our own bodies, it is only consciousness of matter and motion, according to the formula of Evolution. Why must we say they are something else, or manifestations of something else? Surely it is most gratuitous. If they are manifestations of something else which we choose to call an "inscrutable Force," then, since this Force is limited in its mode of manifestation by matter and motion, the quantity of which is fixed, and the whole series of cosmical sequences is a resultant of the original quantity without any guidance or interference, then the inscrutable Force amounts to nothing in the course of things, and is not immediately conscious to us—is but a device of the intellect with respect to the far-off primal constitution of things.

But if it is a present factor in the universe—as it may be—then it is an incalculable, unknowable element,

and no formula of philosophy is possible, and Mr. Spencer's synthetic philosophy no use.

And certainly it is to that far-off primal constitution of things that we are forced by the Evolution philosophy to relegate that "inscrutable Force."

The mind naturally seeks backwards for the set of activities which produced the later sequences, and so on back to the beginning. And what are we to say of that? Are we to say that things must have been created and constituted by an "inscrutable Force"? That is the only place left for it by Mr. Spencer. But Mr. Spencer has examined every possible theory of the beginning of things, and finds that there is no conceivable hypothesis —only Nescience.

Why, then, should we not content ourselves with Nescience to start with, and the formula of Evolution to go on with?

If this is insufficient, then Mr. Spencer's Evolution philosophy is insufficient.

On Mind and Matter.

The charge of materialism comes up several times in Mr. Spencer's replies to critics. Can we wonder at it? His formula of Evolution only comprises matter and motion, and the subsequent Evolution only recognises them. When he says that we only recognise matter and motion as modes of Force or manifestations of Force, which is itself inscrutable, the explanation does not do away with the charge, for all that is then meant by the charge, accepting the interpretation, is that all the cosmos, including humanity, are modes of these manifestations of Force called matter and motion. All sequences, including life and mind, are, firstly, modes of matter and motion, and

are included in the synthesis of the formula of Evolution; and secondarily are, from the fact of matter and motion being modes of something called Force, modes of that Force which we call inscrutable, because we predicate its existence, although we have no reason for doing so.

Twice in the course of his replies to critics, Mr. Spencer quotes the following passage as a reply to the charge of materialism:—

"See, then, our predicament. We can think of matter only in terms of mind. We can think of mind only in terms of matter. When we have pushed our explanations of the first to the uttermost limit, we are referred to the first for a final answer; and when we have got the final answer of the second, we are referred back to the first for an interpretation of it. We find the value of x in the terms of y; then we find the value of y in the terms of x; and so we may continue for ever without coming nearer to a solution."—*Prin. of Psy.*, § 272.

This is true enough, but what we want to know is—is mind included in the formula of Evolution? That formula is supposed to embrace everything, for it is advanced as the unification of all sequences from The Homogeneous; and, amongst others, it is supposed to account for the coming into existence of those feelings and modes of consciousness which constitute "Mind." We may be in the puzzle described, but, as regards the validity of the Evolution philosophy (Evolution meaning concentration and its effects, and not unfolding), we want to know if mind is included in it. Evidently in a complete synthetic philosophy it must be, and can only therefore be a mode of motion of matter. The charge, therefore, against the Evolution philosophy on the ground of being materialistic seems to hold good.

Mr. Spencer speaks of "the inscrutability of the rela-

tion between subjective feeling and its objective correlate which is not feeling—an inscrutability which meets us at the bottom of all our analysis."

This is indeed the great stumbling-block. This inscrutability, as well as the action of the "inscrutable Force," seems to preclude the possibility of a synthetic philosophy which shall unify all knowledge. Amidst so many inscrutabilities how can we hope for an intelligible synthesis?

The objective world we may know, and the subjective world we may know, and Evolution or Development we may darkly recognise, but of a formula that is capable of reducing them all to one explanation we despair.

But this passage requires a little more examination:—

> "We can think of matter only in terms of mind. We can think of mind only in terms of matter, . . . and so we may continue for ever without coming nearer to a solution."

What are the terms of matter, and what are the terms of mind? We presume the terms of matter include the terms of motion. We presume that matter and motion are never disassociated, for they are the two factors recognised in the formula of Evolution. The terms of matter are extension, and the terms of motion are relations of movement, both capable of representation geometrically and mathematically. The terms of mind are feelings or consciousness of some of these combinations of matter in motion. Therefore, when Mr. Spencer says that we can only think of matter in terms of mind, he means that that combination of matter in motion which is called a human organism can only think of matter and motion in terms of its own consciousness of matter and motion, either internal or external; and when

Mr. Spencer says that we can only think of mind in terms of matter, he means that without this combination of matter and motion which constitute the human organism there could be no thinking, and that as this thinking is only the consciousness of matter in motion, therefore we are obliged to describe it in terms of matter, *i.e.*, in terms of geometry and mathematics. It is not meant, I suppose, that the consciousness can be so described, but that everything of which we are conscious can be so described.

And this brings us again to the inquiry, Was there anything in the primary homogeneous more than matter and motion? There is nothing else recognised in the formula of Evolution. So we presume Mr. Spencer means to imply that life and all its developments, including consciousness, are merely modes of matter and motion. If so, the charge of materialism is valid.

As to how we think and the terms we use, that brings us back to the subject of the Relativity of Knowledge. Terms are names we give to items of Knowledge. Properly speaking, there are no "terms of matter." All terms are mental. There are terms relating to subjective facts, and there are terms relating to objective facts. Some of the latter may be called "terms of matter;" properly speaking they are terms of our consciousness of matter. And in any case, the discussion as to our modes of thinking and difficulties of language does not affect the question of fact as to whether the formula of Evolution is not materialistic, *i.e.*, capable of explaining all things, including life and mind, as temporary combinations of extension and motion capable of being represented geometrically and mathematically.

RECAPITULATION.

To recapitulate, I will remind the reader of the plan of this criticism.

First, I asked "What is the Problem of Philosophy according to Mr. Spencer?" and I found that it was "*To state an intelligible formula, which, by its application to the homogeneous, will explain and enable us to construct, ideally, all the changes of the universe.*"

I then gave the formula advanced by Mr. Spencer, which, although intelligible, proved to be utterly inadequate, inasmuch as its two factors, Matter (*i.e.*, extension) and Motion do not explain Life and Mind.

I then attempted to amend the formula by the introduction of the term Force—a term largely employed by Mr. Spencer, but omitted from the formula—and I found the result unintelligible.

I next endeavoured, from a study of Mr. Spencer's exposition, to frame a formula that should be a true representation of it, which formula proved to be so vague and unsatisfactory that it was really useless for our purpose.

From this I have concluded that Mr. Spencer has failed in the task he set himself, and that the Problem of Philosophy remains, so far as our studies have extended, unsolved.

APPENDIX.

AN ACCOUNT OF THE PRINCIPAL CRITICISMS OF MR. SPENCER'S PHILOSOPHY.

Having thus completed our own study of Mr. Spencer's main theses, we naturally turn to a consideration of the manner in which his work has been regarded by other minds. We know the high estimation in which Mr. Spencer's labours are deservedly held by most thoughtful men, and especially by men of science. We know that there is sufficient justification for this in the more scientific and detailed labours of the later volumes of his work, quite irrespective of the large claim set up for his philosophy in the first volume, and of the particular formula we have just disputed.

I have therefore searched around on all sides to enlarge my judgment, and for the use of the student of Spencer's works I append the result of my reading. I must acknowledge my surprise at the absence, so far as I can ascertain, of a thoroughly exhaustive criticism of "First Principles," although the main deficiencies of the theory propounded have been vigorously handled by several eminent thinkers in articles contributed to reviews.

I first referred to some of the critics to whom Mr. Spencer has himself replied. As a rule, I find that the term "evolution" has not been used in any very definite sense. It seems to have been understood generally as an orderly progress of some sort. Some writers, however, have accepted it in the very restricted sense as defined by Mr. Spencer, viz., the concentration of matter and concomitant dissipation of motion. Others, again, have admitted, as Mr. Spencer himself does sometimes, an additional indefinite factor called "force." On the whole, the criticisms have recognised the main characteristic as being deterministic and non-

teleological, and as actually dealing with matter and motion, whether ultimately they are manifestations of something else or not.

I then looked up a variety of notices of "First Principles" and of the theories contained in it. My abstracts and remarks will be found very scanty and inadequate, for to discuss the subjects treated of in an exhaustive manner would make a large book. They must be taken as they are intended, namely, as short notices to assist the student in his consideration of the main theses under our review.

Modern Physical Fatalism and the Doctrine of Evolution, including an Examination of Mr. H. Spencer's "First Principles." By T. R. Birks, M.A., Professor of Moral Philosophy, Cambridge. Macmillan & Co., 1876.

I mention this book on account of its being one of the very few direct detailed criticisms of Mr. Spencer's "First Principles." The very startling title implies that the writer does not distinguish between melodramatic "fatalism" and respectable "determinism." The writer, holding a strongly orthodox position, is not, in any case, capable of accepting Mr. Spencer's conclusions, and his criticisms are to be taken as a wholesale attack upon an adversary rather than as the discriminative judgment of an impartial critic. The title, preface, and introduction are all very theological, and the peroration at the end of most of the chapters marks them as having been lectures composed with a certain intention to produce an effect upon an audience. This circumstance is somewhat against the utility of the book, and, as a matter of fact, we find several cases of injustice to Mr. Spencer; as, for instance, on p. 154, where Mr. Birks speaks of the continuity of motion, and represents motion as being conceived by Mr. Spencer as a substance—a liquid—capable of being poured from one vessel into another; whereas the transference of motion is simply this, viz., that if you have a wheel going round at a given rate, and another wheel is put into gear with it, the latter will move faster and the former more slowly. Now although there are numerous differences in cases of the transference of motion, yet they are all changes of relative rates of motion, and not the transference of a substance, liquid or otherwise.

There are many other misunderstandings as to which the reader must be on his guard.

On the other hand, the book is worthy of the attention of students from the number of valid criticisms made against the "First Principles," more particularly in pointing out the confused and unsatisfactory manner of the exposition, and in adducing quite a number of incompatible statements. Whether or not these are minor errors capable of correction, and not affecting the validity of the main argument, is a matter for consideration.

Chap. v., on the "Reality of Matter," calls attention to contrary definitions of reality, which is said in one case to be an external object, the antecedent of impressions, and afterwards is defined as "persistence in consciousness." And the writer, with some justice, complains that "consciousness or states of consciousness, phenomena or appearances, relative realities, absolute realities, the absolute reality, and the unknowable are named in such a way that it is impossible to know which are meant to be the same, and which are distinguished from each other" (p. 113).

On p. 120 we find manifestations of the unknowable objected to on the ground that the former term destroys the latter. And attention is called, p. 122 *et seq.*, to a passage (and there are many such in Spencer) which we have ourselves endeavoured to understand with patient assiduity, but without success. It is only by detailed examination, such as Professor Birks here gives, that the radical faultiness of Mr. Spencer's style of exposition is fully appreciated, and the apparently systematic and methodical treatment of his subject, together with his loftiness of abstraction, are found to be illusive. We attempted ourselves to make an index of the definitions and propositions contained in "First Principles," but we were not able to succeed.

There is no important item of criticism in chap. vi., on the "Indestructibility of Matter," and the remarks on the "Continuity of Motion" in the next chapter seem to me to be totally wrong, and even unfair. Mr. Spencer says of neither matter nor motion that they are self-existent; he declines to make any supposition.

The section on the "Conservation of Force" (p. 159) is, however, deserving of study as exhibiting the indefiniteness and confusion of Mr. Spencer's statements, say from pp. 161 to 167

and p. 171. The passages are too long for quotation. The persistence of force being the mainstay of Mr. Spencer's philosophy, renders a clear meaning of the term "force" very important; but the writer's search for it, like mine, appears to have been in vain.

The chapter on "Evolution" is not worthy of much attention as valid criticism. The chapter on "Force and Life," however, brings out in the discussion on the definition of "life" the difficulty of framing a merely dynamic physical formula which shall cover the assimilative and disintegrating processes of animal and vegetable life, by which, for instance, the incoming molecules are endowed with the memories and predispositions of their predecessors (p. 281), so as to result in growth and nutrition, special structure, and reproduction. Without assenting to the author's positions, his remarks deserve consideration. The term "organic polarity" is very properly questioned as having any very definite meaning. The writer here also discusses potential energy. I differ both from him and Mr. Spencer in the validity of the use of this word, except as applied to unforeseen effects, the unforeseeingness being due to our want of knowledge of all the antecedents. As applied to entities, as applied to activities supposed to be in abeyance—as, for instance, potential energy, potential force, potential motion—I should suppose that they do not exist at all while they are not in action. When the motion of any object ceases, it may be revived; but until it is revived there is no motion, and to speak of it as being in existence as potential motion seems to me to be a mistake; and so of potential energy and force. If force and motion are constant quantities, they are always actual and never potential. As well might one speak of potential matter. Motion locked up or not going on, and force or energy in abeyance, are much the same as matter going out of existence for a time.

Chapter ix. contains an interesting account of the various theories of the primal factors of the universe.

A perusal of the first four chapters in this book will assist the reader still further into the confusion and bewilderment natural to the discussion of The Relative, The Absolute, and The Unknowable. He will make up his mind to avoid this controversy as much as possible. He will be confirmed in the belief that there is a limit to human knowledge and speculation, and in

the opinion that a philosophy is futile which undertakes to account for every change from the homogeneous.

The value of this book is not so much in its direct criticisms as in its suggestiveness of the need of careful study on the part of the student himself. Perhaps I rather underrate its value; it would be very useful but for a quantity of objectionable matter which creates confusion.

Outlines of Cosmic Philosophy, based on the Doctrine of Evolution, with Criticisms on the Positive Philosophy. By John Fiske, M.A., LL.B., Harvard University. Macmillan & Co., 1874.

This book is not so much a criticism of Mr. Spencer's works as an exposition of them with additional original matter. It is Evolution done into readable English. It does not aim at great elaboration of details nor complete accuracy. It is of great assistance in the study of Spencer, where the mind is apt to get lost in the monotonous wealth of illustrations. The work gives one the impression of great conscientiousness of thought, together with a certain fondness towards the Cosmic theories. It is a well-written book, exhibiting a mastery of the subject, and altogether pleasurable and instructive. The author handles the great problems of his study well and carefully. He has nothing but praise for Mr. Spencer, and entertains a great admiration for his abilities and successful accomplishments. We must not look here for what is to be said against Mr. Spencer's theories; but perhaps we may look for some strengthenings of deficiencies, some obscurities done into definiteness, or perhaps, on the other hand, some errors made more manifest. In any case, Mr. Fiske's work may be recommended to candid consideration. We cannot pretend to do the book justice. It extends over nearly a thousand pages; our remarks must be limited to half a dozen.

I first ask of the author what he means by philosophy. And I get my answer, vol. i. pp. 39–44:—"It is only when the deepest truths respecting physical, chemical, vital, psychical, and social phenomena come to be regarded as corollaries of some universal truth—some truth common to all these orders of phenomena—that such a body of doctrine becomes possible. Such a body of doctrine is what we call philosophy, in distinction from science.

While science studies the parts, philosophy studies the whole. While science, in its highest development, is an aggregate of general doctrines, philosophy, in its highest development, must be a synthesis of all general doctrines into a universal doctrine."

Again, speaking of Comte, vol. i. p. 253 :—"Though he insisted upon the all-important truth that philosophy is simply a higher organisation of scientific doctrines and methods, he fell into the error of regarding philosophy merely as a logical Organon of the sciences, and he never framed the conception of philosophy as a universal science, in which the widest truths obtainable by the several sciences are contemplated together *as corollaries of a single ultimate truth.*"

What, then, is the universal truth from which all others are to be regarded as corollaries?

Chap. xi. asks how we are to set about the task of finding it. By induction and subsequent analysis? "Or, on the other hand, we might begin by searching directly for this ultimate axiom; and, having found it, we might proceed to deduce from it that widest generalisation which interprets the most general truths severally formulated by the concrete sciences. . . . The latter, or synthetic method of procedure, is much better adapted for our present purpose than the former or analytic method." See p. 265 *et seq.* Where is this search to be made? Not in the abstract or the concrete sciences (p. 268), but in the abstract-concrete; and we find that "the widest theorems, therefore, which the three abstract-concrete sciences can unite in affirming, must be universal propositions concerning matter and motion. Obviously it is in this region of science that we must look for our primordial theorem."

The question then arises, What is matter and what is motion? Evidently they are, in the first place, terms applied to mental ideas, images, symbols, and as such stand for feelings resultant from objective existences, and thus mediately they stand for those objective existences.

These are found (p. 280) to be continuous, *i.e.*, "matter is indestructible" and "motion is continuous;" and if these twin theorems are considered, they imply a yet deeper truth (pp. 281–283), viz., that "force is persistent."

If we again ask, What is force? we find again that it is a mental term; but it is not so easy to refer it to its origin nor to

say what it means. All our experiences of matter and motion are said to be experiences of Force, which, I presume, is the experience of the resistance or motion of the matter of which we are composed in relation to external matter and motion, and of the self-consciousness of that matter of which we are composed. Our knowledge of Force is thus limited to its manifestations, viz., a quantum of matter, *i.e.*, resistance and extension, and a quantum of motion, $F = M + Mn$, but since it does not add to our knowledge nor explain anything, it seems superfluous and misleading to introduce the term at all.

What is the Force of which he asserts the persistence?

Mr. Spencer says, "First Principles," pp. 189, 190, 192, "It is not the force we are immediately conscious of in our muscular efforts; for this does not persist. Nor can we predicate it of those objects to which our muscular efforts are opposed." Therefore "we are compelled to admit that force as it exists out of our consciousness is not force as we know it. Hence the force of which we assert persistence is that absolute force of which we are indefinitely conscious as the necessary correlate of the force we know." We know no force of which we are conscious but the force to which it is opposed; we do not know it, but it is a correlate, and being a correlate it cannot be called absolute or non-related, although it may be called inscrutable —particularly if the force of which we are conscious and have knowledge is also one of its manifestations. But that force is more than the summation of matter and motion is not made apparent

The author then considers the question (p. 204), What warrant have we for the fundamental axiom that force is persistent? When this axiom is established as the primordial truth from which all others are corollaries, we naturally ask, What are the corollaries?

When we are asked to deduce corollaries from the persistence of force, we inquire whether the force referred to is knowable or unknowable. If the former, then the only force we know may be—1st, Consciousness, but this does not persist; or it may be matter and motion; or it may be all three. But if the persistent force we know is indestructible matter and continuous motion, we are asked to make these latter corollaries of themselves when we are asked to deduce them from the persistence of force. But if, again, it is the unknowable force from which

we are asked to deduce the corollaries of the indestructibility of matter and the continuity of motion, we naturally ask, How can we get corollaries from what we do not know? How can we deduce knowledge out of ignorance?

Is it too much to ask if the existence of matter is a corollary from the persistence of force? or if the existence of motion is a corollary from it? or if, *vice versa*, the existence of force is a corollary from the existence of matter and motion? A good deal will depend upon whether we are speaking of our consciousness of force or of something external independent of consciousness. If the latter, then we do not see that matter and motion are corollaries from force; if the former, then they may be corollaries from force. Then, again, is consciousness itself a corollary from the "fundamental axiom" of the persistence of force? I may say that the author does not deal with these corollaries, and the presumption is that there is more than one fundamental axiom. The corollaries adduced by him are the persistence of relations amongst forces, the correlation of forces, the transference of motion, the rhythm of motion, and so we get on to the law of Evolution (p. 350), which, of course, is Mr. Spencer's formula.

Now there is no attempt to show that Evolution is a corollary from the persistence of force, given a quantum of matter and a quantum of motion and predicating homogeneity.

Mr. Fiske starts, p. 360, with a nebula containing heterogeneous constituents and heterogeneous motion, and calls that by implication a corollary from the persistence of force.

After completing the planetary evolution and the evolution of the earth, he reaches eventually the beginning of life. This difficulty our author deals with boldly. He makes the most of Dr. Bastian's experiments, which, after all, he has to confess are merely of a suggestive value. And (p. 430)—

"For the present, in representing to ourselves how life may have originated upon the earth, we are reduced to a few most general considerations. However the question may eventually be decided as to the possibility of archebiosis occurring at the present day amid the artificial circumstances of the laboratory, *it cannot be denied that archebiosis*, or the origination of living matter in accordance with natural laws, *must have occurred at some epoch in the past.* That life has not always existed upon the earth's surface is certain; and the following considerations will

show that in its first appearance there need not have been anything either sudden or abnormal."

Now to say that archebiosis must have occurred because there is life now and once there was not, is a very different thing from saying that it must have occurred because it is an inevitable corollary from the persistence of force. This is the task that the author next sets himself, and there can be no dispute about it that he fails.

The general considerations he refers to are a combination of the elements of organic bodies in a cooling world (p. 433).

"Here we obtain a hint as to the origin of organic life upon the earth's surface. In accordance with the modern dynamic theory of life, we are bound to admit that the higher and less stable aggregations of molecules which constitute protoplasm were built up in just the same way in which the lower and more stable aggregations of molecules which constitute a single or double salt were built up. Dynamically" (*notice the limitation*) "the only difference between carbonate of ammonia and protoplasm which can be called fundamental is the greater molecular complexity and consequent instability of the latter. We are bound to admit, then, that as carbonic acid and ammonia, when brought into juxtaposition, united by virtue of their inherent properties as soon as the diminishing temperature would let them; so also carbon, nitrogen, hydrogen, and oxygen, when brought into juxtaposition, united by virtue of their inherent properties into higher and higher multiples as fast as the diminishing temperature would let them, until at last living protoplasm was the result of the long-continued process."

I ask, should not the adjective "living" be substituted by the adjective "chemical"? The introduction of the word "living" seems to be begging the question.

Page 434.—"In view of these considerations, it may be held that the evolution of living things is a not improbable concomitant of the cooling down of any planetary body which contains upon its surface the chemical constituents of living matter."

Pursuing our logical course of deducing corollaries from the persistence of force as applied to matter and motion, we find the result attenuated into a "not improbable concomitant."

This failure is confessed in the preceding section, viz. :—

"It is at the same time true that the ultimate mystery—the

association of vital properties with the enormously complex chemical compound known as protoplasm—remains unsolved, . . . and very likely we shall never know."

I ask the author candidly to say, if any mystery is left unexplained—*i.e.*, any fact or truth that is not capable of being included in a corollary from the persistence of force—if that fundamental axiom really is the Organon or instrument of synthesis which he claims it to be?

If there are other mysteries, so much the worse for the Organon; but I think he is mistaken in saying that there are similar mysteries. He says that "it is equally mysterious that starch or sugar or alcohol should manifest properties not displayed by their elements." Now, since these elements are composed of certain units having definite shapes, sizes, modes and rates of motion, they are capable, under given conditions of medium and motion, of entering into specific combinations with other elements which shall have shapes, sizes, modes and rates of motion, the resultant being different from those of the two or more which entered into the combination. These resultants, if we had the requisite knowledge of the original mechanical factors, we could calculate. It is true we could not calculate our altered sensations, *e.g.*, taste; but that is another question.

On p. 430 the author also refers to acquired tendencies and heredity, but he does not endeavour to account for these as corollaries from the persistence of force.

Yet, notwithstanding these admissions, he winds up the chapter very complacently (p. 435):—

"In this account of the matter we have completed, so far as is needful for the purposes of this work, our exposition of the evolution of the earth. . . . We have witnessed . . . resulting at last in the genesis of compounds manifesting those properties which we distinguish as vital." "It is only for reasons of convenience that the formation of primeval protoplasm is assigned to a different science from that which deals with the formation of limestone or silica." But again, on the other hand, he says:—"It is not pretended, however, that these considerations fulfil all the requirements of a scientific explanation of the genesis of life." In this respect he follows Mr. Spencer and alternately says, Ah! now I have it—see how plain it is! And then again —Mystery—ah!!

The next chapter, on "Special Creation or Derivation?" is of very secondary importance as a step in the advancement of the synthesis, since it is dependent altogether upon the preceding one. Yet granted life, feeling, or consciousness in vast masses of almost formless protoplasm, combinations and definite forms might ensue; still the mystery of the acquirement of tendency, reproduction, and heredity would remain unexplained as a corollary from the persistence of force.

And even the formula of Evolution would be difficult of application, as already indicated in our criticism of Spencer, more particularly with respect to memory, the establishment of intellectual correspondences, the classification of cases, things, and relations. For under what clause of the formula of Evolution do they come? The formula recognises only "the integration of matter and the concomitant dissipation of motion," and what are these that we wish to include in the formula? Truly the characteristics of mental evolution in respect of advancement from indefiniteness to definiteness, complexity and heterogeneity, *are similar to* physical evolution; but are they the physical evolution itself as specified in the formula?

The word "integration" is constantly used in the account of the composition and evolution of mind, thus tending to give a verbal similarity to the representation of its development with that of the physical world; but it means in this case definite combination of feeling, and not the integration of matter mentioned in the formula of Evolution. Thus we find, vol. ii. p. 119, "Under its most general aspect all mental action whatever is definable as *the continuous differentiation and integration of states of consciousness.*" Page 155—"There is an integration of the present impressions with such past ones as they resemble, and a differentiation of them from such past ones as they do not resemble." Again, p. 373—"The doctrine of Evolution . . . represents also the most extensive integration of correspondences that has yet been achieved." So, while there is a formula of life, there is a formula of psychical evolution (p. 119), and a formula of social evolution (p. 223). That there is some difficulty in including these in the general formula of Evolution is shown by the author's remarks, p. 162:—"While steadily refraining from the chimerical attempt to identify mind with some form of matter or motion, it has nevertheless been shown

that, owing to the mysterious but unquestionable correlation which exists between the phenomena of mind and the phenomena of matter and motion, it is possible to describe the evolution of the former by the same formula which describes the evolution of the latter." This is true if the terms matter and motion are omitted from the formula, and it is thus made to relate to processes only. In this case there might be any number of factors, and the formula would only deal with definite combinations of them.

Thus we come to the same conclusion as that to which our examination of Spencer led us, viz., that as a System of Philosophy—*i.e.*, the establishment of a fundamental truth or axiom from which all others can be derived as corollaries—the Evolution formula, and the axiom of the persistence of force, are insufficient, and the attempt to establish a universal philosophy is a failure.

In the body of our essay we discussed the question as to consciousness being a mode of motion. Here we suggest the question as to whether it is to be considered a mode of force. If so, is it a constant quantity, the same as those other modes of force called matter and motion? We presume it must be, else we have something coming into existence and going out of existence, which, Mr. Spencer says, is inconceivable.

According to "First Principles," p. 169, "matter and motion, as we know them, are differently conditioned manifestations of Force." A manifestation, properly speaking, means something known to a conscious being capable of knowledge; but Mr. Spencer deals with real existences previous to the existence of such beings, and therefore we have to translate the word "manifestation" into "modes of activity," and omit the phrase "as we know them." At the same time, it seems better to retain the word manifestation, as implying a power capable of transforming itself into different modes, and by this means we retain the unificatory idea, and avoid the application of the term "mode of activity" to matter. If this is justifiable, then the following considerations occur to the student:—

If matter and motion are the manifestations of force, then force preceded both matter and motion, and was the sole existence. For if matter and motion were coeval with force, then they were conditions of force and not manifestations of it.

The existence of a thing must precede its manifestation, otherwise existence and manifestation must be words having the same meaning, and the word manifestation will have no meaning beyond existence, in which case force is merely a term, being the summary of matter and motion; and the phrase persistence of force, a summary of the indestructibility of matter and the continuity of motion. It is the total of an addition.

But if, on the contrary, it is stated that the existence of force preceded the existence of matter and motion, and that the latter are only manifestations of the former, then there was a time when matter and motion did not exist, which Mr. Spencer denies we can conceive, but which nevertheless we are hereby bound to conceive.

Moreover, if matter and motion are only manifestations of a primal existence called force, we want to know if this is not the homogeneous from which all changes started. If so, how can we apply to it the unproved principle of the instability of the homogeneous, which instability we found to be due to external influences, for in this case there would be no externality? And again, if force is persistent, it means that it remains force, and does not change to anything else, and its manifestations are not differentiated. Again, can we apply to the sole existence of Force the formula of Evolution, and deduce therefrom the differentiation of force into matter and motion? Does the formula of Evolution account for these manifestations of force?

Again, if matter and motion are only different manifestations of the same thing, it is to be presumed that they are interchangeable—one form of manifestations may be changed into another form. Matter may go out of existence and become motion. Motion may cease and become matter, so long as the quantum of force remains the same. Thus an atom or ultimate unit may cease to exist so long as the force of which it is the manifestation is transferred to the acceleration of the motion of some other atom or unit. And conversely one atom or unit moving very rapidly may become two units moving slowly, for the quantum of force remains the same.

It is to be presumed, also, that if force existed antecedent to matter and motion, it could exist unconditioned by these manifestations, and its quantum is not to be reckoned by the total of the two, for there is no necessity for supposing all or any of

it becoming manifested in these particular ways. It is not illogical, then, to suppose a part or quantum of force still unranked with the manifestations of matter and motion, but capable at any time, on conditions unknown, of becoming so. This does away with the ideas of the permanently fixed quantum of matter and the permanently fixed quantum of motion, which may not only be changed from one to the other, as already seen, but may receive accessions at any time.

It therefore does not follow from the persistence of force that there is a fixed quantum of matter and of motion. And unless there is any necessity shown why the whole of force should be used up into manifestations of matter and motion, there may be an unresolved quantum capable of adding to these manifestations of itself at any time, and, for anything we know to the contrary, may have other modes altogether of manifesting itself—say, for instance, in consciousness.

We come to the conclusion, then, that the indestructibility of matter and the continuity of motion are not corollaries from the notion of the persistence of force, but that this idea is built up from the two former, of which it is merely the summation. It is therefore erroneous to put it down as the fundamental truth of philosophy. It is derived, and not fundamental. The fundamental truths are the indestructibility of matter and the continuity of motion, and perhaps the consciousness which recognises them.

If, on the other hand, it is the fundamental truth, then the conclusions follow that I have just enumerated, and the formula of Evolution is utterly inadequate to represent it, as indeed it is utterly inadequate to account for all the changes of the universe. At the same time there is a greater correspondence between the primordial truth, so escaping from the bondage of the formula, and those facts of the universe which the formula strives vainly to compass. Is it too much to say that there is in the universe more than is contained in the formula, more than man can ever put into words? that while he may know part and generalise part, and predicate likenesses of processes, and recognise the same characteristics of procedure throughout, it will never be possible for him to comprehend all? that there are things which elude his eager grasp, and abysses he cannot fathom?

A notice of this book would be incomplete without a reference

to the author's emphatic repudiation of Materialism, his practical acceptance of Spiritualism, his rejection of "blind force," his acknowledgment of a Divine power, and his advocacy of religion under the term "cosmic theism."

This matter is fully stated vol. ii. p. 375 *et seq.* Indeed, the consideration of it takes up the rest of the book to p. 508, and I cannot attempt to do it justice. I quote a few passages merely as indicating the line of thought.

Page 375.—"We have already, in the earlier part of this work, been brought to the conclusion that the phenomenal universe is the manifestation of a Divine power that cannot be identified with the totality of phenomena; we have now to unfold somewhat more fully what is meant by this theistic conclusion. We have, at every fitting opportunity, declared that the phenomena of mind can in no wise be explained as movements of matter, while at the same time a law of evolution expressed in terms of matter and motion is found to include the order of sequence of psychical phenomena. We must now attempt to clear away the difficulties which to many minds no doubt cluster around the seeming paradox. We have also hinted that, beside the sphere to be assigned to morality, there is a wider sphere to be assigned to religion; it behoves us now to show what are the general functions of religion, in accordance with our fundamental view of life as an adjustment between inner and outer relations. . . . The central problem which must first occupy us, and the decision of which will affect the treatment of all the others, is the problem of theism."

Page 377.—"While upon the time-honoured statical view of things, any given group of phenomena was explained by a reference to the direct creative action of a Divine power extraneous to the cosmos; on the other hand, upon the modern dynamical view of things, any given group of phenomena is explained by a reference to some antecedent group of phenomena, while all phenomena alike are regarded as the sensible manifestations of a Divine power immanent in the cosmos. . . . As was clearly shown in the first part of this work, and as will presently be still more emphatically reiterated, our cosmic philosophy is based upon the affirmation of God's existence, and not upon the denial of it, like irreligious Atheism, or upon the ignoring of it like non-religious Positivism. The question which we have now to answer concerns

the existence of a limited personal God, who is possessed of a quasi-human consciousness, from whose quasi-human volitions have originated the laws of nature, and to whose quasi-human contrivance are due the manifold harmonies observed in the universe. Is this most refined and subtilised remnant of primitive anthropomorphism to be retained by our cosmic philosophy, or is it to be rejected? And if it is to be rejected, what are the grounds which justify us in rejecting it?"

Chap. ii. of Part iii. is against anthropomorphic theism, and chap. iii. is a survey of the groundwork of cosmic theism. We summarise the latter as follows, viz. (p. 412):—"The vast synthesis of forces without us, which in manifold contact with us is, from infancy till the close of life, continually arousing us to perceptive activity, can never be known by us as it exists objectively, but only as it affects our consciousness." Thus the universe itself is inscrutable to us. (Page 413)—"Underlying this aggregate of phenomena we have found ourselves compelled to postulate an absolute reality—a something whose existence does not depend on the presence of a percipient mind, which existed before the genesis of intelligence, and would continue to exist though all intelligence were to vanish from the scene." This something is called force, absolute force, the unknown cause of these manifestations, an unconditioned reality, without beginning or end, absolute Being, formularised thus:—"There exists a POWER, to which no limit in time or space is conceivable, of which all phenomena as presented in consciousness are manifestations, but which we can know only through these manifestations."

This formula, arrived at objectively and subjectively, expresses the fundamental truth of theism—the existence of God. This is contrasted with Comtism. The author states, p. 422:—"When, summing up all activity in one most comprehensive epithet, we call it force, we are but using a *scientific symbol*, expressing an affection of our consciousness, which is yet powerless to express the ineffable reality. To us, therefore, as to the Israelite of old, the very name of Jehovah is that which is not to be spoken. . . . We shall never fathom this ultimate mystery, we shall be no nearer the comprehension of this omnipresent Energy. Here science must ever reverently pause, acknowledging the presence of the mystery of mysteries. Here religion must ever hold

sway, reminding us that from birth until death we are dependent on a Power to whose eternal decrees we must submit, to whose dispensations we must resign ourselves, and upon whose constancy we may implicitly rely."

We have avoided criticisms by the way, though tempted much to animadvert on the viciousness of all arguments in which the word "absolute" is introduced. We pause here, however, to remark upon the extraordinary result at which we have arrived, when we consider that the author strenuously repudiates from his religion every vestige of anthropomorphism, every trace of intelligence. For he reminds us that we are dependent upon a Power who has made decrees to which we must submit; to whose dispensations, *i.e.*, arrangements in relation to ourselves, we must resign ourselves; and upon whose constancy (faithfulness to us, or persistence of decrees?) we may implicitly rely. It is said that a lover sees in his mistress a good many more charms than she really possesses: may it not be so with a philosopher and his formulas? The author says, "Here science must ever reverently pause, acknowledging the presence of the mystery of mysteries." I do not know at all why I should be reverent before the mysterious, *i.e.*, that which I cannot understand. The savage worshipped the white man's watch, and fell down in awe before a paper which had carried a written message. I have no reverence for a cosmic or for a solar system. If a stellar system in the galaxy of the sky has no life and mind in it, it may be obliterated from the face of the heavens and leave me unconcerned. I have no reverence for the whole cosmos itself if it manifests nothing but a force which has no intelligence in it, anthropomorphic though such a notion may be. My reverence is not excited by vastness of chemical processes. I am no more in awe of a volcano or a thunderstorm than of the fire in my grate or the galvanic battery on my table. Nor do I tremble when gazing upon the scattered fires of the primal furnace, nor that burnt-out cinder—the moon! How many tons of limestone, how may cubic feet of oxygen and hydrogen, excite the reverence of our author? But the savage was right when he worshipped the watch and reverenced the scroll, for a higher intelligence was manifested there!

While sympathising with the author in his religious aspirations, I cannot approve of this attempt to palm off an empty

abstraction upon my sympathies, and of this wresting of religious language from its proper application towards an intelligence to do service for an abstraction. However, the difficulty is certainly great—to have a God who is not a personality endowed with intelligence.

This difficulty the author proceeds to consider in his remarks on Pantheism (pp. 423–425). The result is that God must be considered as a power or force, about which (not whom) nothing can be known, and from which must be disassociated both intelligence and volition; and even, if we come to that, which we must not regard even as force, for the very terms matter and force (p. 430) "are mere symbols, which stand *tant bien que mal* for certain generalised modes of Divine manifestation: they are no more real existences than the x and y of the algebraist are real existences." So also the word "divine" is a mere symbol of a something, we really cannot know what; and the wedding service of science and religion, like that of the Church of England ritual, ends in blank "amazement"! We are afraid the prayer for a fruitful progeny is of doubtful hope.

Chap. iv. treats of matter and spirit, at p. 434. "What concerns us is the initial *non sequitur*—that every attempt to interpret mental manifestations by a reference to material structure involves the assertion of Materialism. This is the *non sequitur* which lies at the very bottom of the theological misrepresentation, and its utter fallaciousness needs to be thoroughly exposed."

After saying that matter is merely a symbol, and is not a real existence, we are at a loss how to appreciate the term materialistic here. However, I suppose matter must be accepted as a manifestation of the inscrutable force, but what we know of matter, in so far as it is knowable, is, that it is resistant and extended, and can be described geometrically and arithmetically, and that it has motion. And when it is included in the formula of Evolution, we have a definite notion that all changes are changes of combinations of resistance, extension, and motion which are capable of geometrical and arithmetical expression. And since matter and motion are the manifestations originally of an initial force, or the exponents of an existent force limited by the limitations of the formula of Evolution, then all changes occurring in the universe have to be ascribed to changes of combinations of matter and motion, and are to be called materialistic;

and since the facts of consciousness and mind are amongst those changes, the theory which accepts the formula of Evolution, notwithstanding its claim for an initial force which is not materialistic, and an outcome of mind which is not materialistic, is justly open to the charge, and must either accept it or abandon its formula. Indeed, there is no other factor mentioned in the formula than matter and motion; and witness the futile attempt made to galvanise chemical combinations into vital processes.

It would appear, however, that practically both Mr. Spencer and his disciple abandon the formula of Evolution, and, therefore, the unification of philosophy.

The author proceeds to considerations which show that the materialistic hypothesis of mental phenomena is untenable. In this interesting chapter there are many powerful and cogent passages too long as well as too numerous for quotation. We give one only :—

"Henceforth we may regard Materialism as ruled out, and relegated to that limbo of crudities. . . . The latest results of scientific inquiry, whether in the region of objective psychology or in that of molecular physics, leave the gulf between mind and matter quite as wide as it was judged to be in the time of Descartes. It still remains as true as then that between that of which the differential attribute is thought and that of which the differential attribute is extension there can be nothing like identity or similarity. Although we have come to see that between the manifestations of the two there is such an unfailing parallelism that one group of phenomena can be correctly described by formulas originally invented for describing the other group, yet all that has been established is this parallelism. . . . Rich as are the harvests which science has obtained from these two fields, the fence which divides them has never been broken down; and until the insuperable distinction between subject and object, between the conscious and the unconscious, can be transcended, it can never be broken down."

Chap. v. is on "Religion as Adjustment," the principle of which is stated on p. 465. "A philosophy of morality has for its subject-matter the principles of action conducive to the right living of the individual, so far as the well-being of the community is concerned; so a philosophy of religion has for its subject-matter the relations of the individual to the Inscrutable Power

manifested in the universe, and the principles of action conducive to his right living, considered as a part and parcel of the universe."

"The religious sense is primarily based upon the aspiration—the noblest which any creature can entertain—after complete fulness of life; and any thought or act, any sin of omission or of commission, inconsistent with such aspiration, awakens the painful consciousness of shortcoming, without any reference to those lower considerations of pleasure and pain of which alone Hedonism takes cognisance."

I do not know to what extent we should feel ourselves concerned with an Inscrutable Power which has no personality or volition, or what regard we should pay to the harmony of the universe beyond concern for our own happiness and the happiness of the community. There is no doubt that such a sentiment might grow up naturally, for all sorts of correspondences grow up in the mind between itself and externalities, and a correspondence between it and the whole course of the universe might be established and cultivated, but then it might be shown to be unreasonable. It is a mere sentiment towards an object of the highest degree of abstraction.

The consideration of the work thus tends to show that the formula of Evolution is insufficient to explain the universe, whatever parallelisms may exist between it and any supplementary formula that can be devised to make up for the deficiency.

It also shows that cosmic theism is a religion only affecting the most highly cultivated, refined, and philosophic minds, quite out of the reach of ordinary struggling humanity. It may be as beautiful as a star in the heavens, to be seen only through a powerful telescope by the astronomer who knows where to find it, but it is as far away.

Dr. Martineau's Essays. 2 vols. London, Trübner & Co., 1879. *Essay*, "*Science, Nescience, and Faith*," and "*The Place of Mind in Nature*," a Lecture by Dr. Martineau. London, Williams & Norgate, 1872.

I might refer to almost all of Dr. Martineau's essays as elucidative of this faith in the existence of a Power that is more than matter and motion. He is a teacher as well as a critic.

But it is not now our province to examine his doctrine as to the existence of a Supreme Mind in nature.* We shall only examine the critical portion of his notices of the doctrine of Evolution. And if one had to perish by the sword of criticism, would one not choose to be slain by that keen Damascus blade —so sharp and yet so beautiful, so trenchant and yet so richly wrought, and withal descending in its strokes with such dreadful glitter and polish of steel?

To dissect an article of Dr. Martineau's, to get at the structure of the argument, is as bad as pulling to pieces a beautiful plant. There is in each essay so much appealing to the feeling of beauty, so much relating to our highest sentiments, that we have to outrage these much in moving the elegancies aside in order to leave bare the skeleton of firm structure. Not, however, that the philosophic exposition gains by these elegancies of expression.

In the latter essay, Dr. Martineau regards the recognition of mind as the essential object of religion, and rejects mere wonder.

"In dealing with these three conceptions—of creation, construction, evolution—there is one thing on which religion insists, viz., that *mind is first, and rules for ever;* and whatever the process be, is *its* process, moving towards congenial ends."

But an evolutionary process is quite consistent with religion as thus regarded.

"Let this be granted, and it matters not by what path of method the Divine thought advances, or how long it is upon the road."

Nevertheless, if the evolutionary process be accepted, it is apt to foster a variety of illusions. These are, firstly, our altered feelings with reference to the authority of the moral sense, obligation to a Divine ruler, our faith in the intuitions of conscience. For "it usually treats as a superstition our natural reverence for the rational moral and religious intuitions as sources of independent insight and ultimate authority; and, in order to estimate them, translates them back into shorthand experiences of sensible experience and social utility."

However, if Mind be granted at the beginning, and Evolution be accepted as its process towards an end, we think confidence should be restored—however, this is what Mr. Fiske would say. And, indeed, the solution of the problem is indicated by Mr.

* For this see specially "Essays," vol. ii. pp. 185–189.

Martineau himself in saying that we are to look for the functions of our highest faculties in their last stage, not their first.

The second part of this essay deals with the origination of life out of inorganic substances. Start, he says, with the homogeneous, and you cannot advance the history one hair's-breadth through an eternity. Again, present it with an object of heterogeneous elements, and again you cannot advance beyond the water and the air, the salts of the ocean, and the earthy or rocky compounds that comprise the crust of the globe.

An argument advanced against the mere materialistic and mechanical origin of the universe is thus expressed by Dr. Martineau :—

"If all force is to be conceived as one, its type must be looked for in the highest and *all-comprehending* term ; and mind must be conceived as there. . . . Or, if you retain the forces in their plurality, then you must *assume* them *all* among your data, and confess, with one of the greatest living expositors of the phenomena of Development (Lotze), that unless among your primordial elements you scatter already the germs of mind as well as the inferior elements, the Evolution can never be wrought out."

In the essay on "Science, Nescience, and Faith," Dr. Martineau deals, in the first instance, with the theory of The Absolute. Referring to the different moods of the scientific man and the prophet, he brings out the distinction between the views of an age in which science is predominant and an age in which religion is predominant, and then proposes the question, "What can we say, and on what warrant, respecting that invisible sphere of Power behind phenomena?"

The position gathered by Mr. Spencer from the critique of opposite opinions is that the Supreme Cause is incognisable. Thus we arrive at the Absolute. Upon this Mr. Martineau says :—

"The doctrine of religious nescience has been rendered so familiar by Mr. Mansel as to belong to the common stock of contemporary thought, and to make any full exposition of its grounds unnecessary. It assumes that God, if acknowledged at all, must be entitled to the epithets 'absolute' and 'infinite' on the one hand, and 'cause' on the other. Supposing this to be admitted, several contradictions arise between the parts of the admission and some positions to which thought is incom-

petent altogether. To be 'absolute,' for instance, means to be out of all relations; to be 'cause' means to stand related to an effect; and the same object cannot be both. Again, 'infinite' being is unexclusive being, to which nothing can be added and no new predicate attached; 'causal' being is transitive and productive, passing to conditions not occupied before, and adding to the stock of existence, or functions of existence, chargeable upon it. The epithets are therefore incompatible. Moreover, the very nature of thought itself imprisons us within the circle of relative things; for it carries in it a necessary duality, and consists in marking off and distinguishing object from subject, body from space, attribute from substance, prior from posterior, and individuals, classes, and qualities *inter se*. Apart from a field or term of comparison, *any*-thing proposed for thought becomes *no*-thing, and only a vacancy remains; nor is the vacancy itself appreciable but by standing over against the self that looks into it. If then, to think is, on the one hand, to note the confines of things, it can never pass beyond the finite; and if it is, on the other, to discriminate their contents and properties, it can never pass beyond the relative. The absolute and infinite cannot therefore present itself to the intellect at all. So the warrant for the doctrine of religious nescience is simply this, that God is 'absolute,' and we can know nothing but the relative.

"Of one point, however, Mr. Spencer declares we may be sure, and that upon the highest guarantee, the same *a priori* necessity of thought which enforces the nescience itself, viz., *that the absolute exists* in reality, though denied to apprehension. For were it otherwise there could be no relative, *relativity itself being in its term cognisable only by contrast with the non-relative*, and forming a duality with it. Take away its antithetic term, and the relative, thrown into isolation, is set up as absolute and disappears from thought. It is indispensable, therefore, to uphold the absolute in existence, as condition of the relative sphere which constitutes our whole intellectual domain. Be it so; but when saved on this plea—to preserve the balance and interdependence of two *co*-relatives—the 'absolute' is absolute no more; it is reduced to a term of relation; it loses therefore its exile from thought; its disqualification is cancelled; and the alleged nescience is discharged."

Then follows a long consideration of metaphysical terms, into which it would be impossible for us to enter in a short notice like this.

The principal point would be found, I think, to be the discussion of "Causation," Essays, vol. i. p. 197 *et seq.*:—

"Mr. Spencer freely allows that we are obliged to regard every phenomenon as the manifestation of some Power; that 'we are obliged to regard that Power as Omnipresent' (p. 99); that 'we are no more able to form a circumscribed idea of Cause than of Space or Time, and we are consequently obliged to think of the Cause which transcends our thought as positive though indefinite' (p. 93); that we have a right to trust this demand for originating power; and that on this reposes our indestructible belief in an ultimate Omnipotent Reality. Here already are several predicates assigned which hardly consist with the proclamation that the Primary Existence is wholly unknown; that Being, it seems we may say, is One, Eternal, Ubiquitous, Omnipotent, manifested as Cause in all phenomena. Is there not more explicitness here than could be expected from an entity absolutely latent? But this is not all. Our author further identifies the First Cause with what appears in science under the name of 'Force,' and is tracked through the metamorphoses of physical, chemical, vital, and other phenomena. The dynamic principles that we carry into our interpretation of nature, that Force is persistent through all expenditures, and one under every disguise—are in truth but the transformed expression of the axiom of ultimate Causation. The primary and secondary agencies being thus merged into one, and conjointly made objects of *a priori* apprehension, the next question naturally is—what in the last resort means this word 'Cause'? Pursued backward to its native seat, as a form of the intellect itself, what type does the thought present? Mr. Spencer truly says, 'the force by which we ourselves produce changes, and which serves to symbolise the cause of changes in general, is the final disclosure of analysis' (p. 235); he admits that we cannot match our own voluntary effort against an external force, and regard them as susceptible of a common measure, without assuming them to be like in kind (pp. 58, 254); and as 'no force save that of which we are conscious during our own muscular efforts is immediately known to us,' while 'all other force is mediately

known,' it is clearly the inner volition that serves as prototype of all exterior power, and defines what the intellect intends by the word Cause. Now combine these several propositions. One power we immediately know. That power is Will. Others, if assumed by us, must be assimilated to this. But behind every phenomenon we must assume a power. And all such powers are modes of one and the same. And that one is identical with the First Cause and Ultimate Reality of Being. The inference is irresistible, that by a fundamental necessity of thought we are constrained to own an ever-living Will, a Personal Agent, as Author and Administrator of the universe. This is precisely what the Theist maintains; and includes all that he can gather from the bare contemplation of physical nature, apart from the moral experiences and the spiritual history of humanity. Collected from so limited a ground, the ground too least rich in phenomena of the highest expression, it is but a meagre and imperfect form of faith. But still it dissipates the theory of nescience. It vindicates some distinct apprehensions of the 'Supreme Reality.' And drawn as it is directly from the statements of an author who controverts it, it is a matter of some curiosity to see how he evades the apparent cogency of his own premises.

"He forsakes the line of proof by a very simple device. The likeness between our own force and that which operates around us, though a necessity, is also, he conceives, an illusion of thought; and so we must give up our first natural belief that the universe is at the disposal of a Mind, the Divine counterpart of ours. There is no other conception open to us in our apprehension of outward causality; and yet this conception fails, and betrays us into absurdity. How so? Because it implies that the weight which I lift with my muscles must, in order to pull against me, be furnished with muscles too; and whatever teaches me that the objects about me are not alive destroys the assumed resemblance between the inner and the outer world. The case is thus stated:

"'On lifting a chair, the force exerted we regard as equal to that antagonistic force called the weight of the chair; and we cannot think of these as equal without thinking of them as like in kind; since equality is conceivable only between things that are connatural. The axiom that action and reaction are equal and in opposite directions, commonly exemplified by this very

instance of muscular effort *versus* weight, cannot be mentally realised on any other condition. Yet, contrariwise, it is incredible that the force as existing in the chair really resembles the force as present to our minds. It scarcely needs to point out that the weight of the chair produces in us various feelings, according as we support it by a single finger, or the whole hand, or the leg; and hence to argue that as it cannot be like all these sensations, there is no reason to believe it like any. It suffices to remark that since the force as known to us is an affection of consciousness, we cannot conceive the force existing in the chair under the same form with endowing the chair with consciousness. So that it is absurd to think of force as in itself like our sensation of it, and yet necessary so to think of it if we realise it in consciousness at all' (p. 58).

"There would be something in this reasoning if the muscles were the Personal Agent disposing of the chair, and their sensations the power he put forth. The causality, however, does not lie in them, but behind them; they are themselves obedient to a mandate from within; and their sensations, which occur only in the execution of the act, do not even begin till that mandate has given the signal. Were the muscles altogether insensible, the power at headquarters would not on that account be disqualified for action, or be unconscious of itself. We may entirely discharge out of the account the whole of this merely ministerial apparatus, with all its supposable varieties. It is not this which even the simplest individual—be it that small 'child' so much dandled by the psychologists, or the everlasting 'peasant' preferred by bachelor philosophers, or the 'fetish-worshipper' in favour with Mr. Mill—attributes to the external objects acting upon him; and his discovery that they do not possess it disabuses him of no previous idea. What he plants in idea behind the phenomena that strike him is similar, not to his muscles which obey, but to his Will which bids; and of *this* idea, though it has a history to go through in correspondence with his culture, no progress of reason, we feel assured, will ever disabuse him. At last, as at first—because by a necessity of thought which runs through all experience—he has to think of Causality as meaning Will, and to borrow all his dynamic language—'attraction,' 'repulsion,' 'tension,' 'percussion,' 'active,' 'passive,' 'weak,' 'strong,' 'overcome' 'resist'—from familiar

instances and conditions of Will. If not, there must be some point and some process for unlearning his original postulate, and substituting some other idea of power. Yet this can never be. For, confessedly, it is beyond the competency of experience, however refined, to disclose anything but *laws;* the mystery of *force* evades the penetration of the observer, and therefore has no presence among the materials of inductive generalisation; science did not give it, and science cannot take it away; it lies on another field, where the correction or corroboration of phenomenal knowledge can never meet it. Born as a pure intellectual datum, it remains among our intellectual reserves, withdrawn not only from every actual, but from every possible contradiction—an indestructible and unalterable postulate, inherent in the very organism of reason itself."

Then follows an identification of cause or force with mind and the unification of philosophy into the unification of one original mind.

The article terminates by an examination of Mr. Spencer's position as between that of the theist and that of the positivist, the conclusion arrived at being that it is untenable and incomprehensible.

To revert to the commencement of the essay, there is, it seems to me, a very valid criticism with respect to Mr. Spencer's attempt to find a common formula for the propositions of the theist and the atheist—viz., that a Being exists and that a Being does not exist.

The principal question as between Dr. Martineau and Mr. Spencer seems to me to be this. Is the Inscrutable Power of Mr. Spencer an intelligence or not? Now, if Mr. Spencer had succeeded in showing that the universe was capable of explanation in the terms of his formula, the verdict would have been with him; but as we have found it to be utterly insufficient for such an explanation—partly admitted by himself, and wholly confessed by his disciple Mr. Fiske—we have to assert in the universe something more than matter and motion; and if there is an original Inscrutable Power, of which these are but manifestations, then it has other modes of manifestation, and the only other mode of manifestation we know is consciousness, which is the basis of mind. Of this we can say next to nothing—it is to us a mystery. But in so far as it is to be regarded as a manifestation of force or power, it is to be regarded as included in the

notions we attach to those ideas. With any interpretations or corollaries therefrom, we have in these pages, which are merely critical, nothing to do.

There are several difficulties and criticisms adduced by Dr. Martineau which are satisfactorily answered by Mr. Spencer in his "Replies to Criticisms" without affecting the force of the above.

Martineau and Tyndall.

It is not our province to discuss all the modern controversies that have arisen respecting the subject-matter of our studies, but we would recommend the student to a perusal of the controversy between Dr. Martineau and Professor Tyndall as of great assistance in a consideration of the questions under our review. It is comprised in the following:—

Fragments of Science. By JOHN TYNDALL, F.R.S. Longmans & Co.

Religion as affected by Modern Materialism. By JAMES MARTINEAU, LL.D., D.D. Williams & Norgate.

Modern Materialism: its Attitude towards Theology. By JAMES MARTINEAU, LL.D., D.D. Williams & Norgate.

The controversy relates principally to the value to be attached to the factor called "force," Professor Tyndall advocating the enlargement of the definitions of matter and force so as to comprehend all subsequent developments, but failing to give sufficient definitions; and Dr. Martineau contending that our only experience of force being that of the exercise of our own will, the force manifested in the universe must be that of a Divine will. On both sides the discussion is maintained in a very able manner, and should receive the attentive perusal of the student of "First Principles."

Professor Tyndall.

The papers contributed to the various Reviews by Professor Tyndall upon Dr. Bastian's experiments, and giving an account of some of his own, are also a valuable addition to the subject,

as showing experimentally the failure of the attempt to produce the organic from the inorganic. See

Nineteenth Century, January 1878 and November 1878.

This brilliant writer and careful thinker has at various times expressed his views upon the principal theses of the doctrine of Evolution. The most recent expression of his opinions is to be found in the *Nineteenth Century* for November 1878, article "Virchow and Evolution."

With respect to the main problem of philosophy as propounded by Mr. Spencer—viz., the validity of a formula which shall furnish the required unification of knowledge, Professor Tyndall says:—"In 1867 I told the working men of Dundee, that while making the largest demand for freedom of investigation, while considering science to be alike powerful as an instrument of intellectual culture and as a ministrant to the material wants of men; if asked whether science has solved, or is likely in our day to solve, 'the problem of the universe,' I must shake my head in doubt. I compare the mind of man to a musical instrument with a certain range of notes, beyond which in both directions exists infinite silence. The phenomena of matter and force come within our intellectual range, but behind, and above, and around us the real mystery of the universe lies unsolved, and, as far as we are concerned, is incapable of solution."

I understand this to be a repudiation of the formula of Evolution as a sufficient solution of the problem of philosophy as set out in Mr. Spencer's "First Principles."

On the question of the origin of the organic from the inorganic, and the impossibility of finding an explanation of consciousness in any mechanical theory, there are many interesting passages. Indeed, this incompetency of matter and motion is so repeatedly and emphatically expressed, that there can be no mistake about Professor Tyndall's opinions.

Page 818.—"We may even take a step further and affirm that the brain of man—the organ of his reason and his sense—without which he can neither think nor feel, is also an assemblage of molecules acting and reacting according to law. Here, however, the methods pursued in mechanical science come to an end; and if asked to deduce from the physical interaction of the brain

molecules the least of the phenomena of sensation or thought, we must acknowledge our helplessness. . . . Between molecular mechanics and consciousness is interposed a fissure over which the ladder of physical reasoning is incompetent to carry us."

Page 820.—"We cannot deduce consciousness from motion, or motion from consciousness, as we deduce one motion from another. Nevertheless, observation is open to us, and by it relations may be established which are at least as valid as the conclusions of deductive reason. The difficulty may really lie in the attempt to convert a datum into an inference, an ultimate fact into a product of logic."

Page 821.—"On both sides of the zone here assigned to the Materialist he is equally helpless. If you ask him whence is this 'matter' of which we have been discoursing—who or what divided it into molecules, and impressed upon them this necessity of running into organic forms—he has no answer."

Page 827.—"Do states of consciousness enter as links into the chain of antecedence and sequence which gives rise to bodily actions? Speaking for myself, it is certain that I have no power of imagining such states interposed between the molecules of the brain, and influencing the transference of motion among the molecules. The thing 'eludes all mental presentation.' Hence an iron strength seems to belong to the logic which claims for the brain an automatic action uninfluenced by consciousness. But it is, I believe, admitted by those who hold the automaton theory that consciousness is *produced* by the motion of the molecules of the brain; and this production of consciousness by molecular motion is to me quite as unpresentable to the mental vision as the production of molecular motion by consciousness. If I reject one result, I must reject both. *I, however, reject neither*, and thus stand in the presence of two incomprehensibles, instead of one incomprehensible."

"Here I secede from the automaton theory, though maintained by friends who have all my esteem, and fall back upon the avowal which occurs with such wearisome iteration throughout the foregoing pages, namely, my utter incapacity to grasp the problem."

"This avowal is repeated with emphasis in the passage to which Professor Virchow's translator draws attention. What, I there ask, is the causal connection between the objective and the subjective, between molecular motions and states of conscious-

ness? My answer is: I do not see the connection, nor am I acquainted with anybody who does. It is no explanation to say that the objective and subjective are two sides of one and the same phenomenon. Why should the phenomenon have two sides? This is the very core of the difficulty. There are plenty of molecular motions which do not exhibit this two-sidedness. Does water think or feel when it runs into frost-ferns upon the window pane? If not, why should the molecular motion of the brain be yoked to this mysterious companion—consciousness? We can form a coherent picture of all the purely physical processes —the stirring of the brain, the thrilling of the nerves, the discharging of the muscles, and all the subsequent motions of the organism. We are here dealing with mechanical problems which are mentally presentable. But we can form no picture of the process whereby consciousness emerges, either as a necessary link or as an accidental by-product of this series of actions. The reverse process of the production of motion by consciousness is equally unpresentable to the mind," *et seq.*

These passages confirm my impression that Professor Tyndall does not accept the formula of Evolution as a solution of the problem of Philosophy as stated by Mr. Spencer.

But can man rest contented with the position of nescience?

Dr. Martineau cannot, and teaches the doctrine of a pre-existing mind. Professor Tyndall cannot, but is unable to advance any doctrine He advocates patient waiting; a Newton may some day arise to prove that the principles involved in the construction of a butterfly's wing are qualitatively the same as those brought into play in the formation of the solar system.

Page 818.—"We may even take a step further, and affirm that the brain of man—the organ of his reason and his sense, without which he can neither think nor feel—is also an assemblage of molecules, acting and reacting according to law." See also the hopeful expression with respect to the philosophy of the future, in an extract from an article of his in the *Saturday Review*, quoted on page 819.

Notwithstanding this profession of nescience, Professor Tyndall cannot but think favourably, even if he does not quite believe in, the theory that all present existences, not excluding organism and consciousness, are the natural results of the cooling of a mass of nebulous vapour.

"Supposing the molecules of the human body, instead of replacing others, and thus renewing a pre-existing form, to be gathered first-hand from nature, and placed in the exact relative positions which they occupy in the body. Supposing them to have the same forces (motions?) and distribution of forces, the same motions and distribution of motions—would this organised concourse of molecules stand before us as a sentient, thinking being? There seems no valid reason to assume that it would not. Or supposing a planet carved from the sun set spinning round an axis, and sent revolving round the sun at a distance equal to that of our earth, would one consequence of the refrigeration of the mass be the development of organic forms? I lean to the affirmative."—*Belfast Address*, quoted p. 820.

In the South Kensington Museum there is a collection of the solid chemical constituents of a man with a cube on which is marked the number of volumes of the gaseous elements that also enter into his composition. Is Professor Tyndall inclined to think that if all these were got together in suitable arrangement to form a man, his Frankenstein would answer to Hamlet's description of the paragon of animals? Surely if feelings and memories are registered in structure, if you get the structure you get the feelings and memories. It may be a necessary course in Evolution from the fire-mist that there should be stages of development, but if the result is structure out of the chemical elements, surely if we got the structure off-hand, without all the precedent developments, we secure all the results just the same, and we have a man fully equipped with a stock of fictitious memories, and ready to take his place in society. Professor Tyndall leans to the affirmative of this hypothesis.

What is the way, then, out of the apparent contradiction of this affirmative leaning and the repudiation of the mechanical doctrine of organism and consciousness?

It is by a new definition of matter.

This amended definition is indicated by a quotation from Ueberweg, "one of the subtlest heads that Germany has produced" (p. 812).

"Take a pair of mice and a cask of flour. By copious nourishment the animals increase and multiply, and in the same proportion sensations and feelings augment. The quantity of these latter possessed by the first pair is not simply diffused amongst

their descendants, for in that case the last must feel more feebly than the first. The sensations and the feelings must necessarily be referred back to the flour, where they exist, weak and pale it is true, and not concentrated as they are in the brain."

Tyndall adds :—" We may not be able to taste or smell alcohol in a tub of fermented cherries, but by distillation we obtain from them concentrated Kirschwasser. Hence Ueberweg's comparison of the brain to a still, which concentrates the sensation and feeling pre-existing, but diluted in the food."

We may remark that we do not see the comparison ; for alcohol is merely some of the molecules separated by the mechanical action of heat from other molecules, and recombined with some others actually co-existing in the original mixture ; unless, indeed, the feelings of the mice are to be regarded as molecules.

By a similar process of reasoning, the still more rudimentary elements of feeling have been collected and concentrated by the wheat ears out of the field in which they were grown. The sensations and the feelings came out of the ground !

Is it this we are to infer? Are there molecules of feeling? and do they from some law (not of motion), not yet ascertained, enter into combination whenever some law (not of gravitation) brings them into contact with accidentally formed molecules of *chemical protoplasm ?*

Or if this be repudiated ; if it be not accepted that there are *special* separate units of feeling scattered throughout the primordial nebula, then we must look for an amended definition of *all* the ultimate units of matter.

This, it seems to me, is what Professor Tyndall looks to, since if the primordial fire-mist only includes ultimate units of extension and motion, and from these feelings and organisms cannot be produced, then the ultimate units must contain more than extension and motion. The definition of matter must be amended so as to provide for the results.

Professor Tyndall justifies this view as against Dr. Martineau's criticisms, and we think succeeds in making good his right—in fact, his duty—to amend the definition of matter.

He does not, however, give an amended definition, and we do not see how this can be done except by saying that all the ultimate units are conscious. Then although this consciousness might be unorganised, there might be a process of evolution by concen-

tration of this consciousness (I confess the method or even meaning of this is incomprehensible to me), and thus organisms and thought might be produced. This is the only interpretation I can give to the only improved definition of matter, and I do not see that it is superior in any way or more comprehensible than Dr. Martineau's original Supreme Mind.

The Late Professor Clifford.

Virchow on the Teaching of Science. Nineteenth Century, April 1878.
On the Nature of Things in Themselves. Mind, No. IX.

The same problem receives the same kind of treatment from most of the eminent writers who favour the modern Evolutionist doctrine. The consideration ruling their minds is thus expressed by Professor Clifford —

"We know from physical reasons that the earth was once in a liquid state from excessive heat. Then there could have been no living matter upon it. Now there is. Consequently non-living matter has been turned into living matter *somehow*. We can only get out of spontaneous generation by the supposition," &c.—*Nineteenth Century*, p. 729.

This *somehow* is suggested by an example adduced (pp. 726, 727) of the formation of benzine in a red-hot tube from acetylene. A false analogy is drawn between "pre-existing benzine" and "pre-existing life," and then an explanation is rendered upon a mechanical basis. This benzine is one of the products of organic bodies, and is therefore called organic; therefore we have a mechanical explanation of organic molecules, without, however, being endowed with any other than mechanical properties.

"Now, those persons that believe that living matter, such as protein, arises out of non-living matter in the sea, suppose that it is formed like all other chemical compounds. That is to say, it originates in a coincidence, and is preserved by natural selection" (p. 728).

Here living matter is regarded merely as a chemical compound. Why, then, is it called living? We have the answer in the next sentence.

"Still the coincidence involved in the formation of a molecule so complex as to be called *living*," &c.

Hence a living molecule is only a highly complex molecule. But—

"Possibly, however, the molecule has from the beginning that power which belongs to other chemical bodies, and certainly to itself when existing in sensible masses, of assisting the formation of its like. Once started, however, there it is; the spontaneous generation believed in as a possibility by the Evolutionist has taken place."

Here it is well to stop and examine the nature of the assistance given, say, by molecules of acetylene in the passage of benzine through a red-hot tube to the formation of its like, to see if there is any ground for calling such assistance spontaneous generation. I presume the phenomenon to be purely mechanical, and to be expressed thus: a number of complex molecules consisting of atoms composed of ultimate units, being systems of shapes, sizes, and modes and rates of motion, are subjected to the action of heat, *i.e.*, a mechanical appliance which alters the relations of the component atoms by separation, which separation, freeing *some* or all of the atoms, throws them into other relations of position, and thus enables them to enter into other combinations. This combination when effected becomes a factor itself in the current, and even if only as an obstruction, or perhaps as an active hammer may knock the original constituents about in such a manner as to assist in the process of dissolution and recombination. I do not derive any assistance here in trying to solve the problem of spontaneous generation.

It is true that these explanations are always interspersed with appeals to time to assist the explanation by the immensity of its periods, as if in the course of a million of years a fly-wheel would go of itself. Given minuteness so small as to elude sense and puzzle the intellect, given complexity so great as to baffle representation, given changes that are asserted to be insensible, given time so long as to weary inert matter into consciousness of itself, surely we can get life!

No! The only way out of the difficulty is, as indicated by Professor Tyndall, to revise the definition of matter. How is this to be done? Professor Clifford attempts the problem in the second essay quoted above. In the first place he describes the correspondence and parallelism between mind-action and brain-action (*Mind*, p. 63).

"We come, finally, to say, then, that as your consciousness is made up of elementary feelings grouped together in various ways (ejective facts), so a part of the action in your brain is made up of mere elementary actions in parts of it, grouped together *in the same ways* (objective facts). The knowledge of this correspondence is a help to the analysis of both sets of facts; but it teaches us in particular, that any feeling, however apparently simple, which can be retained and examined by reflection, is already itself a most complex structure. We may, however, conclude that this correspondence extends to the elements, and that each simple feeling corresponds to a special comparatively simple change of nerve matter."

"Can a feeling exist by itself without forming part of a consciousness?" This question is answered affirmatively, and this answer is required by the doctrine of Evolution. "For if that doctrine be true, we shall have along the line of the human pedigree a series of imperceptible steps connecting inorganic matter with ourselves. To the later members of that series we must undoubtedly ascribe consciousness, although it must, of course, have been simpler than our own. But where are we to stop? In the case of organisms of a certain complexity consciousness is inferred. As we go back along the line the complexity of the organism and of its nerve action insensibly diminishes; and for the first part of our course we see reason to think that the complexity of consciousness insensibly diminishes also. But if we make a jump, say, to the tunicate molluscs, we see no reason there to infer the existence of consciousness at all. Yet not only is it impossible to point out a place where any sudden break takes place, but it is contrary to all the natural training of our minds to suppose a breach of continuity so great. All this imagined line of organisms is a series of objects in my consciousness; they form an insensible gradation, and yet there is a certain unknown point at which I am at liberty to infer facts *out* of my consciousness corresponding to them. There is only one way out of the difficulty, and to that we are driven. Consciousness is a complex of ejective facts, of elementary feelings, or rather of those remoter elements which cannot even be felt, but of which the simplest feeling is built up. Such elementary ejective facts go along with the action of every organism however simple; but it is only when the material

organism has reached a certain complexity of nervous structure (not now to be specified) that the complex of ejective facts reaches that mode of complication which is called consciousness. But as the line of ascent is unbroken, and must end at last in inorganic matter, *we have no choice but to admit that every motion of matter* is simultaneous with some ejective fact or event which might be part of a consciousness. From this follow two important corollaries.

"1. A feeling can exist by itself without forming part of a consciousness. It does not depend for its existence on the consciousness of which it may form a part. Hence a feeling (or an eject element) is *Ding-an-sich*, an absolute, whose existence is not relative to anything else. *Sentitur* is all that can be said.

"2. These eject-elements which correspond to motions of matter are connected together in their sequence and co-existence by counterparts of the physical laws of matter. For otherwise the correspondence could not be kept up."

"That element of which, as we have seen, even the simplest feeling is a complex, I shall call *mind-stuff*. A moving molecule of inorganic matter does not possess mind or consciousness, but it possesses a small piece of mind-stuff. When molecules are so combined together as to form the film on the under side of a jellyfish, the elements of mind-stuff which go along with them are so combined as to form the faint beginnings of sentience. When the molecules are so combined as to form the brain and nervous system of a vertebrate, the corresponding elements of mind-stuff are so combined as to form some kind of consciousness; that is to say, changes in the complex, which take place at the same time, get so linked together that the repetition of the one implies the repetition of the other. When matter takes the complex form of a living human brain, the corresponding mind-stuff takes the form of a human consciousness having intelligence and volition."

The conclusions reached in the paper are (p. 66):—

"Hence we are obliged to identify the thing-in-itself with that complex of elementary mind-stuff which on other grounds we have seen reason to think of as going along with the material object. Or, to say the same thing in other words, the reality external to our minds which is represented in our minds as matter, is in itself mind-stuff."

"The universe, then, consists entirely of mind-stuff. Some of this is woven into the complex form of human minds, containing imperfect representations of the mind-stuff outside them, and of themselves also, as a mirror reflects its own image in another mirror *ad infinitum.* Such an imperfect representation is called a material universe. It is a picture in a man's mind of the real universe of mind-stuff.*

"The two chief points of this doctrine may be thus summed up:—

"Matter is a mental picture in which mind-stuff is the thing represented.

"Reason, intelligence, and volition are properties of a complex, which is made up of elements themselves not rational, not intelligent, not conscious."

The question now arises, How are we to interpret this new definition of matter, and how does it affect the formula of Evolution? One has a kind of feeling of having walked over the edge of a precipice into vacuity, and it takes some little consideration to realise one's position. I do not think, so far as we are concerned, we are called upon to explain the new term "eject," nor to consider the process of reasoning which leads to these conclusions, nor to discuss the nature of perception and conception; we need only note the conclusions arrived at. These I cannot quite understand. Suppose I consider

* This passage is very difficult to understand. The worst of it is, that the professor of philosophy sitting at his desk is as hard to get at as the preacher in his pulpit. We have continually to ask, What does he mean? and this occasionally seems extremely impertinent, and yet we cannot get along without a clear understanding. Here we have—

1. An universe consisting of mind-stuff.
2. Part of this universe is woven into human minds.
3. The disposal of the other part is not described, except that
4. These human minds contain representations of the mind-stuff outside them.
5. This outside part so represented is called a material universe.
6. The material universe *as so represented* is a picture of the real universe of mind-stuff.

But this throws no light on the mechanical combinations of size, shape, and rates of motion, nor upon different modes of consciousness of them, viz., radiance, colour, touch, smell, odour, &c.

The whole article suggests numerous questions which would have to be answered before it could be understood.

matter to be a mental picture, in which mind-stuff is the thing represented, then I first ask the meaning of these words which explain what matter is. I find, in the first place, that (p. 66), "there is a perception in the man's mind, which we may call the mental image." Matter, then, is a mental image or picture, which is a perception, for they all seem to be identified. This perception or mental image or picture relates to some external reality, and this external reality, which we call matter and motion, is to be called mind-stuff. The reason for this seems to be (p. 65), "That every motion of matter is simultaneous with some ejective fact or event which might be part of a consciousness." And again, "A moving molecule of inorganic matter possesses . . . a small piece of mind stuff." If we accept the new reading of matter, I suppose we should say, "a moving molecule of inorganic matter is a mental image in which mind-stuff is the thing represented." What then is mind-stuff? That which is capable of being organised (concomitantly with *some* organisations of inorganic matter) into consciousness or mind, but otherwise not capable of being described. It is an unknown element utterly incapable of being described, and not known to be possessed by inorganic molecules, but only inferred. By it, however, we are called upon to understand a definition of matter. We only know a candlestick as a combination or arrangement of molecules of mind-stuff (inorganic matter) having definite shapes, sizes, modes and rates of motion. But, as recently quoted, inorganic molecules are said not to be mind-stuff but to possess a small piece of it, thus making a distinction between them. A variety of questions then arises. How does a moving molecule of inorganic matter possess a small piece of mind-stuff? What is the nature of the co-relation?—is it variable in correspondence with the integration of matter and the dissipation of motion? or, again, does it go with the latter or stop with the former? If some matter transfers all its motion to some other matter, does it lose its piece of mind-stuff? Is there a transference of mind-stuff the same as there is a transference of motion? is there also a fixed quantum of mind-stuff the same as there is a fixed quantum of matter and of motion? But then, after all—and there is the puzzle—matter itself is nothing but mind-stuff! and we do not know what mind-stuff is except that it is not rational, not intelligent, not conscious.

It seems to me that this definition of matter throws all the preceding part of the essay into confusion. If I start to read it again, and transform the word matter, wherever I meet with it, into the meaning arrived at in the conclusion, I find myself in an ocean of verbal troubles. And what is the use of a definition so laboriously arrived at if we are not to make use of our discovery in the practical application of it?

For instance, one of the main arguments of the paper is the parallelism between the organisation of inorganic molecules of matter and the organisation of mind—the complexity of the one going with the complexity of the other. With the new definition the parallelism would be between the increased complexity of molecules of mind-stuff and the increased complexity of the element of consciousness, which seems to me, so far as I can understand it, to be mind-stuff also. What then is the nature of the differentiation? One set of combinations of mind-stuff is as complex as the other. Why should one set be said to be made up of molecules of matter if matter itself is mind-stuff, and the other set be said to be made up of the elements of mind-stuff?

Again, referring to the quotation commencing "The universe, then, consists entirely of mind-stuff," &c., the human mind is said to *contain* imperfect representations (*i.e.*, pictures or images or perceptions) of the mind-stuff outside them. Such a representation *in the mind* of the mind-stuff outside them is called the material universe, so that the term "material universe" is applicable not to an externality but to an internal representation of it. But whence comes the representation? Surely from an externality; and surely this externality must be the material universe. But this material universe is only mind-stuff.

Again, what is the difference between a mental image and a cerebral image. I can attach no meaning to the latter. I suppose the brain is composed of molecules of matter (*i.e.*, extension and resistance) having shapes, sizes, modes and rates of motion, and while I can understand a cerebral motion (throb, pulsation, vibration, &c.), I cannot interpret image by any term of motion. But, according to the new definition of matter, I must say that the cerebral image is mind-stuff, so combined in the arrangement of inorganic molecules—*i.e.*, extension and resistance—only, and having also arrangements of motion, that these

shapes, sizes, and motions produce that combination of them which is a cerebral—what?—image?—or simply a passing series of motions? The latter, I think, for I cannot understand a piece of machinery so complex as to produce in itself an image of itself perceptible to itself. I cannot express it in terms of mathematics and geometry. Professor Clifford says that mirrors may reflect each other. This implies a mechanical image. But such an image is nothing more than the firing off of an immense number of small shots on a hard surface, and they all glance off according to the rate and the angle of incidence, and retain their relative position on some other receiving plane. There is no *image* of the object which cast off these shots; there is no image without a mental perception or consciousness.

To me it appears hopeless confusion, and Professor Clifford adds in a note: "The question is one which is peculiarly difficult to make out precisely what another man means, and even what one means one's-self."

Clifford's theory seems to point to an attempt to identify the supposed underlying substance of mind and matter, so as to explain secondarily the nature of the connection and the parallelism of their evolution. The term "mind-stuff," then, applies to a something which manifests itself partly in the evolution of organised mind which takes the mode of consciousness, and partly in the evolution of organised mind which takes the form of aggregates of matter in motion. Both are mind-stuffs, but differentiated in their modes. Thus, after all, it seems only a dressing up—like so much new philosophy is—of old notions under new names. In this case it is Noumenon, Absolute Force, The Absolute, an Inscrutable Power over again under the idea of a primordial mind-stuff. And we have the old questions over again—Is it a fixed quantum, and are its conditions as modes necessary conditions?—or else how did the differentiations into modes—how did the evolution of it into complex forms take place?

Clifford's theory must be taken as a realistic and not as an idealistic theory—that is to say, he evidently conceives of a universe of real existence prior to percipient mind, but he affords no explanation of those evolutions by which some portions of it became self-conscious. Would he have applied Mr. Spencer's formula of Evolution?

Reverting to our main study of Mr. Spencer's formula of Evolution, we may remark that some such theory as this seems to be tacitly implied in the working out of the processes of the Evolution of Biology and Psychology, as treated of in those special volumes of Mr. Spencer's work. Of course it will be seen that such an assumption is not warranted by the formula of Evolution, which only comprises the two factors of matter (taken as extension and resistance) and motion. And the insufficiency of these appears to be universally acknowledged by all the Evolutionist philosophers, and by the scientific men who accept their doctrines.

Hence the necessity for a new factor or a new definition of matter. For our part, we do not think it wise to foist the extra agent into a definition of matter. This appendage to the definition of matter is so powerful and important that it would entirely alter the import of the word, and reminds one of Dundreary's reflection, "If the tail had been stronger, I make no doubt the tail would waggle the dog;" for the addition to the meaning of the word would be of more importance than the original one. There is more than enough confusion of terms already, and to add to the definition of matter, which we consider merely as extension and resistance, capable of being described mathematically and geometrically, is not to produce definition but undefinition. Besides, unless it is an universal and uniform adjunct of extension and resistance, it is not essential to the idea of matter. If, like motion, it is transferable, like motion also it can be wholly transferred, and thus wholly lost to some portions of matter.

To define the meaning of a substantive word is to describe that which is permanent to the thing described, to include in it all that appertains to its permanent constitution, and to omit from it all that can be taken away from it, and yet it shall remain what it is. Thus motion is not essential to the definition of matter, because it can be transferred from one particle of matter to another, so that one particle moving faster than another does so by receiving from another some part of its motion, or even all its motion; for we can imagine, and have reason to believe in, the existence of matter which has thus lost by transfer all its motion (ether). It is still matter, since it possesses extension and passive resistance; and thus motion is not part of the defini-

tion of matter, although it is universally the accompaniment of matter, but is to be regarded as a separate factor. Motion is capable of concentration—*i.e*, more motion in some aggregations of matter; and of dissipation by equalisation; and we are entitled to speak of it as a separate factor from matter, and not as a part of the definition of it. The factor of consciousness is to be regarded in a similar manner. For if it is capable of concentration, as seems to be claimed for it by Ueberweg and Clifford, it must be that some matter parts with it, and other matter receives an accession of it; and thus, similarly to motion, it is not essential to matter, and, similarly to motion, it is to be regarded as a separate factor. And we have to add to our cosmic stock in trade "a fixed quantum of consciousness," and derive it also from the "Persistence of Force"?

It would then follow that it is a third factor in the initial starting-point of Evolution, and it would have to take its place in "the homogeneous." We have already considered the homogeneous as containing two terms, matter and motion, if not three, viz., matter and motion and force. Now we have to add mind-stuff, bearing in mind that this mind-stuff is not rational nor intelligent nor conscious.

If we ask whence this differentiation into matter, motion, force, and mind-stuff, Evolution fails to respond.

If everything is a corollary from the persistence of force, whence the necessary inference of mind-stuff? We have before asked the question as to matter and motion.

It seems to me that there is no more nonsense in supposing the one initial agent (for philosophy, according to Mr. Spencer, requires such an unification) to be mind-stuff than to suppose it to be force. Indeed, may we not ask ourselves,—Are they not the same?

However, our object in this study is not discovery but criticism, and the result of our criticism so far has been to discredit the possibility of an unificatory synthetic philosophy; to invalidate the formula of Evolution; to exhibit the inadequacy of force, taken as the totality of matter and motion, in the explanation of the cosmos, and to show the necessity for a third factor in the universe containing something of the nature of mind.

British Quarterly Review, October 1873 and January 1877.

It would be an interesting but too laborious a task to compile an account of the valid criticisms contained in all the magazines and reviews with reference to the Evolution theory since the publication of "First Principles," and there is no doubt that this work and the works of Mr. Darwin have given rise to a great amount of careful thought. I call the attention of the student to the above, because I am informed that they have had considerable influence in the formation of an unfavourable estimation of the work under review in certain circles.

The article in the *British Quarterly Review* for October 1873 is written in a very irritating manner, which the student cannot but consider a great nuisance, as it is perpetually distracting his attention, and makes him suspect an animus, which in itself is detrimental to the value of the work undertaken by a critic.

The contents of the paper are as under :—1. Difficulties of a commensurate criticism, owing to the wide scope of the work and the indistinctness of the propositions. The writer undertakes the task of an examination from the point of view of the physicist. 2. Objections to Mr. Spencer pronouncing so many things inconceivable. 3. Asserted errors and false notions in physics. 4. The persistence of force not a datum of consciousness, and the assigned corollaries not corollaries. 5. Many different renderings of the term "Persistence of Force." 6. Mechanical difficulties. 7. The *a priori* proof of the great generalisations of physics criticised and opposed. This occupies the most considerable portion of the essay. 8. Objections to some of Mr. Spencer's inductions. 9. Concerning the limitations of the criticism, and objecting to Mr. Spencer's perpetually changing the signification of his terms.

This article should not be read except in connection with Mr. Spencer's reply, published in the third volume of his Essays.

The number for January 1877 contains some apposite criticism, but it should be perused with a just and careful attention. The main points seem to be :—1. A charge against Mr. Spencer that he holds by the visible and that which can be mentally seen and embraced, and that he rejects whatever cannot be conceived. 2. That those objects which transcend our powers of conception can only produce in us symbolic conceptions, which do not

represent, but only stand for, the realities. "Conceivableness or comprehensibility, in truth, in the sense of possible conscious representation, rigorously applied as a criterion of the limits, and consequently of the character, of thought, would almost seem to exclude reasoning altogether." "Our mental picture of a pebble or a shell is as imperfect, as symbolic, as that of the earth itself." 3. "In what sense can Mr. Spencer's ultimate ideas be said to be ideas at all, since they are pronounced to be inconceivable, or, according to the title of the division of his subject in which he treats of them, 'unknowable'?" "If force, motion, personality, are ultimate ideas, and yet are unknown and unknowable, then ultimate ideas do not enter or belong to our minds at all, and can neither support, limit, nor otherwise affect our reasoning or thought." 4. A criticism I do not understand, viz., that Evolution presupposes time and space. It seems to me that Evolution presupposes matter and motion, of which space and time are merely the interrelations. 5. Criticism of that positive element of consciousness which persists notwithstanding the negation of limits—the raw material of definite thought. On this point I cannot but think that Mr. Spencer is substantially correct, but that it is to be interpreted in the manner indicated in my criticism of the Unknowable. The writer of this article concludes, that "it would thus appear that Mr. Spencer means by unknowable, not what cannot be known, but what cannot be definitely known—known under limits." Granted that writers may have the right to use words in any given meaning, there is always the danger both of the writer and of the reader forgetting the arbitrary assigned meaning and reverting to the ordinary one. "No one is likely to dispute the truth that we cannot have a definite or limited knowledge—a consciousness with limits—of that which is itself indefinite and without limits." 6. An examination of force as the ultimate of ultimates. The criticism amounts to this—"No consciousness, no force." This criticism appears in my examination, and is very forcibly expressed in Dr. Martineau's essays, as previously indicated.

This notice of Mr. Moulton's really important criticisms may be deemed very inadequate by the admirers of them, but a long notice would have necessitated a valuation of the merits of a long, subtle, and acrimonious controversy, a task which one does

not feel disposed nor competent to undertake. If the writer would revise his papers, deleting all the bitterness, he would contribute something valuable to the literature of Evolution.

The rest of the paper deals with Sociology, and is beyond the present scope of our studies.

G. H. Lewes' *Problems of Life and Mind.* Two vols. Trübner & Co. London, 1875.

G. H. Lewes' *The Physical Basis of Mind.* Trübner & Co. London, 1877.

I feel that I cannot omit a reference to the above volumes, for although I have only partially read them, I find that the writer deals in a clear and masterly manner with many of the problems which we have been considering in the course of our studies. They are, however, dealt with in such a detailed and methodical manner, and the work itself is so large, that they require a special study and examination.

An Article by Mr. James Sully in the "Encyclopædia Britannica." Vol. VIII. Ninth Edition, 1879.

All students of Spencer should read this article, as it gives a very wide review of the subject of Evolution theories, and enables the reader to form a better idea of the general scope and bearing of any individual work. It assists the reader, by giving him a general summary of the whole of the matters under consideration, and in assigning to any particular writer his place in the battle. He sees not only with the eyes of the fighter, but with the eyes of the onlooker. He understands better the position of the author, his aims and endeavours, and is enabled to adjudge to him more readily his proper place and weight.

I quote a few passages :—

Page 751.—"The most general meaning of Evolution may be defined as follows : Evolution includes all theories respecting the origin and order of the world which regard the higher or more complex forms of existence as following and depending on the lower and simple forms, which represent the course of the world as a gradual transition from the indeterminate to the determinate, from the uniform to the varied, and which assume the cause of this process to be immanent in the world itself that is thus

transformed. All theories of Evolution, properly so called, regard the physical world as a gradual progress from the simple to the complex, look upon the development of organic life as conditioned by that of the inorganic world, and view the course of mental life, both of the individual and of the race, as correlated with the material process. This definition covers roughly the principal historical systems bearing the name of Evolution, as well as others which have hardly as yet been characterised by this title.

"It is clear by this definition that we cannot now press the etymological force of the word. Evolution has no doubt often been conceived as an unfolding of something already contained in the original, and this view is still commonly applied to organic evolution, both of the individual and of the species. It will be found that certain metaphysical systems of Evolution imply this idea of an unfolding of something existing in germ, or at least potentially in the antecedent. On the other hand, the modern doctrine of Evolution, with its ideas of elements which combine and of causation as transformation of energy, does not necessarily imply this notion. It may be remarked that some of the arguments brought against the modern doctrine rest on the fallacious assumption that the word is still used in the etymological sense, and that consequently that which evolves must contain in some shape what is evolved (*e.g.*, inorganic matter must contain life and consciousness).

"Evolution is thus almost synonymous with progress, though the latter term is usually confined to processes of development in the moral as distinguished from the physical world."

The writer goes on to give a very instructive *resumé* of the *forms of doctrine of Evolution.*

1. "*How far is the process a real objective one?*" For very different views may be taken of the reality of the process of becoming, generation, and transformation.

"On the one side we have the extreme view of the Eclectics, that there is no such thing as change or individual object, that real being is one and unchangeable, and that what appears like the formation and destruction of things is an illusion of the senses. At the other extreme, we have the view that all reality consists in the process of becoming, or self-realisation, and that nothing persists save this law of Evolution itself. Between these

two extremes there lie a number of intermediate conceptions, as that of a varying and progressing activity, of a persistent force, or of a gradual manifestation of an unchanging substance."

2. "*What is the nature of that reality which makes the content, so to speak, of the process of Evolution?*"

"First of all, the material and the mental may be regarded from a dualistic point of view as perfectly distinct kinds of reality. According to this view, physical evolution as taking place in the inorganic world, and mental evolution as unfolded in man's history, are two unconnected processes. Further, the fact of their correlation in organic development must either be left unexplained altogether or can only be referred to the arbitrary action of some supernatural power.

"Opposed to this dualistic conception of reality there are the monistic conceptions, which conceive of all parts of the process of evolution as homogeneous and identical. Of these, the first is the materialistic, which assumes but one substance, and regards mind as but a property or particular manifestation of matter."

"The next monistic conception is the spiritualistic, which assumes but one substance—mind, and resolves the reality of the material world into a spiritual principle. According to this way of looking at the world-process, material and mental evolution are but two continuous phases of one spiritual movement. From the operation of inanimate nature up to human history it is the same spiritual reality which manifests itself.

"Finally, there is the monistic conception in the narrow modern sense, viz., that which views the material and the mental as two sides of one and the same reality. According to this view, physical evolution as manifested in the material world, and mental evolution as seen in human life, may each be regarded as a two-sided process."

3. "*How is the process effected?*"

The replies to this question are too long for quotation, and I must refer the student to the article itself. Their substance is this:—

"There are two strongly-contrasted modes of viewing all action or change. The first is drawn from the region of physical events, and views the change as conditioned by antecedents or efficient causes. This way of looking at change gives the mechanical view of Evolution. The second is drawn from the

region of our conscious volitions regarded as themselves undetermined by antecedent causes, and conceives of change as related to and determined by some end or purpose. This gives the teleological view of Evolution."

"Adopting this distinction between the mechanical and teleological conception of Evolution as the essential one, we may roughly classify the various systems of Evolution under three heads—(*a*) those in which the mechanical view predominates; (*b*) those in which the teleological view predominates; and (*c*) those in which the two views are combined in some larger conception."

Then follows a description of the mechanical interpretation and its difficulties with respect to conscious life and of the modifications (three) adopted in order to obviate them.

This is succeeded by an account of the principal teleological theories, in which appears "the element of purpose," and in which "nature is personified as a worker who aims unconsciously and instinctively at some dimly descried end."

And finally, we have a description of the systems which seek to combine the teleological and the mechanical view of Evolution.

It will thus be seen that when any man speaks or writes for or against Evolution without defining what he means, his deliverances are of no effect, and his hearers or readers, naturally interpreting the term according to their own notions, are confirmed or shaken in their belief in a vague, varying sort of way, and there is a great deal of hazy assent or dissent without any very clear conception on the part of speaker or hearer. Thus we have heard Evolution accepted in sermons in the orthodox pulpit and in the Unitarian pulpit, but the preachers have not stated which kind of Evolution they referred to. So in discussions in learned societies the same lack of definiteness is to be found.

The writer of the article next gives a long history of the progressive recognition of Evolution, in which the part of the greatest interest to the students of Spencer will be found to be the "*Modern Doctrine of Evolution*," p. 763.

"We now approach the period in which the modern doctrine of Evolution in its narrow sense has originated. This doctrine is essentially a product of scientific research and speculation. It is a necessary outcome of the rapid advance of the physical sciences. Its final philosophic form cannot yet be said to be

fixed. It may be defined as a natural history of the cosmos, including organic beings, expressed in physical terms as a mechanical process. In this record the cosmic system appears as a natural product of elementary matter and its laws," &c. This is followed by a short notice of Darwin, Wallace, Spencer, Clifford, Lewes, &c.

I notice with regard to Spencer that he says, "He excludes all consideration of the question how life first arose, though it is clear that he regards the lowest forms of life as continuous in their essential nature with sub-vital processes."

Also I notice, "that just as he does not seek to explain the first appearance of life as a whole, so he does not seek to explain the first dawn of mental life."

It seems to me that here the writer is in error, for he goes on immediately to give Mr. Spencer's explanation of the gradual development of mental life, and it will be seen by a reference to my criticism that Mr. Spencer also endeavours to explain the development of organic life and consciousness.

The writer gives a very just summary of the biology, psychology, and of the ethical and sociological developments of Mr. Spencer's theory of Evolution.

The following passage is deserving of notice :—

"Mr. Spencer makes little use of his metaphysical conception in accounting for the evolution of things. He tells us neither why the unknowable should manifest itself in time at all, nor why it should appear as a material world before it appears under the form of mind or consciousness. Indeed, Mr. Spencer's doctrine of Evolution cannot be said to have received from its author an adequate metaphysical interpretation. The idea of the unknowable hardly suffices to give to his system an intelligible monistic basis. In truth, this system seems in its essence to be dualistic rather than monistic."

The final section of the article is an excellent and impartial consideration of the "*Interpretation of Modern Scientific Doctrine.*"

It is the outcome of scientific research of the positive method, and is of a mechanical rather than of a teleological character. But it still awaits its final philosophic interpretation.

The universal applicability of the doctrine to physical and mental phenomena may be allowed. But there are wide gaps in

our knowledge of both orders ; as, for instance, as to the necessity of the process from the homogeneous to the heterogeneous. Again, the transition from the inorganic to the organic is far from conceivable. Again, in spite of Mr. Spencer's brilliant demonstration of the general continuity of mental life, much remains to be done before all the steps in the process (*e.g.*, from particular to general knowledge, from single feelings to self-consciousness) are made plain.

"As a unifying generalisation it is clearly limited by the fact of the correlation of mental and physical evolution. These two regions of phenomena may be seen to manifest the same law, yet they cannot be identified. All the laws of physical evolution can never help us to understand the first genesis of mind ; and this difficulty is in no way reduced by Mr. Spencer's conception of a perfect gradation from purely physical to conscious life. The dawn of the first confused and shapeless feeling is as much a 'mystery' as the genesis of a distinct sensation."

The writer then discusses the theory of vibrations of indivisible atoms accompanied with a mode of feeling, as the basis of a theory of mind evolution. He also assigns a limit to the explanation to be effected by such a hypothesis.

"Such being the limits set to the scope of explanation by the idea of Evolution, the question arises whether these apparently permanent gaps in our scientific knowledge can be filled up by extra-scientific speculations." The attempt to do so leads us back to a consideration of that ultimate nature of matter, force, and mind. "What, it may be asked, are the realities corresponding to these terms, and how are we to conceive of their mutual relations?" The result of the consideration of the matter is found to be—"No one of the metaphysical doctrines which are at our command is so plainly and completely adapted to transform it into a final doctrine of existence, that it must of necessity be accepted at once and by all." Thus the question as to the possibility of filling up the gaps in our scientific knowledge speculatively is answered in the negative.

The bearing of Evolution upon moral and religious ideas is then discussed.

The article winds up with a list of the best works upon the different branches of the subject of Evolution, which the student would do well to consult.

The Philosophy of Herbert Spencer: Being an Examination of the "First Principles" of his System. By B. P. Bowne, A.B. New York: Nelson & Phillips, 1876.

"Professor Bowne, of the New Boston University, has elaborated his strictures of Herbert Spencer into a small volume, which is one of the most subtle and forcible criticisms of the 'First Principles' and the 'Psychology' that have ever proceeded from an essentially evangelical standpoint."—*Mind, No.* 13; *article,* "*Philosophy in the United States.*"

In consequence of this remark I procured the work referred to, and after its perusal I am able to recommend it as a substantial and sound criticism. The *evangelical* standpoint is not discernible, although a *theism* is indicated and maintained. The criticism is fundamental, and not of odds and ends. It is not a mere tossing about of details, but a disjointing of structure, whereby the system should fall into an ineffective heap. The abuse is mainly polite and pleasant. The sarcasm is properly measured and well directed, sufficient to give zest without distracting the reader with bad feelings. Each part is very well handled; but the summary and conclusion, forming chapter vi., though starting well, falls off into weakness of construction and feebleness of statement. The writer has evidently been a diligent student of Dr. Martineau, whose influence is markedly discernible, both in the lines of thought and in detail of expression and illustration.

The positive teaching of the book is weak and incidental, and I cannot but think it a mistake on the part of any writer who undertakes the task of a criticism to mix up with his examination of another man's work any positive teaching of his own—that is to say, if his object is a pure and impartial consideration of a theory propounded for public acceptance. It distracts the student, by raising up far other lines of thought for which he is not prepared, and leaves the critic open to a counter-attack, in which, if he is discomfited, all his valid criticism is apt to perish. In reading this book, let us then draw our pencils through the positive teaching, and see how the criticism of Mr. Spencer stands on its own merits.

CHAPTER I.—*What is Evolution?*

The theist will accept evolution if it is granted that Mind is the primal cause and the eternal ruler of the universe. The writer says, however, that the new philosophy only recognises matter and force. This is not quite correct, as the student will remember, for matter and motion are the factors of the Formula of Evolution. The strict Evolutionist, however, does not grant the above-stated position of the theist, but either from force or from matter and motion would deduce the universe. The task of Evolution, as understood by the critic, is to explain the cosmos as it exists now, including all the facts of life and mind, as results of a process of condensation of a cloud of atoms. The writer well remarks, "It may even be questioned whether many of the Evolutionists themselves properly appreciate the task they have to perform."

CHAPTER II.—*Laws of the Unknowable.*

It is unsatisfactory to give an account of an unsatisfactory subject, and strange that people should have so much to say about that which is unknowable. The writer, treating of the reconciliation of Science and Religion, coincides with many other critics, and considers that a denial of the personality of God destroys the object of Religion.

He next gives an account of the doctrine of "unknowableness," and, after many examples have been considered, he thus characterises some of the speculations:—"There seems to be a kind of intellectual shuffling going on, a playing fast and loose with words, as the 'absolute,' 'infinite,' 'conditioned,' 'unconditioned,' &c. There is an air of conjuring and thimblerigging over the whole." This amounts to a charge of indefiniteness and the loose employment of terms—a charge which is often brought against Mr. Spencer.

The next criticism is p. 30, where the writer advances as Mr. Spencer's opinion that "the test of the knowable is its ability to come before the representative faculty," and asks if all the terms and many of the facts which are the bases of science are capable of mental representation. If not, then science is impossible. The converse rather is true, he considers, viz., that there

are many knowables that are not capable of mental representation—consequently the latter cannot be the test of knowableness. If Mr. Spencer adheres to that test, he says, it does away with the foundation of his own philosophy. Is "force," as an instance, capable of mental representation? All the fundamental notions of science are incapable of mental representation.

On p. 36 appears an examination of the "fundamental reality," the object of which is to show a contradiction of reasoning on the part of Mr. Spencer, as thus expressed:—

"Whatever involves the idea of self-existence is an untenable hypothesis.

"God involves the idea of self-existence.

"God is an untenable hypothesis.

"Whatever involves the idea of self-existence is an untenable hypothesis.

"The fundamental reality involves the idea of self-existence.

"The fundamental reality is *not* an untenable hypothesis."

Again, p. 38, "As the result of his criticism of scientific and religious ideas, Mr. Spencer concludes that a 'fundamental reality' underlies the universe, and that this is 'unknown and unknowable.'" The writer, after a consideration of Mr. Spencer's argument, thinks that it "proves an unexplainable, but not an unknowable; for though we cannot give the *rationale* of that final fact, by the supposition we know it as a fact. To return to our illustration, the essential nature of gravitation is a profound mystery; but gravitation as a fact, the law of its variation, the truth that it includes all the particular facts mentioned, all these things science regards as beyond question. Clearly the incomprehensible may be known as a fact, and its laws and relations may also constitute a part of our most assured knowledge. Mr. Spencer's conclusion is an extremely commonplace one, that argument and all explanation postulate something for their foundation and support. I admit most cheerfully that explanation must assume the unexplainable or independent; but I deny that this unexplainable is the unknowable" (p. 41).

Then follows, p. 45, an examination of the doctrine of "Relativity," including a consideration of "pure being," with respect to which latter he says—

"Again, the doctrine sometimes reads: We cannot know pure being—that is, being without attributes—but only the attributes

of being. . . . We cannot know pure being, for the sufficient reason that there is no such thing to know. All this talk about pure being arises from a pernicious habit into which thinkers fall of thinking that whatever can be separated in thought can be separated in fact," &c.

On p. 48 commences a review of the Idealism and Realism of Spencer, the conclusion of which is thus stated on p. 56:—

"Thus far Mr. Spencer has established nothing which could not have been admitted beforehand; he has laboriously proved two truisms: first, that all our knowledge must be related to our faculties; and, second, that being without attribute or power or manifestation of any kind is unknowable; both of which may be admitted without at all impairing the fact that what knowledge our faculties do give us is objectively real. If, however, he chooses to deny this, then, as we have seen, his only landing-place is absolute Idealism, which Mr. Spencer says is insanity. As between Religion and Science, his argument thus far tells with equal force against both. Religion involves unthinkable ideas, which fact Mr. Spencer looks upon as sufficient warrant for banishing it to the outer darkness of the unknowable. But Science also involves equally unthinkable ideas, and must, therefore, go along with Religion."

Then follows (pp. 57–76) a long examination of Hamilton, Mansel, and Spencer on The Absolute, concluding thus:—

"My excuse for this long and dry discussion is the religious importance of the question. The only important bearing of the nescience doctrine is the religious one. Science would go on in just the same way as at present, collecting and co-ordinating its facts, though the facts were proved to be phantoms. Common life would experience no change. The most thoroughgoing know-nothing would be as eager to get bread as the realist; he would be as careful to keep out of a relative fire or a relative river. . . .

"But it is not so in morals and religion. There we are not forced to act; there we are constantly seeking some excuse for inaction. Even the suspicion that our religious ideas are delusions leads to a speedy relaxation of moral effort, as they know too well who have at any time made nescience their theology."

Chapter III.—*Law of the Knowable.*

We now come to the most essential portion of the criticism. As we have before remarked, Part I. of "First Principles" is non-essential to the work. In fact, it is rather misleading, for it directs the attention of the student into the mysterious, and takes away his discernment of the Problem of Philosophy and the Formula of Evolution as the main object of the work.

The first section of this chapter is taken up with a consideration of the fundamental ideas of science, and of their validity as *a priori* truths, the writer asserting that they have really been discoveries by the inductive process. Mr. Spencer's fundamental reasoning is severely criticised, as thus :—

"No possible amount of experiment and induction would avail to prove these doctrines for all time and space; and unless they can get some *a priori* support, they must present a sorry figure in so great a field. Indeed, these doctrines, as Mr. Spencer points out, are incapable of inductive proof. Matter can be proved indestructible only by assuming the persistence of force, and force can be proved indestructible only by assuming matter to be indestructible. The argument is circular, and hence worthless; one or other of these doctrines must be based upon *a priori* considerations."

The writer goes on to show that Mr. Spencer, "in one place . . . tells us that a necessity of thought is no sign of a necessity of fact; and then he offers us a necessity of thought as the best possible proof of an external fact" (p. 85). "This reasoning, which is repeated in proof of the persistence of force, amounts to this: what we cannot conceive is impossible. We cannot conceive either creation or annihilation; hence they are impossible" (p. 86). This the writer proceeds to answer by adducing from Mr. Spencer a number of instances of inconceivabilities which, nevertheless, are accepted by the intellect; in addition to which is brought forward Mr. Spencer's own test of truth, namely, the inconceivability of the negative; whereupon he remarks :—

"Inconceivability is an ambiguous term. Some statements violate the law of our reason, others transcend our reason. To the first class belong all contradictions; . . . to the

second belong all inquiries about the inner nature of things," &c.

"Yet Mr. Spencer uses this mental impotence as a sufficient test of objective reality. We cannot explain how a thing can be; hence it cannot be. Part I. loads our mental faculties with opprobrium; Part II. constitutes them the measure, not merely of knowledge, but of existence. Part I. declares inconceivability worthless as a test of reality; Part II. makes it the test of proof."

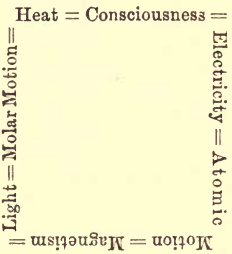
The second section, commencing at p. 90, deals with the correlation of forces. The writer first speaks of the confusion arising from the indiscriminate use of the terms "motion" and "force."

"Heat is a mode of motion and a mode of force at the same time. Motion produces magnetism, magnetism is motion, magnetism is force, motion is force. The same is said of light and electricity; both are motions and both are forces. Yet the universal definition of force describes it as the hidden cause of motion or change. When pressed for a definition, there is no scientist who would view them in any other relation. To use cause and effect as interchangeable and identical involves a most remarkable confusion of ideas. But Mr. Spencer is not alone in this error. I do not know a single scientist who has maintained the proper distinction between force and motion. It would be easy to fill pages with quotations from the writings of the most prominent scientists all illustrating the same confusion. In truth, the majority of scientific men do not understand the doctrine of correlation. Heat, light, electricity, &c., are not forces, but modes of motion, any one of which can produce all the rest. This passage of one mode of motion into another mode is its correlation; but this correlation is the correlation of motions, and not of forces."

I do not know that the writer mends matters in the next passage by stating what is requisite to prove the true correlations of forces. Nor do I understand him when he goes on to consider the question as to the correlation of vital forces with physical forces. "What is the proof that vitality is a function of material forces?"

It would have been well first to have considered if vitality was a correlation of motion, and took its place — as life

—mind — consciousness — in the circle of the changes of motion :—



making a quantum of motion of matter, each mode of which is interchangeable with any other.

However, the writer pursues his argument on the lines laid down by Mr. Spencer, viz., on the basis of the correlation of forces, and finds that "all that is really made out is that heat and light are necessary conditions of vital action; but surely the conditions of the action and the power acting need not be the same." The writer adduces long arguments to show that vitality is not a mode of force transformed from the physical forces. The value of this criticism I am unable to understand until I understand the meaning of the term "force."

In the third section the writer asks, "Let us see whether he succeeds any better in proving the identity of the physical and mental forces." After quoting Mr. Spencer largely, he says (p. 109) :—

"Disengaged from swelling statement it reads thus: Physical forces, such as light and heat, excite sensations; therefore sensations are transformed light and heat.

"Sensations, being pleasant or painful, are followed by motion either toward or from the object of sensation; hence mechanical motion and its equivalents are the correlates of sensation.

"Again, mental action is attended by certain physical conditions; hence they are one.

"Indeed the whole argument may be summed up in this: Physical states excite mental states; hence each is a form of the other.

"Now, looking at this merely with a logician's eye, it must be confessed that it falls far short of proof. It establishes relation, not identity," &c.

But the writer has more to say than this (p. 111):—

"But psychology has yet another aid to offer to the "New Philosophy." It demands the authority for the belief in force at all. It summons the Evolutionist to tell where he discovered this force with which he conjures so mightily. And just here every system of mechanical atheism is speechless. For it is admitted now by all that force is not a phenomenon, but a mental datum. Hume did philosophy a good service in showing that nature presents nothing but sequence, and this is rigidly true. The keenest eye, looking upon the armies of phenomena which manœuvre in the physical world, could detect nothing but succession. Regiment after regiment might march by us in time-order, but they could give us no hint of power. This idea is home-born, and born only of our conscious effort. It is only as agents that we believe in action; it is only as there is a causation within that we get any hint of causation without. Not gravitation, nor electricity, nor magnetism, not chemical affinity, but *will*, is the typical idea of force."

It would follow from this that science should either accept force as a manifestation of will or reject it from its system altogether. The writer says, with what justice I know not, that some rigorous Baconians, as Comte and Mill, have tried the latter plan, and fell into ridiculous contradictions. But upon this matter I am not able to offer an opinion. The positive doctrine here adduced by the writer we leave out of consideration, as not being a criticism of Mr. Spencer. The conclusion of the section will be acceptable to many Evolutionists, viz. (p. 126):—

"This idea of force, which is as much the necessity of science as it is of religion, makes an honourable reconciliation possible, because it enforces on the one hand the need of an originating and controlling mind, and on the other leaves the method of its working undetermined. Science discovers laws, but is forced to provide an ever-active Administrator; this satisfies religion. Religion proves an ever-living Will, but is compelled to grant its steady method; this satisfies science. Thus each can look without aversion on the claims of the other."

This passage shows the thought that is uppermost in the writer's mind, for he diverges from his negative criticism of Spencer to advance positive doctrines. It is very well to advance positive doctrines, but it has led us off our study of Spencer's main theses.

The fourth section is an extension of the same argument:—

"Let us grant that he assumes the existence of a universal impersonal force, and inquire how he accounts for the intelligence which the universe seems to manifest" (p. 127).

This is found to be in the chances of One Force of infinite differentiations, the statement and examination of which is the weakest piece of critical examination in the book.

The writer next examines the doctrine of "Segregation" (p. 133), which is much to the point, and he very justly questions the identity of the process of segregation of masses under action of a medium with the segregations of organisms and of organic and mental processes. "All these are instances of segregation," and "Mr. Spencer has a way of using the vaguest and most far-fetched analogies as identities, which often make it impossible to get at any defined meaning."

The writer then questions the explanation of organic development on the basis of Mr. Spencer's theory, on which he aptly remarks that—

"Mr. Spencer seems to have forgotten that he is engaged in proving the doctrine of evolution, and cannot be allowed to assume it. The force of his reply lies entirely in the assumption that evolution is an established fact. This, however, is not the only time that Mr. Spencer has done this. Many of his arguments, as we shall hereafter see, assume the point in dispute, and are worthless without the assumption."

This is something to be borne in mind in reading the "First Principles." In many passages of this chapter I find that the writer's indignation has exceeded the proper bounds of expression, which is very regrettable. Has not Mr. Spencer undertaken and performed his task in good faith and with a conscientious effort to arrive at the truth? Both the eminence of the author and the dignity of the subject should exercise a restraining influence upon the critic. Besides, the judicious critic is content to leave the logical inferences of his criticisms to the reader.

CHAPTER IV.—*Principles of Psychology.*

This is a long chapter, extending from p. 146 to p. 217, and deals with matters highly important and not inapposite to the main and fundamental object of our study in this volume, but an account and criticism of it would be apt to carry us too far. The general bearing of it is to show the insufficiency of the explanation of mental facts upon the theory of Mr. Spencer, as expressed in his Formula of Evolution. The critical part is cogent and strong; the positive doctrine taught, or rather indicated, is weak. The writer notices Mr. Spencer's acknowledgment of a unit of motion and a unit of feeling having nothing in common, and his admission that "the antithesis of subject and object is never to be transcended while consciousness lasts," and very properly criticises the attempted explanation of the *nexus*. A variety of other difficulties seem very well treated, but are in advance of our present studies.

CHAPTER V.—*The Theistic Argument.*

The first section discusses the teleological argument. The second section considers the theory of the construction of the cosmos out of the homogeneous and the Darwinian theory of development of organisms. The third section contains a discussion of Pantheism.

CHAPTER VI.—*Summary and Conclusion.*

I might have given this chapter instead of the foregoing summary, but that I wished to emphasise some portions of the criticism more than others, and to introduce some critical remarks.

Articles in the Contemporary Review, December 1877, March 1878, July 1878, on "Mr. Herbert Spencer and Mr. G. H. Lewes: their Application of the Doctrine of Evolution to Thought."

As Professor Green possesses a considerable reputation and influence, it is well that we should acquaint ourselves with his views. His thought seems somewhat laborious, but very clear and careful. Would it not be well if those who belong to the

school of thought which pre-eminently claims the title of "scientific" should sometimes step outside their circle and view things from another point of view altogether? This is what Professor Green invites us to do. The study of our subject hitherto has been of the following nature, viz., Accepting Mr. Spencer's statement of the Problem of Philosophy, can we, by the Formula of Evolution, account for the cosmos as it is? Professor Green would seem to dispute the correctness of the problem. To him the fundamental problem is not the construction of the universe, but "How is knowledge possible?"

He thinks that modern philosophy was brought to a crisis by Hume; that his professed followers in this country have really ignored him, but that the problems he laid down have been truly followed and worked out by Kant and Hegel. He therefore proposes to himself the task in these essays thoroughly to overhaul the best representatives of modern "empirical psychology." "Only by a direct examination of that psychology itself, as represented by our ablest writers, can we expect to produce the conviction that this primary question of metaphysics still lies at its threshold, and is finding nothing but a tautological or preposterous answer."

The writer justifies this manner of putting the question, and shows that the Positive philosophy, while repudiating, really accepts a metaphysical basis. "It is unaware of the assumptions which it unintentionally makes in order to its own justification." Beyond certain limits the alliance between psychology and physiology is simply illusive. "It has merely served to give a semblance of scientific authority to what is, in fact, a crudely metaphysical answer to questions which, rightly understood, it has nothing to say."

After re-stating the question, "How is knowledge possible?" the writer gives the supposed reply of his reader. "This seems to be an uncouth way of asking how I and other men have come by the knowledge we possess. The answer is, that we have been taught most of it, but that ultimately, as our best physiologists teach, it results from the production of feeling in us by the external world and the registration of feeling in experience." Mr. Green says that no true disciple of Kant or Hegel will dispute this, but only its sufficiency.

"It is not to the purpose to tell him that consciousness is a simple ultimate fact. Knowledge is quite other than mere consciousness, and, being so, admits of and requires explanation. The fact just stated is not an explanation of it, but a summary of what requires explanation. It either merely amounts to the fact that we know because something makes us know, . . . or it is only more than this because the 'something' is determined as a 'world,' as 'real,' and as 'external,' and as in some way reflecting itself in our experience. It is the analysis of these further determinations and of all which they imply that is the proper task of the metaphysician. . . . The question before him is thus one relating to the *object* of knowledge. What are the conditions implied in the existence of such an object? And an answer to this question forms the necessary prolegomenon of all valid psychology. Till this is fairly dealt with, an inquiry into the subjective process through which the individual comes by his knowledge can only have an illusive result, for it will be assuming an answer to a question of which the bearings have not been considered, and will therefore be at the mercy of crude metaphor and analogy in its assumption. It is this question which it is Kant's great merit to have clearly raised, and which he fixed in the formula, 'How is nature possible?'" It is then shown how this formula was forced upon Kant by the previous historical development of philosophical thought, and it is asserted that the *object-matter* of all philosophy, physical or metaphysical, has been fixed by Locke once for all as in some sort *consciousness*. To enter into the true meaning of this is the true baptism into philosophy.

"If from the proposition, which all admit, that knowledge is of appearances, we go on to inquire into the nature of appearances, we find the natural man summoning in an explanation of them which neutralises the admission that they are appearances, or that they are relative to consciousness at all. They are explained as molecular changes of a nervous organisation. Beginning with a doctrine which, if it means anything, means that only in *a world of consciousness* can any *material relation* be known, we are asked to explain consciousness itself as one sort of such material relation.'

"In Locke himself, the determination of the object of knowledge as lying in ideas is virtually cancelled on almost every

page where it occurs." Then follows an examination of Locke, which is a launching out into the general question of the meaning of "subject" and of "object" and of their relations.

We pause here to inquire as to the duty of the student of philosophy, who has been brought up so far under the so-called scientific training, when in his study of Mr. Spencer, who is supposed to be the outcome of the modern scientific spirit, he is thus met by the assertion that he must explore metaphysics as a necessary prolegomenon of all study—when he is thus led up within view of those vast fields of metaphysical explorations which he has shunned and dreaded all his lifetime? The thought presents itself, If he takes the plunge into that sea of troubles, will he ever come out of it again? He recalls Bacon's characterisation of metaphysical studies as vermicular, where the mind wanders about amongst old worm-eaten passages —studies in which positions remain positions still, and questions remain questions—in which one teacher comes up after another with new phraseologies, but the eternal question remains unsolved. Metaphysics, a toothless Sphynx, going through the centuries with his riddle, and threatening to devour, but impotent in a busy and unheeding world.

However, upon consideration, the student feels bound to lay aside his prejudices, and to endeavour to form for himself some estimate of the position as advanced in the foregoing quotations.

Does Mr. Spencer's statement of the Problem of Philosophy meet the case as therein stated? Does it include the problem as given by Professor Green? Does Mr. Spencer show "How is knowledge possible?" and, by implication, "How is nature possible?"

We recall at once that Mr. Spencer's statement of the problem is obscure, for it reads, firstly, as an unification of knowledge; and again as a problem of construction, by which existence, independent of and antecedent to consciousness and knowledge, came to be organised, including amongst its results our own selves, with our consciousness and knowledge. It is the latter statement of the problem which we have accepted as correct and criticised, and it would seem to us that if Mr. Spencer had succeeded in his attempt, Professor Green's necessary prolegomenon would have been ruled out of court, since it could have been shown how knowledge is possible; but since he has not

succeeded, he has not shown how knowledge is possible. Can Professor Green, or Kant, or Hegel? I must ascertain if they undertake this task, and, if so, how they have succeeded?

The problem appears to be the same in both cases—one approaching it from the physical side, the other from the side of consciousness; but philosophy does not seem yet to have been able to bridge the gulf between them; the problem of the order of the universe is yet to be solved.

It would appear, from what I can judge, that the school of which Professor Green is an exponent confines the terms "reality" and "existence" to that which forms part of consciousness and knowledge. Even when they speak of "material" and "nature," they only refer to terms or items of knowledge and consciousness. Because we can talk of nothing but of our knowledge of things as related to ourselves—things have no relations amongst themselves independently of our knowledge—whereas the records of geology show an age of physical activity long before there was any consciousness. The difficulty appears to be in an ambiguity of the term "reality." Realities would seem to be of two classes: the primary realities—such as are in direct relation to our consciousness; and the inferred realities, which are not present in consciousness. The inferred order of the universe and the inferred relation of things to each other in co-existence and sequence seem to me just as much realities to us as those of which we are immediately conscious. It is possible that the metaphysicians do not mean anything different from ordinary men in the net result, and that ordinary men could agree to their explanations after proper study; but is any real progress made?

It would seem that the metaphysicians, in the position they take up of insisting upon the preliminary study of the question, "How is knowledge possible?" hold up a perpetual bar to any answer to their own question, if they do not admit independent existences and interrelations of things independent of consciousness.

So far, both from the side of the metaphysicians and from the side of the physicists—to use these terms rather broadly—there is no explanation of the mutual relations of consciousness and knowledge, on the one side—with matter (taken as extension and resistance), and motion on the other. The physicist cannot account for mind; the metaphysician or ontologist

cannot account for matter, nor, for the matter of that, for mind either. Neither of these can explain the connection between them. The metaphysician can explain the law of knowledge, but he cannot show, any more than Mr. Spencer or the physiologists, how knowledge is possible and how nature is possible.

One remarkable feature in the writings of metaphysicians of the school of Professor Green is their acceptance of a normal mind for the basis of their studies, and the apparent excision from their study of all relations—or rather of all inconvenient relations—with other sciences. They do not often refer to the records of geology, to the Darwinian theory of development, to the development of the individual from the germ, to variations of mentality, to comparative mentality, nor do they ever seem to seek a theory which shall unite the whole. Yet all these are studies that cry loudly to the metaphysician for affiliation—not to be left relationless in the cold. Unless accepted and explained, we always doubt lest, in place of these legitimate children, metaphysics is nursing the offspring of some cherished but unlawful illusion.

To resume our account of Professor Green's criticism. Assuming that Mr. Spencer accepts the theory that all knowledge must consist or be founded upon consciousness, then, speaking of Hume's doctrine, he says:—

"He can recognise no *unity of the world*, no uniformity of *nature*, but the regularity, varying in every individual and every age, with which one idea suggests another in memory or imagination. Hence the peculiar difficulty of adjusting his system, so far as it is faithfully maintained, to the procedure of the physical sciences—a difficulty which the modern 'experientialist' saves himself by assuming both the reality of an objective order, and an elementary consciousness of it, as antecedents of the process by which knowledge is attained. He cannot, however, claim any superiority over Hume for so doing. He is merely ignoring the previous question which Hume was trying to meet. Given a world of intelligible relations, it is easy to account for knowledge. The modern 'experientialist' is taking the reality of such a world for granted, along with a theory of reality which excludes it. Hume was trying to explain it away, in order that the same theory of reality—the theory that identifies it with feeling—might be consistently maintained."

And as Hume is misapprehended, so Kant is supposed to be superseded. But Professor Green holds that this is not so, for the "experientialist" also misunderstands Kant.

"If the alternative really lay between experience and ready-made, unaccountable intuition as sources of knowledge—if the point in dispute were whether theories about nature should be tested merely by logical consistency or experimentality verified—whether subjective beliefs should be put in the place of 'subjective facts,' or brought into correspondence with them—the 'experientialists' would be entitled to all the self-confidence they show. That the question does not so stand, they can scarcely be expected to admit till their opponents constrain them to it; and in England hitherto, whether from want of penetration or under the influence of a theological *arrière pensée*, their opponents have virtually put the antithesis in the form which yields the 'experientialists' an easy triumph. Both sides are, in fact, beating the air till they meet upon the question, What constitutes the experience which it is agreed is to us the sole conveyance of knowledge? What do we mean by a fact? In what lies the objectivity of the objective world?"

We can scarcely be expected to give Mr. Green's replies to these questions, nor to give his full criticism of Mr. Spencer. We must refer the student to the articles themselves; but the reader must bear in mind that Mr. Spencer has two theories of Evolution — one without, and one with, the factor of "feeling."

The subjects dealt with in the papers are mainly those of object and subject, reality, the independence of matter, and the nature of experience—all of which, the writer undertakes to show, are not properly or satisfactorily dealt with by Mr. Spencer and Mr. Lewes. And since they form the necessary prolegomenon of the study of philosophy, it is to be presumed that the Evolution philosophy cannot be accepted. The primary questions of philosophy, as stated by Professor Green, viz., "How is knowledge possible?" and "How is nature possible?" remain unanswered by the doctrine of Evolution.

In any case, it would seem that Professor Green makes out a good case for the attention of the honest and painstaking student to the views of the metaphysicians, and gives a valid challenge to his opponents to meet him on his own ground.

GENERAL SUMMARY.

The general conclusions to which our studies have brought us appear to be these:—

First, as regards Mr. Spencer's workmanship, it would seem to be the general opinion that it is not executed in that clear and well-ordered manner that is to be expected in a philosophical work. The terms employed are not properly defined; the propositions are indistinct; words are used in different senses in different places without any indication of a change of meaning; some words are used which have no definable meaning at all. It is even said that, in consequence of these deficiencies, the results are not merely confused and nebulous, but absolutely contradictory. These complaints are not made by adversely prejudiced minds only, but by men who have every desire to understand and to accept an explanation of an orderly development of the universe. All this would seem to demand from Mr. Spencer a rewriting of his "First Principles," for although he may hold in his own mind a clear and complete theory, yet he cannot fail to recognise the difficulties experienced by so many of his readers with the very best desire to appreciate and understand him. And when we consider the difficulties and incompetencies of language, no blame is to be attached to a writer upon a difficult subject if he does not always make himself understood; yet, when the difficulties are stated, blame may justly be attributed to the author who does not seek to remove them. Indeed, considering that the preface to a book is generally written last, when the subject is complete in the author's mind, may we not claim that the "First Principles" should at least receive a revision from the author when his work is complete? Should we not regard it as a "working hypothesis," a tentative theory, and at the end of his elaboration of it should the test of the results not be applied to it? and, if necessary, should it not receive some modifications according to the exigencies of the case?

I advance these remarks with due and great respect to Mr. Spencer's high position in the literary and philosophical world, and I mean no disparagement to those great intellectual successes which are sound and good work; but these great accomplishments should not absolve the author from just strictures

upon imperfect work, nor from the necessity of rendering more clear the exposition of the more ambitious scheme propounded in the "First Principles" to which we have more especially directed our studies.

We have also found that the religion indicated by Mr. Spencer is of no value or efficacy in influencing human action, and although something else may be substituted in its place, viz., a kind of "cosmic emotion," yet it is not likely to be of any efficacy in the affairs of the world. Comtism recognises nothing beyond the Knowable; Spencer recognises the Unknowable as a positive. Nescience implies unknown possibilities, and disturbs the self-complacency of Comtism. Mr. Spencer even goes further, and recognises a Power, although it is an Inscrutable Power, and regarding this Power there are many possibilities. How should our lives be influenced by the possibilities of this Inscrutable Power?

But we have also found that too much stress has been laid upon this portion of Mr. Spencer's theories. We have found that this subject, so attractive to the imagination and so important to the interests of mankind, has led the mind off from the main line of Mr. Spencer's argument, and tended much to confuse the consideration of it. For after all, from a merely logical point of view, the book on the Unknowable is non-essential to Mr. Spencer's philosophy. If it were excised from the book, it would leave the mind free to examine on its own merits the real and substantial theory of the work as contained in the part on the Knowable.

This theory is found to be, firstly, a claim for philosophy; and, secondly, a formula which shall satisfy that claim.

With respect to this essential portion of the work, the general opinion of critics seems to be that Mr. Spencer has failed. His theological opponents—not merely those that are thoroughly ingrained in orthodox prepossessions, but those who manifest unbiassed and careful thought—advance objections which Mr. Spencer has not yet met, and which the student may fairly demand shall be replied to. His purely philosophical and scientific critics also argue his failure to accomplish the task he has set Evolution to fulfil.

It is considered, also, that Mr. Spencer and his disciples admit the insufficiency of the theory to account for the facts of

life and mind, and that it is inconsistent to hold on by the soundness of the theory when these incompetencies are allowed. Again, those amongst the eminent scientists of the day who most favour Mr. Spencer's theories appear to be in a state of puzzle. They would like to accept them if they could. The study of the world and the cosmos points to unity, and it also indicates orderly development, and they naturally search for some mode of expressing this unity and order with a natural bias towards that physical science which is the most perfect exhibition, in the present state of human knowledge, of that order. But the most candid and careful of them feel bound to express the incompetency of science to include in any formula certain facts of life and mind, and by implication reject Mr. Spencer's Formula of Evolution as satisfying the requirements of philosophy.

One positive result of our studies has been the recognition of the insufficiency of a materialistic and mechanical theory of the universe. This conviction grows upon the mind the more deeply the matter is studied. Does, then, nature disclose an original mind? Perhaps we cannot say in any positive and certain manner that she does so, but the balance of probabilities is in favour of that theory. We cannot say that that mind is like ours; we cannot attribute to it from a study of nature like passions or thoughts to our own; but, as between two rival theories, the presumption is strongly in favour of that which recognises in some form or another the existence of mind in nature.

If the mechanical and materialistic hypothesis is clearly found insufficient to account for some of the facts of the universe, the mind naturally asks—What are the alternative hypotheses? The only alternative hypothesis is one founded upon the nature of the facts that are unresolved by the other, viz., the facts of life and mind. Although the inference is obscure, yet the general nature of the explanation is indicated. Or there may remain an unknown hypothesis, taking the form of an Unknowable or Inscrutable Power or Force; but even then it seems clear that it must contain within it that which comes out of it, that it implies in its constitution the elements of feeling and mind as we know them, and if it differs from them it does so by transcending and comprehending them.

The only escape from this preponderance of probabilities is by Agnosticism. But there is no pure nescience logically acceptable. It may be used as a condoner of logical idleness and intellectual superciliousness; it may cover pride or stifle the cry of despair; it may be a mental anæsthetic; but to the earnest thinker there can be no pure nescience. Nescience admits all sorts of possibilities. The Agnostic cannot say that any explanation is not the right one; his position demands that he should say "It may be," as well as "It may not be." Nescience does not confer quiescence of thought. It gives no rest. Behind the veil are all sorts of possibilities. What are our relations to these unknown possibilities?

The nescience of Mr. Spencer accepts the positive belief in the inadequacy of the mechanical and materialistic hypothesis. This is a valid definite result. It recognises an all-producing though Inscrutable Power. Other interpreters infer from its results something of its nature.

THE END.

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