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I.

RECENT DISCUSSION IN MATERIALISM.

THESE are phases of contemporary materialism which have little in common with the doctrines of ancient and mediæval materialists, and which in point of subtlety and philosophical attractiveness are quite in accord with the advanced position of nineteenth century thought. The idealist of to-day flatters himself that he avoids the inconsistencies of Berkeley and Fichte, so the materialist smiles at the mention of Priestly, D'Alembert, and Holbach. But these growths respectively in idealistic and materialistic thought have not been parallel. Idealism has tended in the last thirty years to withdraw its gaze from the thought-ultimate as a monistic conception, to perception as a dualistic relation, that is from cosmic to psychological idealism; while materialism has tended in quite the opposite direction, *i. e.*, from the crude postulate of matter in bulk to the search for an ultimate materialistic principle, that is from psychological to cosmic materialism. Each has strengthened its flank and the battle is now joined between psychological idealism and metaphysical materialism.

Spiritualism has gained vastly by this change of base. As long as the ontology of spirit rested upon a dogmatic assertion of universal mind, there was no weapon at hand wherewith to attack the corresponding assertion of universal matter. I have as good right to assert an universal as you have and *chacun à son goût* is the rule of choice. But now that philosophy is learning to value a single fact more than a detailed system, and is sacrificing its systems to the vindication of facts, it is spiritualism and not materialism which is profiting by the advances of science. Materialism has appealed to the metaphysics of force, spiritualism has appealed to consciousness

VI.

WHAT IS ANIMAL LIFE ?

I.

THE success of those who have endeavored to define life has not been such as to encourage new attempts. Life, it would seem, is an energy or form of energy actuating material atoms or bodies, but which can be known to us only in its relations and effects. Even in regard to these it is difficult to frame any statement which shall not be too wide or too narrow, or which shall not, like that celebrated definition formulated by Mr. Herbert Spencer, leave out the essence of life itself.

Energy in nature appears to us under different forms. These may be distinct in kind, but are more probably various modifications of the operation of one omnipotent and all-pervading Power. Energy actuates either ordinary matter in some of its kinds, or that medium, different from the grosser kinds of matter, known as ether. It becomes known to us only in connection with these material media. It may be that matter itself is only a conflict of energies, and that ether and energy are inseparable. It is certain, however, that in order to think and experiment on any of these entities we must recognize matter, ether and energy as a triad of things or powers, existing together, and not known to us separately.

Life, like other energies, has relations to certain special kinds or arrangements of matter. It always appears in connection with that highly complex compound of carbon and other elements known as albumen or protoplasm. On the other hand, though protoplasm may be either living or non-living, we know no protoplasmic matter except that which is, or has been, associated with life. Further, in order that life may produce its most distinct effects, or, perhaps, that it may act at all, the protoplasm must be arranged in such a way as to constitute an organism; and though the organism may be either living or non-living, we know no organism which is not, or has not been, associated with life.

Thus, we have here another inseparable triad, protoplasm, organism and life, distinct in properties and as subjects of thought, but practically incapable of being isolated. We know, however, that it

is the vital energy which sustains the protoplasm and the organism against the influence of other forces; and when life is removed the protoplasm and the organism are, in a short time, pulled to pieces by other forces which life has for a time controlled. These statements apply to both animal and vegetable life.

Confining ourselves now to animal life, and premising that its protoplasmic matter has been previously prepared by the plant, let us ask what effects it produces. In this we need not, at present, concern ourselves with any possibility of the superadded power of the spiritual as distinct from merely animal life.

These effects are four: 1. Growth or assimilation, whereby suitable matter from without is added to the organism, often with chemical or molecular changes. 2. Reproduction, or the formation and development of germinal matter, and this implies specific individuality and its indefinite continuance by heredity. 3. Voluntary and spontaneous movement, in which, by an expenditure of part of its material, the organism is enabled to overcome the inertia and mechanical forces of matter. 4. Sensation, whereby, either by a general sensibility, or by organs specially constructed, the organism is placed in communication with its surroundings. This last effect implies not merely the individuality of the organism, but some degree of psychic power, the precise relations of which to animal life proper we need not now consider.

The first and second functions above stated are performed by plants as well as by animals, but with differences in detail. The third and fourth are distinctively animal powers.

It follows that the most comprehensive idea we can form of animal life is, that it is an energy or modification of energy actuating protoplasmic organisms, and enabling these to carry on not only the functions of growth and reproduction, but those also of voluntary motion and sensation.

This statement, be it observed, leaves out of the account two important relations of animal life—*first*, that which it bears to the plant which is the producer of protoplasm, and, *secondly*, that which it bears to the psychological and spiritual powers that may, in their turn, be founded on the merely animal life. On the principles above stated, however, it is perfectly possible to define the functions and effects of vegetable life on the one hand, and of spiritual life on the other, as distinguished from animal life proper.

J. WM. DAWSON.

II.

The distinction in nature and substance between matter and mind was made by Plato and Aristotle, who represent the best Greek philosophy; by Cicero, who represents the best Roman; by Plotinus and Proclus, who represent the Later-Platonism; by the Christian Fathers; by the Schoolmen; by the great discoverers in modern physics, Copernicus, Galileo, Kepler, Newton and Linnæus; and by the leading modern philosophers, Bacon, Descartes, Leibnitz, Locke and Kant. The distinction has also gone into the literatures of the world, and been recognized by the creative minds: by Homer and Æschylus, by Virgil, by Dante and Cervantes, by Pascal, by Shakespeare and Milton. The denial of the distinction is confined to the pantheistic and materialistic schools, to which physical science is not indebted for any of its leading discoveries, and to which literature in its highest forms is not at all indebted. We shall assume its validity preliminary to answering the question, "What is animal life?"

If this distinction is valid, all substance in the created universe is either matter or mind; and if it is the one, it cannot be or become the other. A chasm lies between the two realms that cannot be filled up. The limits between them are impassable. There is no transmutation of matter into mind, or of mind into matter. Dualism, not monism, is the true theory.

To which of these realms does animal life belong? We answer, to that of *matter*. Animal life is no part of the mental, moral and spiritual world. It belongs to the material, physical and non-moral.* What then is the distinctive characteristic which differentiates the mental from the animal; the human soul from the animal soul? We answer, the presence of *reason* in the former, the absence of it in the latter. By reason is not meant any and all intelligence, but a particular kind. Animal life is intelligent in a certain way; even in its very lowest forms there is selection of means to an end, and this implies a kind of knowledge. We never think of vegetable life as intelligent in any manner whatever, but the action of instinct in the animal world shows both perception and volition. The volitions by which "infusoria avoid each other as well as obstacles in their way," and "animalcules move by undulations, leaps, oscillations,

* Aristotle virtually asserts this in his doctrine of the "fifth essence." He taught that besides the four elements of the material world, of which all things in this world were supposed to be composed, there was a "fifth essence or nature, peculiar to God and the human soul," which had nothing in it that was common to any of the rest. Cicero adopts and defends this view (*Tusc. Quæst.*, i, 27).

or successive gyrations;" the intelligence by which the ichneumon-fly deposits its eggs on the kind of caterpillar that furnishes the appropriate food for its young, and by which the young grubs themselves "gnaw the inside of the caterpillar, carefully avoiding all the vital parts," in order to preserve their food as long as possible—such intelligence as this, though remarkable, is not reason. And neither is that still more wonderful instinct by which the bee constructs its hexagonal cells, and the ant builds its galleries and corridors; nor is that "wisdom" by which the hawk flies (Job xxxix, 26), and by which he plunges with the unerring velocity of a cannon-ball from his height in the clouds to the depths where he grasps his prey; nor is that foresight by which the migrations of birds are directed; nor is the still higher intelligence of the dog, horse and "half-reasoning elephant"—nothing of all this adaptive skill and foresight in the tribes of earth, air and water reaches into the sphere of *rational intuitive perception* in mathematics, æsthetics, ethics and religion. Though it be the highest grade of instinct, yet it is no grade at all of reason. As one sense cannot do the work of another; as the sense of smell, however acute, cannot possibly see objects or hear sounds; so the intelligence of the animal, however keen in its own sphere, cannot possibly enlighten it with the knowledge of things above that sphere. The whole range of cognition in mathematics, æsthetics, ethics and religion is absolutely beyond its ken. No education whatever can give an animal intuitive perception. He is, and ever must be, an irrational creature. It is not so with mental and rational life in man. The most degraded savage, conceivably, may become, by instruction and the development of his created capacities, even a Newton or Milton, because the kind of his intelligence is like theirs. He is not barred out of the higher regions by the structure and constitution of his soul. The most imbruted tribes of men may become the most civilized and enlightened, as is seen in the modern Englishman compared with his progenitors; but no tribe of apes, no breed of dogs, can be lifted by training and education above their animal range and plane. To the instinctive, irrational intelligence of the brute, the Creator has said: "Thus far shalt thou go, and no further."

Reason, strictly defined, is the power of intuitively perceiving the ideas and truths of mathematics, of æsthetics, of ethics and of religion. This is a species of cognition that puts man in a higher plane of being than that of the animal. The most intelligent and sagacious dog does not intuitively perceive that the whole is equal to the sum of the parts, that there is beauty in the object which strikes his eye, that his anger or deception are wrong and damnable before moral law, that God is his creator and he is obligated to Him.

Neither can he be taught these truths. He can be taught a great variety of actions and tricks that stretch his animal intelligence to the utmost, but no action or trick implies the perception of any of these higher ideas. He cannot be trained to perceive the truth of an axiom, the beauty of a form, the guilt of a feeling or act, the infinity and glory of God. How do we know this? it may be objected. Because there is no manifestation of such knowledge. The only conclusive proof of the existence of a power is its operation. The burden of proof, consequently, is upon him who affirms that instinctive intelligence is potentially rational intelligence, and by a natural process may be transmuted into it. He is bound to furnish the instances and examples.

By reason, then, of the absence of rational intuitive perception, the animal belongs only to the world of living organic *matter*, not of mind or spirit. His animal soul is not spiritual like mind, but non-spiritual like matter; is not moral like mind, but non-moral like matter; is not immortal like mind, but mortal like matter. The intelligence with which he is endowed is related only to the world of sense; it has no connection with the immaterial world of spirit. It is given to him by his Maker only to subserve the purposes of a brief, transitory existence here upon earth. The "be all and the end all" of the animal is "here, on this bank and shoal of time."

Having thus located the animal within the world of matter, and excluded him from that of spirit, we proceed to consider more particularly the nature of animal *life*. Life in all its forms is an invisible principle or entity. No man has seen or can see it. Be it vegetable or animal, it is a power and principle that cannot be detected by the naked or armed eye. The vitality that builds up the individual plant, or the individual animal, eludes all observation. Its effects and products are seen abundantly, but itself is unseen. Consequently, if animal life belongs to the domain of matter, there must be a mode or form of matter that is *invisible, intangible and imponderable*. In common phraseology, however, matter is described as visible, tangible and ponderable. In the common apprehension, matter and mind are differentiated as the visible and invisible, the tangible and intangible, the ponderable and imponderable. Matter is popularly defined as extension in the three geometrical dimensions. This is supposed to exhaust the subject. But there is another form of matter which the scientific mind recognizes and believes in. This is its unextended, invisible mode or form. The ultimate of matter, on either the dynamic or the atomic theory of it, is without extension and invisible. If we adopt Kant's theory that extended and visible matter is the resultant of two

unextended and invisible forces that meet in equilibrium, and evince their balancing counteraction by a visible product that fills space with a certain degree of intensity and impenetrability; or if we adopt the theory that visible matter is composed of invisible molecules—in either case, we assume an invisible mode of matter. Neither these primordial forces nor these primordial atoms are extended, visible, tangible or ponderable. And yet they are assumed to be entities. Their advocates will not concede that they are mere fictions of the imagination, or mere notions of the intellect, like the square root of two. These unextended, invisible forces, or molecules, are claimed to be as objectively real as the visible matter of which they are the underlying substance and ground.

Again, the forces of attraction and repulsion, of cohesion, of gravitation and chemical affinity are not, like space and time in the Kantian theory, mere forms of the understanding without objective existence, but are real entities. They are substance or being of some kind, because they are able to produce effects, which absolute nonentity cannot do. They answer, in this way, to Plato's definition of substance, as "that which has the power of doing or suffering in relation to some other existing thing" (Sophist, 247, 248). They constitute a part of the material universe. Without them there would be no extended and visible phenomena whatever. But they themselves are unseen; they are matter in its invisible mode or form. They were created *ex nihilo* in that "beginning" spoken of in Genesis i, 1, when the chaotic matter of the universe was created of which they are the constitutive and regulative forces. Once they were not; now they are. This places them among entities.

But if non-extension and invisibility may be a characteristic of inorganic and dead matter, it may be of organic and living matter. If the ultimate form of matter in the rock is an invisible, the ultimate form of matter in the vegetable and animal certainly is. The unseen vitality which is the *substans* of the individual tree or the individual lion is a real entity, and makes a constituent part of the material universe of God, the creator of all things.

The answer, then, to the question, "What is animal life?" is, that it is an invisible material principle that is able to organize, vitalize and assimilate inorganic and lifeless matter, and thereby build up a living animal. Having reference simply to the distinction between matter and mind, it is no higher in kind than the inorganic forces below it; than gravitation or chemical affinity. Like them, it is an invisible mode of matter. It does not belong to the mental, moral and spiritual world any more than they do. It is no more rational, moral, spiritual and immortal than they are. But considered within its own sphere of the material and physical, and compared with

other varieties of matter, animal life is higher than vegetable life, as vegetable life is higher than gravitation and chemical affinity. Though physical and material in its nature, animal life cannot be produced by natural evolution from vegetable life, and still less from the inorganic forces. A distinct and definite fiat of the Creator is requisite to its origination, as well as in order to that of the vegetable; such fiats as are indicated in Gen. i, 20, 24: "Let the waters, and let the earth, bring forth the living creature," and in Gen. i, 11: "Let the earth bring forth grass."

This view of animal life, and of the animal soul, as different in kind from the rational life and the rational soul, is supported by Revelation. The individuating and vitalizing principle in the animal is denominated a "soul of life," or a "living soul" (Gen. i, 20, 21, 24). When God created it, He addressed the "waters" and the "earth," and made both body and soul together and simultaneously. He did not "breathe" the animal soul, as a distinct and separate thing, into the body which it vivified and inhabited; nor did He create it after His own "image and likeness." But when He created the "soul of life" or rational soul in the first man, He addressed Himself, not the waters or the earth, and imbreathed it into a distinct and separate body previously made of "the dust of the ground," and described it as made in His own image. This difference in the manner of creation infers the higher grade of being. Again, Scripture describes death in the instance of man as the separation of the soul from the body, the continued existence of the former and the dissolution of the latter. The animal is never represented as "giving up the ghost," nor is the animal soul described as leaving the body, as being "gathered to its fathers," and continuing to exist in happiness or misery. The death of the animal is the destruction of the total creature, body and soul. "The spirit of the beast goeth downward to the earth" (Eccl. iii, 21).

According to this view, the entire animal world and animal life in all its varieties is of the earth earthy. It is matter, not mind. It has no immortality, no permanency. The animal soul, though it may exhibit a striking kind of intelligence that allies it with man in some degree, yet is destitute of man's distinctive characteristic of reason and rational intuition. Having no moral ideas, and holding no moral relations, it dies with the body which it has organized, vitalized and used, in accordance with the design of the Creator, within that narrow and transient sphere of existence to which alone it belongs.

W. G. T. SHEDD.

III.

In view of our profound ignorance of the nature of life in general, a complete and satisfactory reply to the question which forms the title of this paper is obviously not to be expected. An outline or suggestion of an answer may, however, be given by comparing (1) living with non-living things, (2) animals with plants, (3) animals with men.

The doctrine of a special vital force or entity has now been completely abandoned, and it is clearly recognized that all the functions of a living organism are performed in the strictest accordance with ordinary physical and chemical laws. This admitted fact, while of fundamental importance, does not bring us very much nearer to a solution of the problem as to what life really is. Between living matter on the one hand and non-living matter on the other, there is a great gulf fixed, and so far as our present knowledge goes, there is no way of bridging this gulf. In three ways all living things are profoundly different from all not-living things, whatever.

1. In chemical composition. All organisms consist of more or less modified protoplasm, which is made up of water and various proteids, and these again are very complex chemical compounds of carbon, hydrogen, oxygen and nitrogen, with traces of other elements, such as phosphorus and sulphur. This chemical composition is of less importance as a distinction than the other features to be mentioned. Modern chemistry has succeeded in making artificially many compounds which it was formerly supposed could only be formed by the agency of living things, and I see no reason to suppose that the artificial production of protein will always be beyond our reach; but there is just as little reason to imagine that a protein so produced would be *alive*.

2. Living matter assumes the oxygen necessary for the production of energy, and breaks down by oxidation into simpler compounds, the waste being repaired by taking in new material, as food, which is assimilated and becomes alive in its turn. On account of the continual change of the matter which makes it up, a living organism has been aptly compared to an eddy in a stream, always stationary at one point, formed by continually renewed particles of water. This is, however, only an illustration; for inorganic matter shows nothing comparable to this process, the parallels which have been drawn between the growth of a crystal, for example, and that of an organism, presenting no real analogies.

3. Living matter passes through a cycle of developmental changes. Each organism begins its independent existence by being separated, usually in the form of a germ, from some preëxisting organism,

grows to maturity, reproduces its kind, declines in vigor and dies. The living world is thus a continuous existence, which never, so far as we can tell, is recruited by additions spontaneously arising in inorganic nature.

The distinction between the two great kingdoms of the organic world, the animal and vegetable, is of only less importance than that between organic and inorganic nature, but is far less easy to draw. Between the higher members of the two kingdoms the differences are very obvious, and in the vast majority of cases there is no difficulty in distinguishing an animal from a plant. But as we trace down the two series, step by step, from their higher to their lower members, we find their distinctive peculiarities vanishing, one after another, until they converge into a group of the simplest kind of organisms where, if there be any distinction between animal and vegetable, we have no means of making it out. Of all the differences which distinguish the animal from the vegetable realm, the most important is a physiological one. Nearly all plants are able to build up protein from simple inorganic compounds, such as carbonic acid, water, ammonia and the like; animals cannot do this, but must obtain their protein ready-made, either in the form of plants or other animals. But the existence of a common term between the two is a fact of great theoretical interest.

The simplest possible expression of animal life is to be found in such unicellular types as the *Amoeba*, which is a mere tiny speck of clear, jelly-like protoplasm, with a denser spot in the centre called the nucleus. There are no organs, no differentiation of structure, and yet all the functions of which the higher animals are capable are here shadowed forth. 1. The creature is contractile and by virtue of this contractility it is freely locomotive. 2. It exhibits irritability; *i. e.*, it shows itself sensitive to external stimuli, such as a touch, or a change of temperature and the like. More than this, it has spontaneity, or at least automaticity; *i. e.*, it moves about in obedience to internal stimuli conditioned by its own internal changes, chemical or otherwise, such as the need of food. 3. It is respiratory, taking in the oxygen necessary for the chemical changes upon which the vital processes depend, and giving out carbonic acid. 4. The continual waste of substance is repaired by taking in new material, the digestible portion of which is assimilated and the remainder rejected. And so the list might be extended until all the functions of the higher forms of life were included, it being clear that in its last analysis animal physiology is but the study of the activities of protoplasm.

The bodies of the higher animals are made up of an immense multitude of cells, each one of which, in its primary or unmodified

state, is strictly comparable to the *Amœba*. But these cells do not remain all alike ; a horse does not differ from the *Amœba* merely in the number of cells which compose his body. Certain groups of cells similarly modified are set aside to perform certain functions, thus forming separate tissues and organs, and thus the functions which, in the *Amœba*, are all performed by the same unmodified protoplasm, are in the higher animals parceled out among the various tissues. The tissue whose function it is to be especially contractile becomes the muscular tissue; the eminently irritable and automatic, the nervous, and so on through the list. The advance, therefore, from lower forms to higher does not consist merely in the indefinite aggregation of similar cells, but in the advancing "physiological division of labor, corresponding to the morphological differentiation of structure." The unification of this assemblage of organs into a single organism is secured by the blood vessels, which provide for a rapid and easy interchange of material between all the parts, bringing oxygen and nutritious material to the most secluded cells, and removing the waste products of their activity; and, *secondly*, by the nervous system, which provides for the interchange of energy, coördinating all the various organs into harmonious activity.

A very important question for us to consider is as to whether the *Amœba* has any psychic life; is it conscious? or is it an automaton? To this no positive answer can be given, as we interpret the signs of consciousness in others by our own consciousness, and the more remote from ourselves in structure and habits the creature is, the more difficult does the problem become. The exhibition of purposive adaptations of motion is, of itself, no sufficient proof of consciousness, as many reflex actions, such as we know to be clearly mechanical, exhibit the same trait. A brainless frog is capable of reflexes which are very surprisingly like conscious choice. Such a frog, however, has no spontaneity, and when left to itself will shrivel to a mummy, but the *Amœba* shows something which, if not spontaneity, is very like it, as when it moves about in search of food.

Romanes rather inclines to the view that such unicellular organisms have no true consciousness. Wundt, on the contrary, believes that they have. The latter view is complicated by the fact that the lowest plants have the same claim to be regarded as conscious as these unicellular animals, and if we admit this, it would seem to follow that life and some degree of consciousness are coëxtensive. Whether this be true or not, it is clearly the case that in the organic world, no high degree of mental life is possible without a complex nervous system, and this is of course confined to the animal kingdom. It is a very general rule that the larger and more richly convoluted the brain of an animal is, the higher is its level of intelligence.

A remarkable characteristic of the mental life of animals is the large part played by *instinct*, which may be thus defined: "Instinct is reflex action into which there is imported the element of consciousness. The term is therefore a generic one, comprising all those faculties of mind which are concerned in conscious and adaptive action, antecedent to individual experience, without necessary knowledge of the relation between means employed and ends attained, but similarly performed under similar and frequently recurring circumstances by all the individuals of the same species" (Romanes). Instincts are thus closely dependent upon structure and upon a very delicate adjustment between the animal and its environment, so that they may be radically changed, suppressed and new ones developed by new conditions. Even a very slight disturbance of this adjustment is often sufficient to lead the instinct ludicrously astray. But besides these curious and often extraordinary instincts, the higher animals, at least, possess a large share of intelligence and even reasoning power. The latter is on theoretical grounds often denied them, but the evidence for it is convincing and is precisely the same in kind as that from which we infer the possession of reason by our fellow-men.

Since the time of Descartes, the doctrine that animals are automata has found adherents, and it has lately been advocated in a modified form by Huxley. "The consciousness of brutes would appear to be related to the mechanism of their body simply as a collateral product of its working, and to be completely without any power of modifying that working. . . . Their volition, if they have any, is an emotion indicative of physical changes, not a cause of such changes." This position involves great difficulties. If consciousness is a mere by-product of physical changes, without any power of modifying those changes, why should it ever have arisen at all? From the evolutionary point of view, this is altogether inexplicable and opposed to what we know of the facts of development.

We have next to inquire what animal life is as contrasted with human life. If we have regard only to physical structure and function, the answer must be that there is no essential difference. The human frame corresponds, bone for bone, muscle for muscle, tooth for tooth, and even in the details of brain structure, with that of the anthropoid apes. A chimpanzee differs in anatomical structure much more widely from one of the lower monkeys than it does from man. Every human being begins existence as a tiny speck of protoplasm like an *Amœba*, and passes through a course of development, which in its early stages is exactly like that of the lower animals. Man grows to maturity, reproduces his kind, declines and dies, just as do the beasts that perish. He is in great degree subject

to the same conditions and his functions are performed in accordance with the same physiological laws. If we accept materialism as applied to the lower animals, we cannot escape it as applied to ourselves. If it can be shown that a brain of a certain degree of complexity can generate the consciousness and intelligence of a dog, there can be no reason for denying that a higher degree of cerebral complexity will suffice to produce the consciousness and intelligence of a man.

There being this complete continuity between the physical structure of man and that of the brutes, are we justified in assuming a like continuity between their psychical natures? Upon this question the evolutionists are divided, one school following Darwin in believing that human nature in its totality, physical, mental and moral, is a product of evolution, while the other school maintains, with Wallace, that man, or at least the human mind, cannot be so accounted for. Even such a thorough-going adherent of the Darwinian view as Mr. Romanes admits freely that the gap between man and the brute is enormous: "The question, then, as to whether or not human intelligence has been evolved from animal intelligence can only be dealt with scientifically by comparing one with another in order to ascertain the points wherein they agree and the points wherein they differ. Now there can be no doubt that when this is done, the differences between the mental faculties of the most intelligent animal and the mental faculties of the lowest savage is seen to be so vast, that the hypothesis of their being so closely allied as Mr. Darwin's teaching implies, appears at first sight absurd."

There is no space to enter here upon a discussion of this most important and vitally interesting question, nor indeed is it possible at the present time to give it a definite answer. To many it seems as if the whole truth of Christianity hung upon this reply. Yet this is an illogical view. The doctrine of evolution in no way involves the rejection of the doctrine of design in nature. Evolution is simply a question of the manner in which certain results have been brought about by the operation of certain proximate causes. Miss Cobbe has somewhere spoken of the common fallacy of inferring, when we find out how a thing is done, that God could not have done it. The firmament showeth his handiwork just as truly now in the days of the nebular hypothesis, as it did in the days of David. So if it shall eventually prove that it has pleased the Almighty to create the human soul by a process of gradual evolution, rather than by an immediate fiat, I do not see why the scheme of Christian philosophy may not assimilate that new truth (should it turn out to be one) as readily as the once startling but now familiar doctrines of astronomy and geology.

IV.

The claim that animal life is a purely mechanical process seems a straightforward, intelligible view, whether true or not. The theory that the facts of life demand a force distinct from and superior to mechanical events also seems simple and comprehensible, whether correct or not. But a view which denies both of these positions appears somewhat strained. The reason is that this third view—which I shall endeavor to present—depends upon a certain whole theory of things, and considers animal life not in isolation but in connection with the rest of reality—as a manifestation of a spiritual principle of self-activity implied, but not explicitly developed, in the physical world, and clearly shown forth in the *conscious* life of man. It regards animal life, in short, as the transition from the merely “natural” to the spiritual sphere, this transition occurring not for any supernatural reason nor by any miraculous intervention but simply because the “natural,” from its very structure, depends upon and requires, first the organic and then the spiritual.

The bearing of the theory may be most easily got at by considering that both the mechanical and the vitalistic theory really rest, each upon the weakness of the other. The mechanical theory recognizes that the “vital force” of its opponent is but a name for the sum of existing phenomena, and this is the problem requiring solution, and not a *vera causa*; that taken as a cause it is a hypostatized abstraction; that it belongs in the same region as the various entities and faculties of the scholastics; and that science has always advanced by the rejection of such occult powers and the substitution of physical explanation. The vitalistic theory, on the other hand, sees that its opponent ignores the most distinguishing character of animal life, its organic and teleological character, that it runs hopelessly against the questions of the origin of animal life, of the connection of sensation with life, and that, in consistency, it must regard all animals, man included, as mere automata; having consciousness only as an *epiphenomenon*, an intruder, a shadow that somehow accompanies physical processes that would go on equally well without it.

Now the third theory seems to me to satisfy the interests really but one-sidedly contended for by the mechanical and vitalistic theories respectively. It admits, or rather claims, that every event in animal life is, *as an event*, to be wholly accounted for by mechanical considerations; but it also holds that animal life has certain characteristics which are not adequately presented by the mere occurrence of events. This does not mean that over and above the events there is something unlike in kind called a vital force; it means that the events have certain interrelations and aspects which

science, in its purely mechanical character, does not and need not recognize, but which must be considered when we come to ask the final question: "What is animal life?" It must be borne in mind that the scientific and philosophic problems, while not ultimately separate, are yet proximately distinct. While science may—and should—object to every attempt to foist upon it any force excepting those which it finds everywhere, it has nothing to say against an attempt to interpret the facts of animal life by higher and more complete categories—that is, tools of thought—than physical science itself, reducing the universe as it does to a congeries of numbered and measured events, requires. In a more final and comprehensive interpretation, the very aspects that physical science neglects may be found to be the more important.

More in detail, it is admitted that all such events as say the beating of the heart, and in larger matters what we call natural selection, heredity and variation are to be treated as any physical occurrences would be treated. But it is contended that such treatment does not exhaust the entire significance of animal life, and that there are certain features of animal life which must forever resist reduction to the level of *mere* physical events, these features not being anything over and above the events, but their interrelated unity. Of these features we may specify three: (1) the organic character of animal life, that is, the thorough-going unity of action, or singleness of end, to which all events are subordinated, their value, indeed, with reference to it being wholly *functional*; (2) the fact that animal life is not determined wholly by environment in the same sense in which the movement of a stone is determined by outside events; and (3) the existence of consciousness in the form of feeling, at least, and the influence of this consciousness upon action.

1. The unity of the various events which occur in animal life is so striking that recognition of it has never entirely failed. It is the trait which is mainly used to mark the difference between life and the non-living—the trait of *organism*. Now this unity is not some one thing over and above the various processes of life; if it were, the vitalistic theory would have some footing. It is the unity of all the processes; the unity of end to which they contribute. This, indeed, is just what we mean by life; that unity of activity to which the activity of every member is subordinated in the way of specific service or function. Now this unity is incomprehensible upon the *purely* mechanical theory; it implies that the events, as mechanical, are subordinated to a purpose which they fulfill.

What would become of biological science without the idea of *function*? And yet the conception of function implies something for which the mechanical in its strict sense makes no allowance; it

implies degradation of the mechanical to the position of a servant. No error could be greater than supposing that the theory of evolution, since it gives a mechanical explanation of the processes by which functions have been brought into existence, since it shows the mechanical occurrences by which the unity of the organism is secured, thereby abolishes this subordination of the mechanical to the organic and teleological. The unity of the organism, and its service by contributing organs, is none the less a fact by whatever means it may have been brought about. Indeed, the very position here contended for is that *all* occurrences, as occurrences, are to be explained mechanically, but that in life we find something more than occurrences, namely, that unity to which occurrences contribute. It may be fairly said that the great philosophic service which the theory of evolution is destined ultimately to render is to bring the mechanical and the teleological interpretations of the universe into harmonious relationship, giving the mechanical its due rights by surrendering wholly to it the realm of events, while it is recognized that in and through these events an end is realized.

2. Up to this point, we have been dealing with life on its internal side; but it has an external side or relation to the environment. The strictly mechanical theory must hold that life is as entirely a product of environment, as the steam or smoke escaping from a locomotive is a product of its antecedents. Yet such facts as the impossibility, up to the present time, of producing life without life, the constant subjection and transformation of the inorganic by the organic, the adaptation of the environment to the organism so as to sustain the latter, or, even when destroying it, so as to develop more perfect forms, suggest that it is rather the exigencies of the theory than the facts themselves which lead to such a belief. It is, after all, the proper business of a theory to explain, and not to explain away, facts. When we find a theory compelled to hold that the relation of a lion, or of man himself, as a living being, to his surroundings is precisely that of a grain of dust to its surroundings, we can but ask whether it is the observation of facts, or the straight-jacket of a presupposed theory that has brought us to such a pass. Why not produce the one phenomenon at will as we do the other? What is the meaning of the fact that among the conditions necessary to life, we always find the very thing we are attempting to account for? Is the marvelous adaptation of the physical and chemical world to life, whereby the latter is maintained from moment to moment, and whereby, if we accept the theory of evolution, it has been developed from the simplest forms up to the complexity of existing life, a mere accident?

3. But it is when we turn to the phenomena of life, the powers

of irritability, of relation, of adjustment in response to stimuli, and of feeling, that the insufficiency of the mechanical view as a final theory is most forcibly thrust upon us. The position that animals are automata is the logical outcome of the strict mechanical theory. The impossibility of accounting for feeling, from mechanical events, puts the upholder of that theory in the following dilemma: he must either deny that the animal has any consciousness at all, or must hold that its feelings are miraculous and supernatural, absolutely incomprehensible, having no assignable ground. But the question must yet be faced. We are sure that *we*, at least, have feeling. What shall we do with *our* sensations? Shall we deny that there is any connection between life and feeling? Shall we hold that the sense organs, sensory nerves and brain centres, being physiological, have no essential connection with feeling, since feeling is psychical? I can imagine this position being taken, but I can hardly imagine its being taken by one who is interested in a strictly scientific explanation of facts, and in excluding supernatural entities from natural processes. And yet to this position the logical upholder of the strictly mechanical view of life is forced; the physiological processes are complete in themselves, and consciousness is a supernumerary accompaniment. The denial to feeling of all influence upon conduct whether in ourselves or in lower animals is but the other side of this same position. And I would ask the strict mechanist, who is also an evolutionist, how he reconciles his two views? Unless feeling is involved in the lower forms of animal life whence its appearance in man? But I cannot believe that scientific men will long be contented with the present self-contradictory evasion, which, on one hand, asserts the sole validity of mechanical ideas, and, on the other, admitting feeling as a fact, regards it as mysterious, and inexplicable. Sooner or later, the question of the relation of sensation to life must be fairly faced, and it must be recognized that we have in life a teleological and idealizing function which brings mechanical processes to a focus, to an internal unity, and this is feeling. It will be seen that in animal life we have the more explicit manifestation of the spiritual, self-conscious principle through relations to which all that we call natural has its existence.

The fact is we are going through a conflict similar to that of the seventeenth century. At that time men had become conscious of the value of mathematical principles as a scientific instrument, and the attempt to advance beyond the idea of quantity to that of force was resisted as a movement back to scholasticism. The Cartesians were so conscious of the revolution which the introduction of mathematical principles had effected in science that they would not

hear of force and motion. But the advance was made with the result not only of winning for science new fields from out the void of ignorance, but of revealing the full meaning and application of mathematical ideas. We are now in the thick of the struggle between these mechanical ideas, now fully established, and organic conceptions. There is the same assertion of the adequacy of mechanical categories, the same fear lest the recognition of function and internal unity should lead to vital forces and other mediæval abstractions. But the advance is demanded, and not in behalf of metaphysics, but of science itself. Biology and history can get a firm scientific basis, with recognition of their entire significance, only when the ideas of end, function and ideal unity are frankly utilized.*

JOHN DEWEY.

UNIVERSITY OF MICHIGAN.

V.

Widely differing views on this subject are entertained by thinkers equally entitled to be described as Christian.

1. Bishop Butler, while presenting no theory of the nature of brutes, teaches (*Anal.*, Pt. i, chap. i) that there is no good reason for the belief that death destroys them. Having shown the strong probability that men survive death, and having rebutted the arguments in support of the position that death destroys personality or identity, he meets the objection, that the considerations adduced by him are "equally applicable to brutes," with two remarks. The first is, that the supposed immortality of brutes is no objection, for "we do not know what latent powers and capacities they may be endued with:" and the second is, that brutes may be immortal even though they are not endued "with any latent capacities of a rational or moral nature." His theory, if he has one, is that each brute is at its centre a simple, immaterial and immortal substance; and that this substance exists in the mode of a person. Hence, the brute's identity will continue after death. *Anima ejus in se ipsa est, sine materia.*

2. Prof. Shedd (*Dogmatic Theol.*, Vol. i, p. 159) presents the opposite theory. Matter may be and often is invisible. In the inorganic world gravity is invisible matter; matter without form. Like it in the organic world is the principle of animal life. "The so-called soul of a dog is nothing but matter. It dies with the body which it inhabits and vitalizes." The real animal is a compound of matter which is organized by

* For this analogy, I am indebted to Caird's "Critical Philosophy of Kant," Vol. i, pp. 37-39.

vital force; which phrase, "vital force," like the word "gravity," denotes only a more or less stable relation between certain material masses. Hence, an animal, being a material composition, is discernible and cannot be immortal. The difficulty which the mind has in accepting Prof. Shedd's view is not the difficulty of thinking matter as existing in an invisible mode, but that of thinking matter as existing in a conscious mode. Certainly his view involves either the denial of consciousness to animals, or the affirmation that matter, in some of its forms, is conscious. Moreover, the only difference on this theory between unorganized matter, vegetables and animals is the difference in their several modes of subsistence. There is no difference in substance between them; and there is, therefore, no inherent improbability that vegetation was at the beginning "spontaneously generated" from inorganic matter, or that afterwards the animal forms were evolved from vegetation. These movements are not the development of "the homogeneous into the heterogeneous," which he calls "pseudo-evolution." They are simply the transformation of the homogeneous. For no new element is introduced.

3. Dr. Samuel Harris, in his "Philosophical Basis of Theism," says, what is true, that on the question whether each brute possesses "a soul," an immaterial, individual substance, it is out of place to dogmatize. But he goes far enough towards the formation of a theory to say that, "in animated organisms there is the manifestation of mechanical force and something more." Instead, however, of undertaking to state the nature of this "something more," he calls it a result of the divine activity. An animal is an effect produced by the "Absolute Power limiting and conditioning and thus individuating its inexhaustible energy." This is true. Brute animals as well as men live and move and have their being in God. But this is not a scientific theory of the nature of animal life. Dr. Harris can be criticised only, because, having a good opportunity to present such a theory, he neglected to take advantage of it. I mention his mode of treating the subject because it is the usual, and possibly the wisest, mode among Christians. Perhaps it is best to substitute the theological for the scientific view; and to rest content with the statement, that brutes, like men, were created by God.

4. Another theory which in one of several forms has found wide acceptance, is the theory that, besides matter and spirit, there is a third kind of substance—psychical or animal substance. Matter is unconscious and insensate. Spirit is self-conscious (that is, its mode of subsistence is personal), emotional and voluntary. Now, if there can be consciousness without self-consciousness; if there can

be conscious reactions (feelings) without personality; if there can be executive volition where there is no choice between ends; and if all these can be organized into a unity without a knowledge of self, we can believe them to be the qualities of a psychical or animal substance, which is not matter on the one hand, or spirit on the other. On this theory, life (whether vegetable or animal) is one of the forces (the highest, the organizing force) of matter. And matter organized by life is the theatre on which psychical substance appears and acts. This psychical or animal substance is distinguished from matter by mental activity, by consciousness, by freedom from confinement to a fixed point in space and by sensation. It is distinguished from spirit by its impersonality or want of self-consciousness, by the limitations of its mental life (this being confined to perceptions of singulars, comparison between them, physiological as distinguished from logical judgments ["judgment according to sense"—Coleridge]; the whole process being regulated by instinctive impulses, instead of by reason), and by its lack of real choice before executive volition.

This theory may be held in three forms. Either the entire psychical substance may be thought as numerically one, and as distributed among, but not individualized in, the several units of the animal kingdom; or it may be thought as modified in each species, and this modified psychical substance distributed among, but not individualized in, the animal units constituting the species; or the one kind of psychical substance may be thought as existing really only in individual animals. The first two may be called the realistic forms, the third the nominalistic form of the theory.

Other modifications of the general theory are due to speculations touching the nature of substance. Thus Lotze, who believes in the real existence of the animal soul—"the soul which not only concentrates the multitude of impressions in the unity of consciousness, but feels pain and pleasure in respect of them, and uses them as starting points for future action" (Micro., Vol. i, p. 533)—Lotze hesitates to employ the term "substance" in order to designate it, and prefers instead the word "Idea" [*Ideé*]. But when he expounds the term he uses, especially when he discriminates the Idea in itself and in its unity from its mental equivalent in us, that is, from its representation [*Vorstellung*], it is difficult to distinguish the Idea of the animal soul from a substance, which, unlike a quality or a mode, exists in itself and not in another subject. For, according to Lotze, the "real is nothing else than the Idea, embodied, in a manner incomprehensible by us, in the form of efficacious substantiality."

In order not to complicate the question before us (What is an Animal?) with that of the number of substances that enter into the com-

position of man (whether three or two), it is to be said that one does not need to believe in the tripartite nature of man, as a consequence of his belief in the existence in brutes of this psychical or animal substance. For the whole mental life of man may be the rational mental life of the spirit, and the rest of him may be only matter organized by life. In other words, the spirit is quite equal, not only to its own higher and distinctive intelligence and feeling, but also to the lower intelligence and feeling of the animal. The higher intelligence knows all that the lower knows and more. If this is true, we do not need to suppose as a distinct entity in man a soul, in addition to his spirit, to act as the mediating substance between spirit and matter. The spirit suffices. Nor is it more difficult on this theory, than on the theory of three substances, to interpret and harmonize the Scriptural statements concerning man.

Of these four theories of the nature of animal life, the fourth, or the theory of a psychical substance different from both matter and spirit, seems best to account for the various phenomena of brute existence. Of course, there are many phenomena which no theory accounts for, and which will probably continue to baffle all search for their second causes. The wonderful precision of instinctive action, its movement without hesitation and without error towards ends, of which it is impossible to suppose the animal has any intelligence—of these no theory of the mental life of animals can offer the slightest explanation. The instinctive acts of the animals which are so near to us, and with many of which we stand in such close relations, are just as mysterious as the most occult or the most distant forces of inorganic nature. And one might as reasonably explain second-sight by a theory of vision, as attempt to account for instinct by a theory of animal intelligence.

The reasons for holding to this fourth theory may be stated very briefly. On the one hand, we cannot, I think, attribute consciousness and true mental activity to matter; but brutes show both. On the other hand, spirit has powers and capacities, and exists in a mode not to be affirmed of brutes. What, then, are distinctively animal phenomena the phenomena of, if not of matter, and if not of spirit? Of God's working? Certainly. But immediately, or through an abiding medium? The latter, analogy compels us to say. But this medium is what? A quality? If we say quality, we shall still have to say a quality of somewhat. And why not call this somewhat substance? Try it by the criteria of substance, as these are presented in any well wrought-out metaphysics. So far as appears it stands every test.

Supposing, then, this animal or psychical substance to be real, and to be the nature of each unit of the brute kingdom, the question

arises, Is it individualized in each unit of the kingdom; or is it numerically one, and distributed without true individualization among the units; or is it modified in each species, and distributed without further change of mode? If the facts warrant any statement on this subject, they warrant the last statement of the three. For this statement alone accounts, on the one hand, for the lack of personality in individual brutes, and, on the other, for the fixity of species.

But while species seem to be fixed (certainly no historical evidence of the transmutation of species has as yet been offered), we cannot grade species by additions, so to say, of intelligence. Perhaps the most striking phenomenon of animal life is the dead level of intelligence that seems to obtain throughout the series. Some animals, it is true, are more like us in bodily organization than the rest, and, for this reason, are nearer us in space and more intimate with us in intercourse. But, after all, the flea and the spider (see the account of Prof. Langley's engineering spider in Romanes' "Mental Evolution in Man," p. 62) show just as much intelligence, just as great flexibility or elasticity of instinct, as the dog or the horse. And the dog and the horse show exactly the limitations of intelligence manifest in the spider and in the flea. I know no reason for doubting that there is no difference, in these respects, between the horse, the spider and the oyster. Difference in physical organization is not difference in intelligence.

Finally, the question will arise in the mind of any one who gives to this subject any reflection, Is it possible for man imaginatively to construct and so to "enter into" the mental life of the animals about him? I think not. How can we imagine the feelings of a being which is without consciousness of a self as the subject of the feelings? What is memory, which is dissociated from the idea of time? What can we know of the thoughts of a being that cannot abstract and generalize? What account can we give to ourselves of the hostility or the affection of a horse or a dog that knows neither the "me" nor the "not me?" What are the discursive processes of a mind in which the categories of the understanding are wanting? These and other questions, which will suggest themselves, will show how far we are from being able to appreciate *what* psychical substance is in its processes, even when compelled to conclude *that* it is, and that it is real substance.

JOHN DE WITT.