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# I

## LIFE AND CONSCIOUSNESS

*The Huxley Lecture delivered in the University of  
Birmingham, May 24, 1911*

WHEN a lecture is dedicated to the memory of a distinguished man of science, one cannot but feel some constraint in the choice of subject. It must be a subject that would have specially interested the person honoured. I feel no embarrassment on this account in regard to the great name of Huxley; the difficulty would be to find any problem to which his mind would have been indifferent, one of the greatest minds the England of the nineteenth century produced. And yet it seems to me that if one subject more than another would have appealed with particular force to the mind of a naturalist who was also a philosopher, it is the threefold problem of consciousness, of life and of their relation. For my part, I know no problem more fundamental in its importance, and it is this which I have chosen.

In dealing with this problem we cannot reckon much on the support of systems of philosophy. The problems men have most deeply at heart, those which distress the human mind with anxious and passionate insistence, are not always the problems which hold the place of importance in the speculations of the metaphysicians.

## 2 *Mind-Energy*

Whence are we? What are we? Whither tend we? These are the vital questions, which immediately present themselves when we give ourselves up to philosophical reflexion without regard to philosophical systems. But, between us and these problems, systematic philosophy interposes other problems. "Before seeking the solution of a problem," it says, "must we not first know how to seek it? Study the mechanism of thinking, then discuss the nature of knowledge and criticize the faculty of criticizing when you have assured yourself of the value of the instrument, you will know how to use it." That moment, alas! will never come. I see only one means of knowing how far I can go: that is by going. If the knowledge we are in search of be real instruction, a knowledge which expands thought, then to analyse the mechanism of thought before seeking knowledge could only show the impossibility of ever getting it, since we should be studying thought before the expansion of it which it is the business of knowledge to obtain. A premature reflexion of the mind on itself would discourage it from advancing, whilst by simply advancing it would have come nearer to its goal and perceived, moreover, that the so-called obstacles were for the most part the effects of a mirage. But suppose even that the metaphysician does not thus sacrifice the use of mind for the criticism of mind, the end for the means, the prey for the shadow: too often, when confronted with the problem of the origin, nature and destiny of man, he passes it by in order to deal with questions which he judges to be higher, and on which he thinks its solution depends. He speculates on existence in general, on the real and the possible, on time and space, on mind and matter, and from these generalities descends gradually to the

consciousness and life whose essence he would understand. Now, is it not clear that his speculations have become purely abstract, with no bearing on the things themselves, but only on the altogether too simple idea of them which he has formed before he has studied them empirically? It would be impossible to explain a philosopher's attachment to so strange a method had it not the threefold advantage that it flatters his self-esteem, facilitates his work and gives him the illusion of definitive knowledge. As it leads him to some very general theory, to an almost empty concept, he can always, later on, place retrospectively in the concept whatever experience has come to teach him of the thing. He will then claim to have anticipated experience by the force of reasoning alone, to have embraced beforehand in a wider conception those conceptions, narrower, I confess, but the only ones difficult to form and the only ones useful to keep, which we get by the study of facts. On the other hand, as nothing is easier than to reason geometrically with abstract ideas, he has no trouble in constructing an iron-bound system, which appears to be strong because it is unbending. But this apparent strength is simply due to the fact that the idea with which he works is diagrammatic and rigid and does not follow the sinuous and mobile contours of reality. How much better a more modest philosophy would be, one which would go straight to its object without worrying about the principles on which it depends! It would not aim at immediate certainty, which can only be ephemeral. It would take its time. It would be a gradual ascent to the light. Borne along in an experience growing ever wider and wider, rising to ever higher and higher probabilities, it would strive towards final certainty as to a limit.

#### 4 *Mind-Energy*

I hold, for my part, that there is no principle from which the solution of the great problems can be mathematically deduced. Moreover, I am unable to discover any decisive fact which clinches the matter, such as we expect to find in physics and chemistry. But it seems to me that in different regions of experience there are different groups of facts, each of which, without giving us the desired knowledge, points out to us the direction in which we may find it. Now, to have only a direction is something. And it is still more to have several, for these directions will naturally converge towards one and the same point, and it is that point we are seeking. In short, we possess even now a certain number of *lines of facts*, which do not go as far as we want, but which we can prolong hypothetically. I wish to follow out some of these with you. Each, taken apart, will lead us only to a conclusion which is simply probable; but taking them all together, they will, by their convergence, bring before us such an accumulation of probabilities that we shall feel on the road to certitude. Moreover, we shall come nearer and nearer to it through the joint effort of philosophers who will become partners. For, in this view, philosophy is no longer a construction, the systematic work of a single thinker. It needs, and unceasingly calls for, corrections and re-touches. It progresses like positive science. Like it, too, it is a work of collaboration.

The first line or direction which I invite you to follow is this. When we speak of mind we mean, above everything else, consciousness. What is consciousness? There is no need to define so familiar a thing, something which is continually present in everyone's experience. I will not give a definition, for that would be less clear

than the thing itself; I will characterize consciousness by its most obvious feature: it means, before everything else, memory. Memory may lack amplitude; it may embrace but a feeble part of the past; it may retain only what is just happening; but memory is there, or there is no consciousness. A consciousness unable to conserve its past, forgetting itself unceasingly, would be a consciousness perishing and having to be reborn at each moment: and what is this but unconsciousness? When Leibniz said of matter that it is "a momentary mind," did he not declare it, whether he would or no, insensible? All consciousness, then, is memory, – conservation and accumulation of the past in the present.

But all consciousness is also anticipation of the future. Consider the direction of your mind at any moment you like to choose; you will find that it is occupied with what now is, but always and especially with regard to what is about to be. Attention is expectation, and there is no consciousness without a certain attention to life. The future is there; it calls us, or rather, it draws us to it; its uninterrupted traction makes us advance along the route of time and requires us also to be continually acting. All action is an encroachment on the future.

To retain what no longer is, to anticipate what as yet is not, these are the primary functions of consciousness. For consciousness there is no present, if the present be a mathematical instant. An instant is the purely theoretical limit which separates the past from the future. It may, in the strict sense, be conceived, it is never perceived. When we think we have seized hold of it, it is already far away. What we actually perceive is a certain span of duration composed of

two parts – our immediate past and our imminent future. We lean on the past, we bend forward on the future: leaning and bending forward is the characteristic attitude of a conscious being. Consciousness is then, as it were, the hyphen which joins what has been to what will be, the bridge which spans the past and the future. But what purpose does the bridge serve? What is consciousness called on to do?

In order to reply to the question, let us inquire what beings are conscious and how far in nature the domain of consciousness extends. But let us not insist that the evidence shall be complete, precise and mathematical; if we do, we shall get nothing. To know with scientific certainty that a particular being is conscious, we should have to enter into it, coincide with it, be it. It is literally impossible for you to prove, either by experience or by reasoning, that I, who am speaking to you at this moment, am a conscious being. I may be an ingeniously constructed natural automaton, going, coming, discoursing; the very words I am speaking to affirm that I am conscious may be being pronounced unconsciously. Yet you will agree that though it is not impossible that I am an unconscious automaton, it is very improbable. Between us there is an evident external resemblance; and from that external resemblance you conclude by analogy there is an internal likeness. Reasoning by analogy never gives more than a probability; yet there are numerous cases in which that probability is so high that it amounts to practical certainty. Let us then follow the thread of the analogy and inquire how far consciousness extends, and where it stops.

It is sometimes said that, in ourselves, consciousness is directly connected with a brain, and that we must therefore attribute consciousness to living beings which

have a brain and deny it to those which have none. But it is easy to see the fallacy of such an argument. It would be just as though we should say that because in ourselves digestion is directly connected with a stomach, therefore only living beings with a stomach can digest. We should be entirely wrong, for it is not necessary to have a stomach, nor even to have special organs, in order to digest. An amoeba digests, although it is an almost undifferentiated protoplasmic mass. What is true is that in proportion to the complexity and perfection of an organism there is a division of labour; special organs are assigned special functions; and the faculty of digesting is localized in the stomach, or rather in a general digestive apparatus, which works better because confined to that one function alone. In like manner, consciousness in man is unquestionably connected with the brain: but it by no means follows that a brain is indispensable to consciousness. The lower we go in the animal series, the more the nervous centres are simplified and separate from one another, and at last they disappear altogether, merged in the general mass of an organism with hardly any differentiation. If then, at the top of the scale of living beings, consciousness is attached to very complicated nervous centres, must we not suppose that it accompanies the nervous system down its whole descent, and that when at last the nerve stuff is merged in the yet undifferentiated living matter, consciousness is still there, diffused, confused, but not reduced to nothing? Theoretically, then, everything living might be conscious. *In principle*, consciousness is coextensive with life. Now, is it so *in fact*? Does not consciousness, occasionally, fall asleep or slumber? This is probable, and here is a second line of facts which leads to this conclusion.

In the living being which we know best, it is by means of the brain that consciousness works. Let us then cast a glance at the human brain and see how it functions. The brain is part of a nervous system which includes, together with the brain proper, the spinal cord, the nerves, etc. In the spinal cord there are mechanisms set up, each of which contains, ready to start, a definite complicated action which the body can carry out at will, just as the rolls of perforated paper which are used in the pianola mark out beforehand the tunes which the instrument will play. Each of these mechanisms can be set working directly by an external cause: the body, then, at once responds to the stimulus received by executing a number of inter-coordinated movements. But in some cases the stimulus, instead of obtaining immediately a more or less complicated reaction from the body by addressing itself directly to the spinal cord, mounts first to the brain, then redescends and calls the mechanism of the spinal cord into play after having made the brain intervene. Why is this indirect path taken? What purpose is served by the intervention of the brain? We may easily guess, if we consider the general structure of the nervous system. The brain is in a general relation to all the mechanisms in the spinal cord and not only to some particular one among them; also it receives every kind of stimulus, not only certain special kinds. It is therefore a crossway, where the nervous impulse arriving by any sensory path can be directed into any motor path. Or, if you prefer, it is a commutator, which allows the current received from one point of the organism to be switched in the direction of any motor contrivance. When the stimulus, then, instead of following the direct path, goes off to the brain, it is

evidently in order that it may set in action a motor mechanism which has been chosen, instead of one which is automatic. The spinal cord contains a great number of ready-formed responses to the question which the circumstances address to it; the intervention of the brain secures that the most appropriate among them shall be given. The brain is an organ of choice.

Now, the, further we descend the scale of the animal series, the less and less definite we find the separation becoming between the functions of the spinal cord and those of the brain. The faculty of choosing, at first localized in the brain, extends gradually to the spinal cord, which then, probably, constructs somewhat fewer mechanisms and also mounts them with less precision. At last, when we come to the nervous system which is rudimentary, still more when distinct nervous elements have disappeared altogether, automatism and choice are fused into one. The reaction is now so simple that it appears almost mechanical; it still hesitates and gropes, however, as though it would be voluntary. The amoeba, for instance, when in presence of a substance which can be made food, pushes out towards it filaments able to seize and enfold foreign bodies. These pseudopodia are real organs and therefore mechanisms; but they are only temporary organs created for the particular purpose, and it seems they still show the rudiments of choice. From top to bottom, therefore, of the scale of animal life we see being exercised, though the form is ever vaguer as we descend, the faculty of choice, that is, the responding to a definite stimulus by movements more or less unforeseen. This then is what we find along the second line of facts. It re-enforces the conclusion we had come to before; for if, as we said, consciousness retains the past

and anticipates the future, it is probably because it is called on to make a choice. In order to choose, we must know what we can do and remember the consequences, advantageous or injurious, of what we have already done; we must foresee and we must remember. And now we are going to see that our first conclusion, re-enforced by this new line of facts, supplies an intelligible answer to the question before us: are all living beings conscious, or does consciousness cover a part only of the domain of life?

If consciousness means choice and if its role be to decide, it is unlikely that we shall meet it in organisms which do not move spontaneously, and which have no decision to take. Strictly speaking, there is no living being which appears completely incapable of spontaneous movement. Even in the vegetable world, where the organism is generally fixed to the soil, the faculty of movement is dormant rather than absent; it awakens when it can be of use. I believe all living beings, plants and animals, possess it in right; but many of them have renounced it in fact, – some animals, especially those which have become parasitic on other organisms and have no need of moving about to find their nourishment, and the vast majority of plants has it not been said that plants are earth-parasites? It appears to me therefore extremely likely that consciousness, originally immanent in all that lives, is dormant where there is no longer spontaneous movement, and awakens when life tends to free activity. We can verify the law in ourselves. What happens when one of our actions ceases to be spontaneous and becomes automatic? Consciousness departs from it. In learning an exercise, for example, we begin by being conscious of each of the movements we execute. Why?

Because we originate the action, because it is the result of a decision and implies a choice. Then, gradually, as the movements become more and more linked together and more and more determine one another mechanically, dispensing us from the need of choosing and deciding, the consciousness of them diminishes and disappears. On the other hand, when is it that our consciousness attains its greatest liveliness? Is it not at those moments of inward crisis when we hesitate between two, or it may be several, different courses to take, when we feel that our future will be what we make it? The variations in the intensity of our consciousness seem then to correspond to the more or less considerable sum of choice or, as I would say, to the amount of creation, which our conduct requires. Everything leads us to believe that it is thus with consciousness in general. If consciousness mean memory and anticipation, it is because consciousness is synonymous with choice.

Let us then imagine living matter in its elementary form, such as it may have been, when it first appeared: a simple mass of protoplasmic jelly like the amoeba, which can undergo change of form at will, and is therefore vaguely conscious. Now, for it to grow and evolve, there are two ways open. It may take the path towards movement and action, – movement growing ever more effective, action growing freer and freer. The path towards movement involves risk and adventure, but also it involves consciousness, with its growing degrees of intensity and depth. It may take the other path, it may abandon the faculty of acting and choosing, the potentiality of which it carries within it, may accommodate itself to obtain from the spot where it is all it requires for its support, instead of going abroad

to seek it. Existence is then assured to it, a tranquil, unenterprising existence, but this existence is also torpor, the first effect of immobility: the torpor soon becomes fixed; this is unconsciousness. These are the two paths which lie open before the evolution of life. Living matter finds itself committed partly to the one path, partly to the other. Speaking generally, the first path may be said to mark the direction of the animal world (we have to qualify it, because many animal species renounce movement and with it probably consciousness also); the second may be said to mark the direction of the vegetable world (again it has to be qualified, for mobility, and therefore probably consciousness also, may occasionally be awakened in parts).

When, now, we reflect on this bias or tendency of life at its entry into the world, we see it bringing something which encroaches on inert matter. The world left to itself obeys fatalistic laws. In determinate conditions matter behaves in a determinate way. Nothing it does is unforeseeable. Were our science complete and our calculating power infinite, we should be able to predict everything which will come to pass in the inorganic material universe, in its mass and in its elements, as we predict an eclipse of the sun or moon. Matter is inertia, geometry, necessity. But with life there appears free, unpredictable, movement. The living being chooses or tends to choose. Its role is to create. In a world where everything else is determined, a zone of indetermination surrounds it. To create the future requires preparatory action in the present, to prepare what will be is to utilize what has been: life therefore is employed from its start in conserving the past and anticipating the future in a duration in which past, present and future tread one on another, forming an

indivisible continuity. Such memory, such anticipation, are consciousness itself. This is why, in right if not in fact, consciousness is coextensive with life.

Consciousness and matter appear to us, then, as radically different forms of existence, even as antagonistic forms, which have to find a *modus vivendi*. Matter is necessity, consciousness is freedom; but though diametrically opposed to one another, life has found the way of reconciling them. This is precisely what life is, – freedom inserting itself within necessity, turning it to its profit. Life would be an impossibility were the determinism of matter so absolute as to admit no relaxation. Suppose, however, that at particular moments and at particular points matter shows a certain elasticity, then and there will be the opportunity for consciousness to install itself. It will have to humble itself at first; yet, once installed, it will dilate, it will spread from its point of entry and not rest till it has conquered the whole, for time is at its disposal, and the slightest quantity of indetermination, by continually adding to itself, will make up as much freedom as you like. But here are new lines of facts which point to the same conclusion with still greater precision.

When we investigate the way in which a living body goes to work to execute movements, we find that the method it employs is always the same. This consists in utilizing certain unstable substances which, like gunpowder, need only a spark to explode them. I refer to foodstuffs, especially the ternary substances, – the carbohydrates and fats. A considerable sum of potential energy, accumulated in them, is ready to be converted into movement. That energy has been slowly and gradually borrowed from the sun by plants; and the animal which feeds on a plant, or on an animal which

has been fed on a plant, or on an animal which has fed on an animal which has been fed on a plant, and so on, simply receives into its body an explosive which life has fabricated by storing solar energy. To execute a movement, the imprisoned energy is liberated. All that is required is, as it were, to press a button, touch a hair-trigger, apply a spark: the explosion occurs, and the movement in the chosen direction is accomplished. The first living beings appear to have hesitated between the vegetable and animal life: this means that life, at the outset, undertook to perform the twofold duty, both to fabricate the explosive and to utilize it in movements. As vegetables and animals became differentiated, life split off into two kingdoms, thus separating from one another the two functions primitively united. The one became more preoccupied with the fabrication of explosives, the other with their explosion. But life as a whole, whether we envisage it at the start or at the end of its evolution, is a double labour of slow accumulation and sudden discharge. Its task is to ensure that matter, by a slow and difficult process, shall store potential energy and hold it available at need as kinetic energy. Now, what could a free cause do, – a cause which although unable to break the necessity to which matter is subject would yet be able to bend it, – a cause which although able to exercise but a very small influence on matter yet should purpose to obtain movements ever more powerful in a direction ever more freely chosen? Would it not behave exactly in this way? It would strive to have nothing more to do, in order to release an energy which it had caused matter slowly to accumulate, than touch a spring or apply a spark.

We shall come to the same conclusion along a third line of facts. Let us consider the idea which precedes

an action in conscious beings, apart from the action itself. What is the sign by which we recognize the man of action, the man who leaves his mark on the events in which chance has called on him to take part? Is it not the momentary vision which embraces a whole course of events within one purview? The greater his hold on the past in his present vision, the heavier is the mass he is pushing against eventualities in preparation. His action, like an arrow, flies forward with the greater force the more tensely in memory his idea had been strung. Now think of our visual consciousness in relation to the perceptual matter it apprehends. In its briefest moment consciousness embraces thousands of millions of vibrations which for inert matter are successive; if matter were endowed with memory, the first of these would appear to the last in the infinitely remote past. When I open and close my eyes in rapid succession, I experience a succession of visual sensations each of which is the condensation of an extraordinarily long history unrolled in the external world. There are then, succeeding one another, billions of vibrations, that is a series of events which, even with the greatest possible economy of time, would take me thousands of years to count. Yet these dull and monotonous events, which would fill thirty centuries of a matter become self-conscious, occupy only a second of my own consciousness, able to contract them into one picturesque sensation of light. Moreover, just the same could be said of all the other sensations. Placed at the confluence of consciousness and matter, sensation condenses, into the duration which belongs to us and characterizes our consciousness, immense periods of what we can call by analogy the duration of things. Must we not think, then, that

if our perception contracts material events in this way it is in order that our action may dominate them? Supposing the necessity inherent in matter be such that at each of its moments it can be forced, but only within extremely restricted limits, how in such case must a consciousness proceed if it would insert a free action into this material world, let that action be no more than releasing a spring or directing a movement? Would it not have to adopt precisely this method? Should we not expect to find between its duration and the duration of things a difference of tension such that innumerable instants of the material world could be held within one single instant of the conscious life, so that the desired action, accomplished by consciousness in one of its moments, could be distributed over an enormous number of the moments of matter and so sum up within it the indeterminations almost infinitesimal which each of them admits? In other words, is not the tension of the duration of a conscious being the measure of its power of acting, of the quantity of free creative activity it can introduce into the world? I hold that it is, but for the moment I will not press this. All I wish to say is that this new line of facts leads us to the same conclusion as the former line. Whether we consider the act which consciousness decrees or the perception which prepares that act, in either case consciousness appears as a force seeking to insert itself in matter in order to get possession of it and turn it to its profit. It works in two complementary ways: – in one, by an explosive action, it liberates instantly, in the chosen direction, energy which matter has been accumulating during a long time; in the other, by a work of contraction, it gathers into a single instant the incalculable number of small

events which matter holds distinct, as when we sum up in a word the immensity of a history.

Let us then place ourselves at the converging point of these different lines of facts. On the one hand, there is matter, subject to necessity, devoid of memory, or at least with no more than suffices to form the bridge between two of its moments, each of which can be deduced from its antecedent, each of which adds nothing to what the world already contains. On the other hand, there is consciousness, memory with freedom, continuity of creation in a duration in which there is real growth; – a duration which is drawn out, wherein the past is preserved indivisible; a duration which grows like a plant, but like the plant of a fairy tale transforms its leaves and flowers from moment to moment. We may surmise that these two realities, matter and consciousness, are derived from a common source. If, as I have tried to show in a previous work (*Creative Evolution*), matter is the inverse of consciousness, if consciousness is action unceasingly creating and enriching itself, whilst matter is action continually unmaking itself or using itself up, then neither matter nor consciousness can be explained apart from one another. I will not return to this theme now, I will merely say that I see in the whole evolution of life on our planet a crossing of matter by a creative consciousness, an effort to set free, by force of ingenuity and invention, something which in the animal still remains imprisoned and is only finally released when we reach man.

We need not go into the details of the scientific investigations which since Lamarck and Darwin have come more and more to confirm the idea of an evolution of species, that is, of the generation of species from

one another, the organized forms from the simpler. We can hardly refuse to accept a hypothesis which has the threefold support of comparative anatomy, of embryology and of palaeontology. Science has shown, moreover, along the whole evolution of life, the various consequences attending upon the fact that living beings must be adapted to the conditions of the environment. Yet this necessity would seem to explain the arrest of life in various definite forms, rather than the movement which carries the organization ever higher. A very inferior organism is as well adapted as ours to the conditions of existence, judged by its success in maintaining its life: why, then, does life which has succeeded in adapting itself go on complicating itself, and complicating itself more and more dangerously? Some living forms to be met with today have come down unchanged from remotest palaeozoic times; they have persisted, unchanged, throughout the ages. Life then might have stopped at some one definite form. Why did it not stop wherever it was possible? Why has it gone on? Why, – unless it be that there is an impulse driving it to take ever greater and greater risks towards its goal of an ever higher and higher efficiency?

Even a cursory survey of the evolution of life gives us the feeling that this impulse is a reality. Yet we must not think that it has driven living matter in one single direction, nor that the different species represent so many stages along a single route, nor that the course has been accomplished without obstacle. It is clear that the effort has met with resistance in the matter which it has had to make use of; it has needed to split itself up, to distribute along different lines of evolution the tendencies it bore within it; it has turned aside, it has retrograded; at times it has stopped short.

On two lines only has it achieved an undeniable success, partial in the one case, relatively complete in the other. These are the lines of evolution of the arthropods and the vertebrates. At the end of the first line, we find the instincts of the insect; at the end of the second, human intelligence. We have good ground, then, for believing that the evolving force bore within it originally, but confused together or rather the one implied in the other, instinct and intelligence.

Things have happened just as though an immense current of consciousness, interpenetrated with potentialities of every kind, had traversed matter to draw it towards organization and make it, notwithstanding that it is necessity itself, an instrument of freedom. But consciousness has had a narrow escape from being itself ensnared. Matter, enfolding it, bends it to its own automatism, lulls it to sleep in its own unconsciousness. On certain lines of evolution, those of the vegetable world in particular, automatism and unconsciousness are the rule: the freedom immanent in evolution is shown even here, no doubt, in the creation of unforeseen forms which are veritably works of art; but, once created, these unforeseeable forms are mechanically repeated; the individual has no choice. On other lines, consciousness succeeds in freeing itself sufficiently for the individual to acquire feeling, and therewith a certain latitude of choice; but the necessities of existence restrict the power of choosing to a simple aid of the need to live. So, from the lowest to the highest rung of the ladder of life, freedom is riveted in a chain which at most it succeeds in stretching. With man alone a sudden bound is made; the chain is broken. The human brain closely resembles the animal brain, but it has, over and above, a special factor which furnishes the

means of opposing to every contracted habit another habit, and to every automatism an antagonistic automatism. Freedom, coming to itself whilst necessity is at grips with itself, brings back matter to the condition of being a mere instrument. It is as though it had divided in order to rule.

That the united efforts of physics and chemistry to manufacture matter resembling living matter may one day be successful is by no means improbable, for life proceeds by insinuating, and the force which drew matter away from pure mechanism could not have taken hold of matter had it not first itself adopted that mechanism. In such wise, the points of the railway coincide at first with the lines from which they will shunt the train. In other words, life must have installed itself in a matter which had already acquired some of the characters of life without the work of life. But matter left to itself would have stopped there; and the work of our laboratories will probably go no further. We shall reproduce, that is to say, some characters of living matter; we shall not obtain the push in virtue of which it reproduces itself and, in the meaning of transformism, evolves. Now, reproduction and evolution are life itself. Both are the manifestation of an inward impulse, of the twofold need of increasing in number and wealth by multiplication in space and complication in time, of two instincts which make their appearance with life and later become the two great motives in human activity, love and ambition. Visibly there is a force working, seeking to free itself from trammels and also to surpass itself, to give first all it has and then something more than it has. What else is mind? How can we distinguish the force of mind, if it exists, from other forces save in this, that it

has the faculty of drawing from itself more than it contains? Yet we must take into account the obstacles of every kind that such a force will meet on its way. The evolution of life, from its early origins up to man, presents to us the image of a current of consciousness flowing against matter, determined to force for itself a subterranean passage, making tentative attempts to the right and to the left, pushing more or less ahead, for the most part encountering rock and breaking itself against it, and yet, in one direction at least, succeeding in piercing its way through and emerging into the light. That direction is the line of evolution which ends in man.

Now why did mind engage in such an enterprise? What interest could it have had in boring the tunnel? To answer this inquiry, we should have again to follow several new lines of facts and see them converge on one single point. But this would require us to go into details concerning psychical life, concerning the psycho-physiological relation, concerning the moral ideal and social progress. Let us rather go at once to the conclusion. Here are matter and consciousness confronting one another. Matter is primarily what brings division and precision. A thought, taken by itself, is a reciprocal implication of elements *of which we cannot say that they are one or many*. Thought is a continuity, and in all continuity there is confusion. For a thought to become distinct, there must be dispersion in words. Our only way of taking count of what we have in mind is to set down on a sheet of paper, side by side, terms which in our thinking interpenetrate. Just in this way does matter distinguish, separate, resolve into individualities, and finally into personalities, tendencies before confused in the original impulse of life.

On the other hand, matter calls forth effort and makes it possible. Thought which is only thought, the work of art which is only conceived, the poem which is no more than a dream, as yet cost nothing in toil; it is the material realization of the poem in words, of the artistic conception in statue or picture, which demands effort. The effort is toilsome, but also it is precious, more precious even than the work which it produces, because, thanks to it, one has drawn out from the self more than it had already, we are raised above ourselves. This effort was impossible without matter. By the resistance matter offers and by the docility with which we endow it, it is at one and the same time obstacle, instrument and stimulus. It experiences our force, keeps the imprint of it, calls for its intensification.

Philosophers who have speculated on the meaning of life and on the destiny of man have failed to take sufficient notice of an indication which nature itself has given us. Nature warns us by a clear sign that our destination is attained. That sign is joy. I mean joy, not pleasure. Pleasure is only a contrivance devised by nature to obtain for the creature the preservation of its life, it does not indicate the direction in which life is thrusting. But joy always announces that life has succeeded, gained ground, conquered. All great joy has a triumphant note. Now, if we take this indication into account and follow this new line of facts, we find that wherever there is joy, there is creation; the richer the creation, the deeper the joy. The mother beholding her child is joyous, because she is conscious of having created it, physically and morally. The merchant developing his business, the manufacturer seeing his industry prosper, are joyous, – is it because money is gained and notoriety acquired? No doubt, riches and

social position count for much, but it is pleasures rather than joy that they bring; true joy, here, is the feeling of having started an enterprise which goes, of having brought something to life. Take exceptional joys, – the joy of the artist who has realized his thought, the joy of the thinker who has made a discovery or invention. You may hear it said that these men work for glory and get their highest joy from the admiration they win. Profound error! We cling to praise and honours in the exact degree in which we are not sure of having succeeded. There is a touch of modesty in vanity. It is to reassure ourselves that we seek approbation; and just as we wrap the prematurely born child in cotton wool, so we gather round our work the warm admiration of mankind in case there should be insufficient vitality. But he who is sure, absolutely sure, of having produced a work which will endure and live, cares no more for praise and feels above glory, because he is a creator, because he knows it, because the joy he feels is the joy of a god. If, then, in every domain the triumph of life is creation, must we not suppose that human life has its goal in a creation which, unlike that of the artist and philosopher, can be pursued always by all men – creation of self by self, the growing of the personality by an effort which draws much from little, something from nothing, and adds unceasingly to whatever wealth the world contains?

Regarded from without, nature appears an immense inflorescence of unforeseeable novelty. The force which animates it seems to create lovingly, for nothing, for the mere pleasure of it, the endless variety of vegetable and animal species. On each it confers the absolute value of a great work of art. It seems as much attached to the first comer as to man himself. But the form of a living

being, once designed, is thenceforward indefinitely repeated, and the acts of this living being, once performed, tend to imitate themselves and recommence automatically. Automatism and repetition, which prevail everywhere except in man, should warn us that living forms are only halts: this work of marking time is not the forward movement of life. The artist's standpoint is therefore important, but not final. Richness and originality of forms do indeed indicate an expansion of life, but in this expansion, where beauty means power, life also shows a stop of its impulse, a momentary powerlessness to push farther, like the boy who rounds off in a graceful curve the end of the slide.

The standpoint of the moralist is higher. In man alone, especially among the best of mankind, the vital movement pursues its way without hindrance, thrusting through that work of art, the human body, which it has created on its way, the creative current of the moral life. Man, called on at every moment to lean on the totality of his past in order to bring his weight to bear more effectively on the future, is the great success of life. But it is the moral man who is a creator in the highest degree, the man whose action, itself intense, is also capable of intensifying the action of other men, and, itself generous, can kindle fires on the hearths of generosity. The men of moral grandeur, particularly those whose inventive and simple heroism has opened new paths to virtue, are revealers of metaphysical truth. Although they are the culminating point of evolution, yet they are nearest the source and they enable us to perceive the impulsion which comes from the deep. It is in studying these great lives, in striving to experience sympathetically what they experience, that we may penetrate by an act of intuition to the life principle

itself. To pierce the mystery of the deep, it is sometimes necessary to regard the heights. It is earth's hidden fire which appears at the summit of the volcano.

On the two great routes that the vital impulse has found open before it, along the series of the arthropods and the series of the vertebrates, instinct and intelligence, at first wrapped up confusedly within one another, have in their development taken divergent directions. At the culminating point of the first evolution are the hymenoptera, at the culminating point of the second, man. In each, in spite of the radical difference in the forms attained and the growing separation of the paths followed, it is to social life that evolution leads, as though the need of it was felt from the beginning, or rather as though there were some original and essential aspiration of life which could find full satisfaction only in society. Society, which is the community of individual energies, benefits from the efforts of all its members and renders effort easier to all. It can only subsist by subordinating the individual, it can only progress by leaving the individual free: contradictory requirements, which have to be reconciled. With insects, the first condition alone is fulfilled. The societies of ants and bees are admirably disciplined and united, but fixed in an invariable routine. If the individual is forgotten in the society, the society on its part also has forgotten its destination. Individual and society, both in a state of somnambulism, go round and round in the same circle, instead of moving straight forward to a greater social efficiency and a completer individual freedom. Human societies, alone, have kept full in view both the ends to be attained. Struggling among themselves and at war with one another, they are seeking clearly, by friction and shock, to round off

the angles, to wear out antagonisms, to eliminate contradictions, to bring about that individual wills should insert themselves in the social will without losing their individual form, and that different and diverse societies should enter in their turn into a wider and more inclusive society and yet not lose their originality or their independence. The spectacle is both disquieting and reassuring, for we cannot contemplate it without saying that, here too, across innumerable obstacles, life is working both by individualization and integration to obtain the greatest quantity, the richest variety, the highest qualities, of invention and effort.

To conclude, then, the aspirations of our moral nature are not in the least contradicted by positive science. On this, as on many other points, I quite agree with the opinion expressed by Sir Oliver Lodge in many of his works, and especially in his admirable book on *Life and Matter*. How could there be disharmony between our intuitions and our science, how especially could our science make us renounce our intuitions, if these intuitions are something like instinct, – an instinct conscious, refined, spiritualized, and if instinct is still nearer life than intellect and science? Intuition and intellect do not oppose each other, save where intuition refuses to become more precise by coming into touch with facts scientifically studied, and where intellect, instead of confining itself to science proper (that is, to what can be inferred from facts or proved by reasoning), combines with this an unconscious and inconsistent metaphysics which in vain lays claim to scientific pretensions.

If we now take into account that the mental activity of man overflows his cerebral activity, that his brain is a storehouse of motor habits but not of memories,

that the other functions of thought are even more independent of the brain than memory is, that preservation and even intensification of personality are not only possible but even probable after the disintegration of the body, shall we not suspect that, in its passage through the matter which it finds here, consciousness is tempering itself like steel and preparing itself for a more efficient action, for an intenser life? That life, as I imagine it, is still a life of striving, a need of invention, a creative evolution: to it each of us might come by the play of natural forces alone, taking our place on the moral plane to which in this life the quality and quantity of our effort had already virtually raised us, as the balloon set free takes the position in the air which its density assigns it. I admit that this is no more than a hypothesis. We were just now in the region of the probable, this is the region of the simply possible. Let us confess our ignorance, but let us not resign ourselves to the belief that we can never know. If there be a beyond for conscious beings, I cannot see why we should not be able to discover the means to explore it. Nothing which concerns man is likely to conceal itself deliberately from the eyes of man. Sometimes, moreover, the information we imagine to be far off, even infinitely distant, is at our side, waiting only till it pleases us to notice it. Recollect what has happened in regard to another beyond, that of ultra-planetary space. Auguste Comte declared the chemical composition of the heavenly bodies to be forever unknowable by us. A few years later the spectroscope was invented, and today we know, better than if we had gone there, what the stars are made of.

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