

BIOLOGY; OR, THE PRINCIPLE OF LIFE.

Institutiones Philosophiæ Naturalis, Secundum Principia S. Thomæ Aquinatis. Father Tilman Pesch, S. J.: Friburg, 1880. "Novi errores impugnandi sunt veritate antiqua."

Synthetic Philosophy—Other Works. Mr. Herbert Spencer. New York: Appleton & Co. "There is a soul of truth in things erroneous." (Introduction to First Principles.)

I.

"ALL your culture," says Mr. Herbert, in his speech at the end of "the New Republic,"—"all your culture is based ultimately upon this,—a discrimination between right and wrong. True, profoundly true. But will you be able to say what is right, and what is wrong any longer, if you do not know *for whom* anything is right and *for whom* anything is wrong,—whether it is for men with immortal souls, or only with mortal bodies,—who are only a little lower than the angels, or only a little better than the —?"¹

Who is it that furnishes the fact, which lies at the base of ethical science? What is he?—he whom ethical science presupposes, contemplates, and then directs? *Aut deus, aut bestia?* Is he god, or is he brute, or is he some degree betwixt the extremes?

We had better dismiss at once all notion of his being a god, or even an angel. That was a conceit of Jewish psalmody. It is the poesy of Christian spirituality. "I have said it. You are all gods and sons of the Most High!" So sang the psalmist. And the Christian saint takes up the same refrain: "Heavenly men, or earthly angels!" Let us dismiss, however, all such notions, as too poetically sublime for the present matter-of-fact question.

What then is man? Shall we set him down at the other extreme, as differing but a trifle from the brute? To speak in the terms of modern science, shall we set him down, with his energies, his perceptions, and that wonderful consciousness of his, as being only a subject-matter into which some perceptive current makes its way from without, and out of which some motor impulse goes answering from within? Shall we explain his psychical life by the symptoms of a brute "sympathetic," as the brute himself is explained by chemistry?

Now as to that consciousness of his,—we should prefer indeed to call it intellect,—it is manifestly so unique a fact in this material universe, that Mr. Herbert Spencer relegates it entirely out of Biology in general. It is, he says, radically distinct in its nature

¹ W. H. Mallock.

from any such subject-matter as Biology comprehends; and the method of self-analysis, by which alone the laws of dependence among changes of consciousness can be found, is a method unparalleled by anything in the rest of Biology.¹

And yet, if we listen now to one of Mr. Spencer's own type and color, answering Mr. Mallock, and laying down from the most authentic sources the positivist doctrine with regard to the consciousness of man, we shall hear the following explanation:

"Psychical life (that is to say, the life of the human soul) commences in the organs of the senses; it is a constant current, which passes from without inwards into perception, and from within outwards into organs of movement. Between the sensation and the motor impulse is gradually formed an accessory sphere, and this sphere, developing, extending, enlarging little by little, finally becomes itself a powerful and complex centre, which, in its turn, diminishes in many respects both sensation and movement,—and in the midst of which moves the entire spiritual life of man. This sphere is the sphere of the intelligence. All effort, instinct, and volition represent the centrifugal motor force of the activity of the soul. The individual constitution of this aspect of the life of the soul forms in great part what we call personal character," etc.²

In terms of a more common philosophy, this passage may be interpreted thus. What we call the life of the human soul, with its perceptions of things without and of things within, is a product; it is a product in the shape of a centre; this centre is generated as the development of a sphere; this sphere is accessory as a gradual formation; the gradual formation is betwixt sensation from without and movement from within; and, finally, the first principle of all is a current which is started in the outward sense.

This is the philosophy of human life. As so stated it is not quite complete in its brevity. To complete it, let us add that the current started in the outward sense, is explained in the same way as any other physical or chemical phenomenon, by the combinations and vibrations of atoms. And if the reader desires a specimen of the complete satisfaction engendered in an inquiring mind by the subtlety, ingenuity, and lucidity of the scientific explanation, we may take, almost at random, the following passage. Mr. Spencer is speaking of the life in plants, and, coming to speak of light acting on the leaves of plants, he delivers himself as follows:

"These conceptions help us to some dim notions of the mode in which changes are wrought by light in the leaves of plants. Among the several elements concerned there are wide differences in molecular mobility, and probably in the rates of molecular

¹ Principles of Biology: Scope, p. 99.

² The Value of Life: A Reply to Mr. Mallock's Essay, Is Life Worth Living? p. 69.

vibration. Each is combined with one of the others, but is capable of forming various combinations with the rest. And they are severally in presence of a complex compound, into which they all enter, and which is ready to assimilate with itself the new compound atoms that they form. Certain of the ethereal waves falling on them when thus arranged, there results a detachment of some of the combined atoms and a union of the rest. And the conclusion suggested is, that the induced vibrations among the various atoms, as at first arranged, are so incongruous as to produce instability, and to give collateral affinities the power to work a rearrangement, which, though less stable under other conditions, is more stable in the presence of these particular undulations. There seems indeed no choice but to conceive the matter thus," etc.¹

It might indeed be objected here that "choice," or no choice, is not a fit term for philosophy; particularly when the choice only "seems;" one would think that at least it ought to be seen. It might be objected that the "suggestion" of a conclusion is not a conclusive way of deducing; that "probably" is an odd word in deductive logic; and that if a "dim notion" is indeed the intellectual result of so much subtlety and ingenuity, it is about as much as might be expected.

But this is not to throw discredit on Mr. Spencer's occupation. For, short of such conclusions, his occupation as a philosopher were gone.

Only we say, reverting to the question with which we had begun, it stands obvious that neither the matter nor the form of such argumentation as we have now exemplified can furnish a fair basis for the science of Ethics. As to this form and style of argumentation, it enervates the mind with feeble hypotheses instead of solid theses, with flimsy probabilities instead of downright reasons, with words instead of thoughts, and with much eloquence, possibly, about premises that can never warrant any other conclusion than a "perhaps," or a "may be," or a "suggestion," or a "choice." And, of course, the suggestion takes its color from the optics of the philosophic mind that sees, and the choice from the likes and dislikes of the very human will that chooses. That is not logic. "Hypothesis upon hypothesis, and cloud upon cloud!" as Mr. Frederick Harrison somewhere stigmatizes it; though the stigma comes back to him who sent it, and finds itself at home.

Be it remarked, that when the mind has grown accustomed to this unsubstantial, airy flitting, there is never a reason then why it should halt at executing any figure of thought which fancy suggests; or hesitate to call such figure logic, if science so demand.

¹ Data of Biology, chap. ii. ; Action of Forces on Organic Matter.

So much for the form of such argumentation. Now, as to the matter, it is clear that man remains undistinguished from the brute, as the brute on his side is only a mass of chemicals. It is clear that the gravest interests, whether of the person in both the moral and intellectual orders, or of society in both the civil and domestic spheres, are swamped in the deluge of turbulent thought. Actual life, with its vagaries, whether normal or abnormal, does not fall under a rule. Such philosophy can give no rule; nor does it pretend to give one. Life becomes a "series of experiments in living," as Mr. Mill would say; "the deepest moral degradation becomes a phase of enthusiasm comparable with religion and social virtue," as a certain French oracle poetically declaims; "realism and naturalism can in nowise lead us to a state of savage sensuality; and even if they did," say men of Büchner's type, "that fact would avail nothing against the truth of nature;"—"a truth to be sought," says Cotta, "whether logical or illogical, whether æsthetical or otherwise, whether conformable to error or at variance therewith."

Such being its programme for the future, this molecular theory looks back, and finds there a history to match. It finds no sin there, albeit there is suffering. It finds no wrong there, albeit there are things not right. It discerns only a process of "adaptation to circumstances," a mere "self-adjustment to environment," on the part of all humanity, whether molecular or organized. Now, as adaptation or self-adjustment is always attended with incidental friction, restraint, pinching, suffering, here you have suggested, in a nutshell, the explanation of the mystery of evil in the world. Let us take a specimen passage:

"The manifold evils which have filled the world for these thousands of years—the murders, enslavings, and robberies; the tyrannies of rulers, the oppressions of class, the persecutions of sect and party; the multiform embodiments of selfishness in unjust laws, barbarous customs, dishonest dealings, exclusive manners, and the like—are simply instances of the disastrous working of this original and once needful constitution, now that mankind have grown into conditions for which it is not fitted,—are nothing but symptoms of the suffering attendant upon the adaptation of humanity to its new circumstances."¹

With such a metaphysical theory, the science of ethics becomes impossible. And but for ethics, what Christian with a soul to save cares for metaphysics? With Seneca, let us avow that but for something beyond the human, it were never worth our while to be ranked in humanity. And with such a metaphysical theory there is nothing left us. We are like those who have no hope. Right

¹ Herbert Spencer's *Social Statics*, p. 451.

and wrong, as Mr. Mallock graphically describes, fade into one another; and virtue and vice are deadened into one neutral tint. This state of mind is the "malady of the modern world—a malady of our own generation, which can escape no eyes that will look for it. It is betraying itself every moment around us, in conversation, in literature, and in legislation."¹

If the moral colors appear still to remain distinct, they are no longer those of right and wrong, but of a public opinion, of a social behavior, of a *savoir faire*, and other technicalities, which we need not take the trouble to show are very different from morality.

And therefore, to conclude this introduction, by quoting again from the Mr. Herbert cited above: "There never was a time when you talked so much as now about teaching the people; and yet do not you yourselves confess that you cannot agree together as to what to teach them? You can agree about teaching them—I know this too well—countless things that you think will throw light upon life; but life itself you leave a blank darkness, upon which no light can be thrown. You say nothing of what is good in it, and of what is evil. . . . Does success in it lie in the enjoyment of bodily pleasures, or in the doing of spiritual duty? Is there anything in it that is right for its own sake, or are all things right only because of their consequences?"

With the ulterior object of working out so important a problem—no difficult task for the Christian philosopher, and incumbent now in the face of fashionable atheism—we propose for our present question the gist and essence of Biology—What is Life? And as in one article we cannot reach that point of the treatment where it affects man, we shall be forced to leave for subsequent handling both sensation and the psychological portion of the subject.

II.

LIFE AND NON-LIFE.

To begin with the primary notion of life. We cannot tolerate in matters of science commencing with an obscurity and ending with a mystery; standing upon hypotheses and climbing up to unknowables. Yet Mr. Spencer repeatedly proclaims that all ultimate facts are mysteries! After establishing all the grades of metamorphoses, called evolution, from those modes of the unknowable which we style heat, light, chemical affinities, etc., to those other modes of the same unknowable which we distinguish as sensation, emotion, thought, he continues:

"How this metamorphosis takes place,—how a force existing as

¹ *Is Life Worth Living?* Chap. VIII.

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. They are not more completely beyond our comprehension than the natures of Mind and Matter. They have simply the same insolubility as all other ultimate questions.”¹

Now we may as well have it distinctly understood at once that the scholastic philosophy does not presume to touch mysteries, which are beyond its sphere; but what things it does comprehend as within the sphere of philosophy, those it does not dispatch as mysteries.

Life, which we see so crudely wrapped up in the inexplicable by Mr. Spencer, is, on the contrary, a very simple primary notion. It is an inductive fact which is derived from observations made by common-sense. Such things as the common mind understands to be alive will give the same common mind to understand what life is and what it is not. They can give common-sense a clear notion of life as far as common-sense goes; not a comprehensive and adequate idea, which it belongs to science, from that point, to pursue. Thus it is that the question receives, at the same time, the fundamental solidity of common-sense and the philosophic distinctness of science.

Animals are manifestly alive. Hence the principle which appearing in them makes us call them “alive,” will enable us to predicate life wherever that principle is, and to deny it where that principle is not. This is common-sense. Now what is the principle which is so evident in them, and makes us at one and the same time affirm that they live because it is present, and that rocks are dead because it is absent?

It is surely that in which the animal’s life is first said to show itself, that with which life is seen to endure, and that in which common-sense declares that there the life disappears, and the animal dies for want of life. When a thing is first seen to *move itself*, there common-sense comes in, and from that moment affirms such self-moving thing to be alive. As long as such moving thing continues to go of itself, so long does common-sense persist in the same affirmation. And when at last it is discovered that the moving thing no longer actuates itself, but has to be actuated from without, then common-sense says “Oh, it is dead!” for want of life—that is, for want of inward action.

According, then, to the verdict of common-sense,—that is, of

¹ The Correlation and Equivalence of Forces, § 82.

observation; that is, of physical fact, unimpeachable, because patent and universal,—the criterion by which we judge whether a thing is alive or not is its power of moving itself. And therefore—and let us note this metaphysical consequence—the principle of life is that from which such self-moving power proceeds; it is such an active cause as is adequate to such an effect. It is *that from which* this act of moving self does come; and as this act of moving self is clearly an actuation of self, a form of activity in oneself, an “informing” of oneself with activity, the principle from which it comes must correspond; it must be the principle of a formal act; it must be a formal principle in the agent. By a formal principle is meant the principle of a formal act; and by a formal act is meant an actuation of an agent as distinct from any passive actuation on the part of a recipient. So much for the metaphysical use of terms. But the argument is clear enough: that there must be a principle admitted; and we may call it, for the time being, “soul,” “form,” “idea,” “reason,” “molecular vibration,” as we like.

This is the metaphysical argument simple and clear, based on the fact which common-sense reports. It is a skeleton argument; uninteresting, like most skeletons, except that as other skeletons reveal much to the physiologist, so this will be found eloquent by the philosopher. In this one argument you will find the reason why all orders of beings are distinguished from one another, and why they are what they are in themselves—from the eternal chaos through the grades of beautiful beings up to the Eternal Being who drew everything out of chaos. In this one argument from the effect to the cause, with the implied formal relationship between them, that the inward movement is the *formal* effect of a principle within, we have revealed the inflexible framework on which the universe is stretched; and while physical sciences abound in descanting on the universe, metaphysics alone reveals the thing within.

But this and the like of this are just the subjects which the so-called New Philosophy relegates as unknowable to itself. Then, so saying, it condemns itself as being, not philosophy, but physics. As Monboddo said: “Nothing deserves the name of philosophy except what explains the causes and principles of things.” And, moreover, he said well: “With regard to Experimental Philosophy, so called, I am far from denying the use of it; but I would have the gentlemen who value themselves so much upon this kind of *manual* philosophy, to distinguish betwixt the *phenomena* and the *principles* of nature, and not imagine that the latter as well as the former are objects of sense, to be discovered by chemical analysis, or seen through a microscope. They should consider themselves as the historians of nature, who, by great attention and minute observation, investigate facts which escape the vulgar, and

may be called the anecdotes or secret history of nature. But history and philosophy are two things very different."¹ And Father Harper in the same vein animadverts that "if every science permits itself to run riot in its neighbor's property,—if osteology out of its dry bones constructs a theology,—if comparative anatomy must needs trespass on cosmogony, physical science on psychology, mathematics on logic,—if physics and applied mathematics are to meddle with the essential nature and constitution of being,—if metaphysics is to change its teachings at the beck and call of each whimsical theory of the hour, then anarchy is introduced into the commonwealth of science, the old landmarks are subverted, vagabond caprice is liberated from prison, and truth is expatriated."²

Reverting now to the skeleton argument, which is taken, by the way, from the *Summa Theologica* of St. Thomas,³ we may observe that life is spoken of in two distinct states. We started with the action and landed in the principle, we began with the formal effect and ended in the formal cause; just as we may speak of the strength of an arm when it is striking the table, or of the same strength when not exerted in striking anything. In the act of striking you have an exercise of the permanent power within, a formal effect thereof. When not exercised in striking, the permanent power still remains, that is to say, the formal principle or cause. And so in life: you have the exercise of life in the actual movement, called by Scholastics life *in actu secundo*; you have the principle always remaining within, and capable of putting forth actual movement, until the animal is dead; this principle the Scholastics call life *in actu primo*.

This life *in actu primo* is another term for the principle of life. The principle of life is the formal cause of immanent or inward action. The formal and visible *effects* of the principle are the action put forth by the principle upon itself, or upon the living subject which the principle is informing with life. This action on self is called *immanent*, "remaining in" the subject. Action which does not "remain in," but goes out to any other recipient is called *transient*. Immanent action begins within, actuates within, terminates within, so that the agent acts on self, goes, moves, energizes in a *self-principled* shape or form, if I may coin a term. Transient action passes from the agent to another subject, beginning in one as a principle and ending in the other as a term. So bodies act by heat, and by light, and by electricity and chemical affinities, all of which act from body to body, or from cell to cell, or from molecule to molecule. But living action is manifestly immanent in a single cell, which energizes throughout; in a whole arm, which puts forth its energy as a whole member and

¹ Lord Monboddo, Introduction to Ancient Metaphysics.

² The Metaphysics of the School, Book I., Ch. III.

³ 1 p. q. 18, art. 1.

receives the whole actuation in itself, whatever exterior or transient effect there may or may not be at the same time. So it is in the whole body, and in every member of the body. And thus it is that the eye sees; thus the mind thinks.

At once we are in face of a question, a problem, which answered definitely becomes a great metaphysical principle. That is to say: Can the non-living account for the living? Can life come from non-life? Is life merely a mode of motion? This latter term, motion, is taken by the scientists in the sense of only local motion.

We answer positively, absolutely: No phase whatever of non-life can account for life. No variation of motion, which is not already living motion, can produce that which is living. Life is not a mode of motion.

This is directly in the teeth of evolution. Here it is we meet the first great paralogism of modern science. Here the first great application of its capital principle, that 2×2 do not only make 4, but likewise 5, aye 6, nay 7; in fact, it is not clear why they stop, or where they stop. They do not stop at all, but find that their 2×2 , if they make more than 4 at all, may just as well make all. And hence, in sober earnest, the evolutionists will have not only the lowest forms of life to be a mode of motion, but the highest too; and intellect and emotion all sink down into gyrations of the atoms, and God and the soul become rotations of the molecules.

We proceed to establish that there is an essential difference of principle between the living and non-living: that non-life cannot produce life, and therefore that life is not a mode of motion. When once this restraint is put upon uncontrolled thought, the energies of the mind have a chance of being kept in their channel, of being ordered by the eternal principles of logic, and so of remaining strong, beautiful, and true.

The physical action of heat, light, electricity, gravitation, etc., is such that no one claims for it any other character than the *transient* one of *passing* from particle to particle, from molecule to molecule, from atom to atom. If a chemist speaks of a single atom as getting heated, he means merely that its "mobility" is being actuated, that its attractions and repulsions are undergoing a certain modification, that, in fact, its heat consists in some motion with reference to other atoms, as the very notion of attraction and repulsion necessarily implies. Here we are met by no difficulty. There is not a physicist, I suppose, who claims that an atom gets hot by turning round upon itself; and, being itself the independent principle of that reflex action, becomes likewise the term of the same, so that the heat is the consequence of enterprise, as it were, upon itself. No; heat, light, electricity, affinities, are conceived of as undulations of different lengths and degrees of rapidity; and the undulations pass over atoms, molecules, particles,

gyrating them perhaps into "more than astronomical" periodicities of revolution and complex curves of motion, which, as nobody so far has seen them, nor any one cast them on a screen like Lissajous's figures, every one is free to describe as he will, provided he subscribe to the theory. But however unsatisfactory such undemonstrated theory may be as an adequate explanation of what the physical forces are, certain it is that there is one thing which they are *not*, and which no one claims for them. Their action is not that of the atom upon itself, of the molecule on itself, of the subject reacting on the subject; it is not action inward, immanent. It is all transient.

Now no amount of transient action can give that which is immanent. Let us take a living molecule. Take a living cell of the smallest size—a segmentary cell of the germ from which a great living body is going to evolve. Take that smallest expression of physical life to which analysis and the microscope can reduce the problem in act, and call it as you like, with Mr. Huxley, protoplasm, with others, bioplasm—the first, simplest plasm in which, as in a distinct cell, science detects life.

And first, by the way, I would remark the propriety of determining the issue on a cell. Atoms are smaller indeed than a cell; they are aggregated to the cell; and matter generally is transmuted into the homogeneous mass of the cell. But it is perfectly proper and correct not to join issue, in this question of life, on an atom or a molecule. First, because no molecule separately is seen to live. Secondly, because molecules, in this connection, are known as only subserving the purpose of living particles, by being taken into them or being moved out of them. Thirdly, because it requires a certain amount of material to show the phenomena of life in even its simplest form. An atom does not supply enough of material. Just as in other substances generally there must be a certain amount of material to enable the substance to be in its identity, so in a living thing there must be a certain quantum of material, and that complex enough, to allow of the very first and simplest phenomena of life. In such a quantum, called, as we choose, protoplasm, bioplasm, primary cell, complex atom, or the like, the problem of life in the first place opens, though, be it said, it does not there in the last place close. For, though short of that you have only non-living material, beyond that you have endless developments of living matter, through various grades of perfection, up to life without matter in spiritual being.

Such being the case, let us take this living cell. As living, it is acting on itself. That is to say, it is the principle of its action, and is itself the term of the same. Thus, if it grows by nutrition, what happens? It appropriates external matter, and changes it into its own homogeneous mass; it is itself the principle and itself the

term, although, in the circuit, it touches, handles, alters things which are not itself,—these are external effects, resulting from the immanent action; and, from the elements of oxygen, hydrogen, nitrogen, and carbon, it forms the protein which enters into its own homogeneous formation, and there results then a development of cell within cell. There is an inward action in it, a distinctly marked action, which can disappear or “die,” though the simple elements all remain, yes, and remain as the oxy-hydro-carbon compound; because even so remaining they can be dead, and their action is dead too, as far as it was immanent. The transient remains as ever. The protoplasm is dead through want of life. There was in it that action which escapes the analysis of the chemist, “inasmuch as such matter must needs die in the act of analysis,” says Mr. Huxley, and therefore: “Chemical investigation can tell us little or nothing, directly, of the composition of living matter.”¹

Again, therefore, we say, no amount of transient action can produce that which is immanent or reflex. No number of straight lines can make a curve (except by a fiction of mathematics). By no possibility can the action which supposes another term as the patient, at one and the same time make the agent the patient. All the relative changes of attitude and location, by oscillations and revolutions, elliptical, spheroidal, complex in any order and expressed by unknown equations of any power; all the “astronomical distances” imagined between atoms, thus gyrating and flitting and sailing through molecular skies, subject to the laws of molecular astronomy, will never produce this resultant, that the action which by every physical law is simple and transient, directed to a term outside, is, with the same simplicity, immanent, reflex, and terminating inside.

The primary action of the living atom is extremely simple, indivisible, and is immanent. If we speak of the “complex atom,” called a cell, the whole of it is living with an immediate reflex action in itself. If we speak of each component part of that primary cell, each component part is living in the same way. Though life would not subsist in conditions less than those of the complex cell, yet the cell being actuated with life every minor part of it is alive. So that however you take it, whether in the whole or in molecular parts, there is everywhere action immanent; and such cannot come from any combinations of action transient.

There seems to be no need of dwelling further upon this proposition. Therefore the conclusion follows of its own weight, that, since living action is immanent, then transient action—which can never become immanent—cannot give living action. The non-living

¹ Lecture on the Physical Basis of Life.

cannot explain the living. If each has an intrinsic principle that constitutes it in its own order, the intrinsic principle of life cannot be explained by the intrinsic principle which does not give life. There is an essential difference of principle between the one order and the other.

Is it necessary to speak of principle at all? Many think not; or rather they do not know what is meant by principle. According to the principles of Comtism—which has its own principles, to the effect that nobody has any business with principles at all—it is said that antiquated philosophers used principles, and it is said they obscured knowledge by such notions, of things which the senses certainly cannot see. Knowledge, says Comtism, is the experience of facts acquired by the *senses*; and the senses observe only the succession of phenomena. What do they know of principles or cause? They observe accidental qualities. What do they know of essential substrata, or substance? All that we know, says Comtism, is what we see and touch. The rest is unknowable. Cause, agent, matter, motion, force—all are an unknown reality underlying known phenomena. A question of principle therefore is ruled out of court.

Nevertheless, without pausing to analyze the axiom of “principle” or causation, that there is nothing without a sufficient reason or cause, let us take occasion to animadvert upon the use or abuse of it by the scientific school. In the first place, though not expressly denied, it is equivalently so; for if a cause exists, then it is knowable; and if it is not knowable, at least as a cause, then neither can you say that it exists. The axiom is equivalently denied. In the second place, however much this science kicks against the goad, and imagines it takes pleasure in doing so, we may notice that, though kicking, it goes all the same, and it is going precisely in the line of finding in practice the very cause which in theory it equivalently denies. Thus Mr. Huxley, in his essay on the *Physical Basis of Life*, first denies that we should seek a principle: “What justification is there for the assumption of the existence in living matter of a something which has no representative or correlative in the non-living matter which gave rise to it?” Of course, with that, there is an end of anything like asking for a principle which may be adequate to the phenomena of life. But immediately afterwards, with a pass or two of sufficiently unphilosophic blundering in his conceptions, he falls back into the good old fashion of finding a cause, and laying down a principle on the sly, as it were. The laying down is covert, but the principle is broad. “I can find no intelligible ground,” he continues, “for refusing to say that the properties of protoplasm *result from* the nature and disposition of its molecules.”

“Naturam expellas furca!”

Good old mother nature will not go! Mr. Huxley then proceeds to show what will come of this admission, and expresses in his own way what we ourselves were inculcating awhile ago, that the first metaphysical relationship of effect and cause here, the "skeleton" argument as we called it before, can be the skeleton of a man or a monster, according as you argue right or wrong. He says that this admission of his will make all vital action, all thoughts and emotions, merely a direct result and expression of molecular changes in our protoplasm. Or, as Mr. Tyndall puts it in his poetical rhapsody on the Matterhorn, the formless fog whence issued the solar and stellar systems contained potentially the *sadness* with which he regarded the Matterhorn. The *thought* which ran back to the universal cloud simply returned to its primeval home. "If so," he continues, "had we not better recast our definitions of matter and force; for, if life and thought be the very flower of both, any definition (of matter and force) which omits life and thought must be inadequate, if not untrue."¹

Apropos of this method of arguing, it is well to make some observations on the use and abuse of the axiom, "There is nothing without a sufficient reason or cause." It means that a cause must be assigned either equal to the phenomenon or greater than it. $2 + 2$ give 4; $3 + 2$ give 4, as containing it; $4 + 2$ give 4, similarly. But $1 + 2$ do not give 4, being neither greater than it, nor equal to it. If now you start with one intellectual admission,—not a conviction, for that cannot be, but an admission,—that $1 + 2$ *may* give 4, by some "unknown" system of combinations and permutations, then there is no arithmetic for you. You dispense yourself from the science and the use alike of arithmetic. How you could possibly do it we could not possibly imagine, unless, perhaps, one's ingenuity in these matters being sharpened by a Herbert Spencer and his philosophy, we might suggest, that $1 + 2$ are next door to 3, and 3 is certainly next to 4, therefore $1 + 2$ give 4.

And now, applying this to philosophy, if by any intellectual admission, resting on an obscurity or possibilities, a "may be" or a "suggestion," one commits himself to what he neither knows by the senses, nor perceives with the eye of his mind, nor can logically deduce from distinct premises, thenceforth there is no intellectual science for him. At least, if he is consistent there is not. There is no arithmetic for a person who admits the remotest possibility that $1 + 2$ may give 4. No shopkeeper of the smallest calibre will let such a person supervise the scantiest daybook.

Hence Mr. Darwin's precious observations of empirical science, as far as they are empirical facts, may be gems; but in his hands,

¹ Fragments of Science: Note to Essay on Scientific Materialism.

when deductively put together, are what gems would be when the barleycorn were much better. The barleycorn of logic any day before the gems of such science!

If all this seems to be severe upon the school of modern science, let us recall to mind that, just at present, we are not in their school but they are in ours, and they must observe the regulations of metaphysics if they aspire to be metaphysicians. And, secondly, we shall do them the justice forthwith of filling out their scheme of defence, which they make on the respective heads in the bill of indictment. First defence: We may admit secret forces which we do not know of; occult, hidden agencies. Second defence: We must not run to miracles, and talk of soul, forms, spirit—no miracles! Third defence: There are so many mysteries in the world! “Regarding science as a gradually increasing sphere, we may say that every addition to its surface does but bring it into wider contact with surrounding nescience.”¹

Here some one objects: You are scouting mysteries and obscurities in science. Can you make it clear, without mystery, what life is; and particularly the life of man?

III.

THE DEFINITION OF LIFE.

The term “mystery” is very obscure,—about as obscure as the thing it signifies. Nevertheless, in the mouth of a scientist it comes to this: That is a mystery which is only intellectually conceived, with no other aid from imagination than what imagination can lend analogically, or, as in a certain subject-matter it is called, anthropomorphically. If the imagination cannot paint or represent definitely the length, breadth, height, depth, hardness, color, temperature, hygrometry of the object, that object is a mystery. If, however, the object can be so represented, with its material attributes, then it is not a mystery.

From this it follows that everything abstract and everything spiritual is a mystery. By the term “abstract” we designate the state of reality which is not actual in nature, but is underlying the actual. Thus *whiteness* is an abstract notion, for it is a state of reality which does not appear to our eyes as whiteness; we see only things white. Nor does whiteness exist except in things white; yet nothing would be white but for the whiteness in them. That is a sample of the abstract.

By “spiritual” it is clear what is meant; not that which merely prescind from actual existence in matter, as whiteness, but that which is eminently actual and existent, independent of all matter. And here our imagination is naturally quite at a loss to paint the

¹ Mr. Herbert Spencer, *First Principles*: “Religion and Science.”

height, depth, color, and so forth of an idea; for instance, of an emotion, of a mind, a soul, God. Therefore, says science, all these things are mysteries, and unknowable. We cannot even predicate that they exist, because they are not "mentally presentable." Science means because they are not subjects to be painted, that is all.

On the same principle, neither is logic knowable. It cannot be painted. Therefore, theoretically, it is unknowable. Practically, it does seem to be somewhat unknown. Practically, this school of science does not abound in logic, however much it is exuberant in fancy. If we chose to adopt the style of fence used by a certain opponent of Mr. Mallock,¹ we might say "that the very picturesqueness of its style, and its abounding imagery, derived from a love and contemplation of the surface of nature, suggest the doubt whether it is really adequate to the task of entering into the constitution of nature, and discovering the principles of things. As Cardinal de Polignac beautifully expresses it:

"Materiæ decus et formam externumque nitorem
Miramur tantum, summoque in cortice rerum
Ludimus.
Quam pulcrum est in principiis, in origine rerum
Defixisse oculos et nobile mentis acumen!
Pervolat huc sapiens, nugæ sunt cætera vulgi."

However, to say that the school of science is not equal to this, is only saying that it is a school of "science" and not of metaphysics. And yet we should wish it did not stumble so. Father Pesch mentions that Maurice Wagner, for instance, meets the difficulty of not finding certain links in the chain of evolution by suggesting that the links may have migrated!

Father Pesch, the title of whose book we have prefixed to this article, has accomplished a very excellent task. Evidently a man of scientific bent, he has applied a vigorous philosophic mind to the grateful task of filling up the skeleton of scholastic principles, so far as they bear on physics, with modern physical facts. So much drifting has taken place in scientific thought, so many illogical, loose theories are afloat, that a considerable portion of his space is taken up with direct antagonism to the imaginings of the new philosophy; but this direct antagonism of his only makes his body of scholastic philosophy the more valuable, as bringing it everywhere into immediate contact with errors in all their minutiae. And, at the same time, there is such analytic appreciation and grasp of the philosophy which has energized in the philosophic mind of centuries, that he builds it up through every stratum of physical fact and scientific intuition (for which thanks to the modern physicists); and he edifies too the moral sense of the Christian

¹ The Value of Life, ch. ii.

philosopher with the beautiful harmony which is intuitively discerned betwixt the open, physical world and that which lurks behind. Nature thus becomes an open scroll, and the supernatural is seen to adorn it as an illumination. His motto is *Novi errores impugnandi sunt veritate antiqua*: "New errors are to be righted by ancient truth."

We have laid down a metaphysical abstract truth with regard to the essence of life. We should be happy now to clear up whatever cloud of "mystery" overhangs such truth. If we mistake not, the mystery comes from the background, or rather, from the want of background,—from the absence of a perspective.

That principle of life to which we have so rigidly argued—one should like to approach it closer, and examine it minutely, and see how it ranges among other principles of its own class, or of other classes. For, to be candid, all that this paper has established so far, is the fact that such a principle exists. A relationship from observed facts of common observation has been discerned to a cause adequate, and has been followed up; and as far as the facts or effects give us to understand, we know now some general attributes of the cause or principle behind. But the cause itself—how does it stand? as an effect of what other cause? as subordinated in nature to what principles of its own, or other kinds?

Curiosum ingenium! says Seneca. "Inquisitive mind" of man, that is always asking what? and why? and how?

We should be glad to supply the background desired; or, in other words, having established two of the five points, which Father Liberatore¹ very well distinguishes, we should like to establish the other three. First, as he maintains, we should establish well the fundamental fact of life as distinct from non-life. Secondly, we should rise from the fact to the law, by answering the question, What true cause can be assigned to such a fact, considered as an effect? These two things we have done.

Then comes, thirdly, the connecting this order of facts with others more general, and the ranging this special law under laws more universal. Fourthly, general observations should be taken on the bearings of things mutually, and the phenomenon of life should be properly located in the universal order of beings. Fifthly, the essence of life being thus completely ascertained, its accidental properties could be more accurately investigated.

While the psychological portion of the subject will avail much towards clearing up the principles already laid down, the background which we feel is needed to the entire presentation of the subject is the internal composition of bodies, or as the scholastics put it, the theory of matter and form.

¹ Del Composto Umano.

This would serve as a background; and we reserve it for future treatment. It is notable how such a perspective helps to the realization of the abstract principle we have advanced and established. Then, besides supplying the perspective, when the outlines of the principle are filled up with the universe of living beings, all representing the one law of Immanence as made concrete in their respective grades, and this upwards, even to God himself, truly a creditable test has been applied to the definition of life, and it is more than a creditable definition which stands such a test.

We propose now to conclude by repeating the definition in a double form, as that of the principle of life, and this is manifestly a metaphysical idea; secondly, as that of life in action, and here the ideas are manifestly physical. So that life *in actu primo* draws on metaphysics, and life *in actu secundo* on physics.

While we shall repeat both definitions, we take occasion to remark, that for the development of the latter, or the physical description of life, there is scarcely a way more simple, more profitable or entertaining, than to consult the physicists themselves. Indeed, we should be glad to give here a *résumé* of their researches in the laboratory of vegetable physics; but we have no room. So we refer, for instance, to Mr. Herbert Spencer, whose ingenious and solicitous concern about physical facts, and whose comprehensive summaries of the results arrived at by specialists, furnish a large repertory of facts for developing the physical idea of life. What is wrong in him is the metaphysics. And let no one venture to assert that a metaphysical principle is useless, because dry; is valueless, because abstract; when the difference between a right metaphysical principle and a wrong one makes the difference between a sophist and a philosopher, between agnosticism and true science, between atheism and Christianity; and that, too, although both use the very same physical facts to construct their respective bodies of doctrine. Babel and Jerusalem may be built of the same stones. Just as he is a singular metaphysician who runs counter to logic and common-sense, so is he eccentric in common-sense who denies a due value to metaphysics.

Life then, in principle, is the principle of immanent action. It is that adequate principle which is sufficient to explain its effects; therefore, in the last analysis, it is found to be simple, substantial, informing matter, and to be the inner reason why the body is one, active, ordered, and subordinating others to its purpose; just as, on the other hand, matter is found to be, in the last analysis, the principle of inertia, extension, divisibility, density. Only material body it is which has all these qualities; but the qualities are respectively to be referred either to the active principle actuating or to the passive principle actuated, the latter being matter, the other

form. And, in a living body, the substantial principle of its *immanent* action is the principle of life.

Life, physically considered,—not in principle now, but in its action,—may here be described diversely, though briefly.

Life then, as it appears phenomenally, is an active state of self-preservation, in a composition which of its own nature is corruptible. This state of self-preservation is the result of means applied in the shape of circulating moistures or humors, and in the selection and rejection of matter for a definite purpose. Such is the definition of Ernest Stahl, a celebrated physician of the last century.

Life is the sum total of many functions, which have for effect the continuance of action, as opposed to the discontinuance, or the state of death. This is the definition of Bichat.

It is, again, the faculty which certain material combinations have of lasting a definite time under a determinate form, by drawing unceasingly into their composition a part of the substances around them, and restoring to the elements portions of their own substance.

Life is a whirling vortex, more or less rapid, more or less complex, having a direction which remains constant, and carrying around molecules of the same kinds, but meanwhile receiving and losing continually, so that the form of the living body is more essential than the matter. As long as the movement lasts, the body is alive, it lives. When the movement stops without recovery, the body dies. This is the definition of Cuvier.¹

Life is a tendency to individuation, says Schelling.

It is a collection of phenomena which succeed each other during a limited time in an organized body. So says Richerand, coinciding very much with Cuvier.

It is the twofold internal movement of composition and decomposition, at once general and continuous. This is De Blainville's.

It is a series of definite and successive changes, both of structure and composition, which take place within an individual without destroying its identity. This is from G. H. Lewes.²

Finally, to give Mr. Herbert Spencer's own definition, expressed in his own luculent metaphysical style,—Life is the definite combination of heterogeneous changes, both simultaneous and successive, in correspondence with external coexistences and sequences. Or briefer: It is the continuous adjustment of internal relations to external relations. Or briefest: It is the co-ordination of actions.³

These may all be right in the limited physical direction in which they go. But the scholastic philosophers have given the simple and complete definition, which we established above from the data of common-sense. Taken in its physical aspect, life is immanent action.

¹ These three definitions are taken from Father Liberatore's work, *Del Composto Umano*.

² These last four definitions are taken from Spencer's *Data of Biology*, ch. iv.

³ *Data of Biology*, ch. v., iv.