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PHILOSOPHICAL BIOLOGY: SCIENCE DESTRUCTIVE AND CONSTRUCTIVE

EVERY man has a philosophy of life. The philosophy of some folks is meagre enough; others keep the different aspects of theirs in watertight compartments. The great prophet, poet or teacher is he who can break down these compartments, give free play to the floods of actuality that pour in on every side, and yet not (like lesser men) be overwhelmed in the turmoil. He will take these violent but vital streams, combine their flow, use their full head of water for power, distribute them in peaceful runlets for the irrigation of new fields of life or old fields grown barren through the drying of the old springs. For let us not forget the world never stands still; to each generation the old problems come in new forms, with new problems on their heels. Bergson had the poet's insight in his vision of evolution as a creative thing. The new, the not-to-be-prophesied is constantly coming into being, does continuously arise from the old and the familiar. That is true not merely for the slow workings of animal evolution; much more is it true for the rapid changes of human civilization.

In this last century of human years, great and bewildering changes have been made both in man's understanding of himself and external nature, and in the material basis of his life—greater and more bewildering than in any other century of which we have record. These changes demand a new outlook and a new philosophy; and it is of

the contribution of biology to this new outlook that I wish here to speak.

In the first place, there is the realization of change itself, of the fact that society, like other organisms, must change if it is not to stagnate. There are organisms, like the lamp-shell *Lingula*, which have not changed for ten million years; but such are extremely rare. The law for the vast majority of species is change. That is especially true for those of generalized plastic nature; and man is preëminent, thanks to the construction of his brain, in plasticity.

There seems for man, as for most organisms, to be no escape from one of two alternatives. Either he must be going somewhere, or he must be like the old darkey in the story, who when asked where he was going, said, "Ain't going nowheres, I'se been gone where I'm gwine to". (One knows both individuals and nations who seem to have already gone where they were going to!)

The fact that the world never stands still is, to be sure, a chestnut of experience; but none the less important for that. Very often reason's contribution to a problem lies in providing an intelligible basis for some dimly-perceived familiar truth, in making its boundaries clearer and in seeing precisely how it operates. Biology does this for our general notion that the world does not stand still.

The discovery of the fact of evolution made change in the law of the organic world; and from a study of evolution we are enabled to say something as to the meaning of change for life.

By this we are shaken out of any conceit we might have that this is the best of all possible worlds, and made to see that, as I said yesterday, we are become the trustees of evolutionary progress; and that any state of the world in

which men and women are so far, as they are in the present, from realizing more fully the possibilities that are in them is very far from the end of its evolutionary course. There are actually people who hold up the existing order of society as divinely ordained and therefore presumably ideal. Such an attitude is, presumably, in most cases, the mere rationalization of a fear of change, but it is nevertheless pernicious.

The real problem is to strike the balance between stability and change—to make change itself regular. This has its practical bearings. Mr. Trotter in his book on the "Herd Instinct" has pointed out that one real classification of human types is into the stable-minded and the unstable-minded: that the latter are those who produce most of the great discoverers and reformers, the former most of the administrators and business men. Further, that the greater the innovators and reformers, the more are they usually attacked and reviled during their lifetime; and that the chief practical power and the bulk of wealth are in the hands of the stable-minded.

Our problem is to encourage the unstable-minded to make their discoveries and point the way to their reforms without letting them pull the whole fabric about their own and other people's ears; and this calls for a toleration that is even at present rare.

Apropos of this toleration, let me quote a passage I recently came across in Bernard Shaw's preface to *St. Joan*, since it is relevant to much of my later argument: under the section-heading, "The Law of Change is the Law of God", we read, "In short, though all society is founded on intolerance, all improvement is founded on tolerance, or the recognition of the fact that the law of evolution is Ibsen's law of change. And as the law of God in any sense of the word which can now command a faith proof against

science is a law of evolution, it follows that the law of God is a law of change, and that when the churches set themselves against change, as such, they are setting themselves against the law of God."

The greatest of the last century's changes lies in the new outlook on nature and man's relation to nature—in other words, in the theology of his religion, since religion is the response of human personality to the outer universe of experience, and theology is our attempt to give an intellectual statement of that relation, and build a rational basis for our beliefs.

There have been in the past two main phases through which man has passed in regard to this question: the period of magic, fetichism, and primitive animism, and the period of theism.

In the first period, which must have started as soon as man was truly man, and began to try his reasoning powers, magic appears to have been the guiding principle of his existence.

What is magic? Anthropology studies the habits of every primitive people, and compares them with the curious survivals found in the highest civilizations. For want of a better term, the anthropologist uses magic to denote a certain set of practices which he finds in use. To be sure, they appear in a bewildering multiplicity of form, but analysis shows that all issue from a common cause—which in its turn is a particular theory of the nature of things.

Magic in its first, or fetichistic development, consists in ascribing supernatural attributes to physical objects such as stones or skulls or the skins of animals—in endowing them with a spirit-life and a share of the power which primitive man felt and feared moving in the world about him. Psychologically, the operation seems to be this.

An object arouses emotion; the primitive mind, not yet arrived at full distinction between subject and object, ascribes to the object some of the spiritual life which was manifested in the emotion. We too often do something very like this, and not only in our childhood.

Secondly, it implies the belief that by symbolic and ritual practice the powers of nature can be forced or propitiated to the fulfillment of human desires.

Both these beliefs long survived their first crude manifestations, and, with the necessary modifications, overlapped into the theistic period.

In this stage, further, men appear to have made no clear distinction between matter and spirit; they projected their own emotions into the objects which happened to arouse emotion. Religion of this type is an external thing like a patent medicine—it is, indeed, only a spiritual patent medicine. The great reform made by the Hebrew prophets was in urging the uselessness and stupidity of such a religion.

Gradually, it would seem, the Magic theory was found to be insufficient. Objects themselves came to be regarded as lifeless and passive; the spirit and the power that man felt in his confrontation of the world was taken out of objects and placed behind them, on a new plane. So was called into existence a world of spiritual beings, whose wills were supposed to control the actions of brute matter, of beasts, and of men.

This step was of profound importance, since it meant the severance of the bond in human belief between matter and arbitrary will. Two effects inevitably followed—slowly, and with pain and effort, but inevitably. On the one hand, Science was born. Matter itself became for the first time truly material. Up till then, it had been regarded as itself the seat of supernatural powers, incalculable,

irresponsible, illimitable; thus thought of as holy and mysterious, it was shielded by the powerful barriers of human emotion, by fear and longing and adoration, from any cold and dispassionate scrutiny.

But with the transfer of this supernatural power to separate supernatural beings, cold and dispassionate scrutiny of matter was no longer sacrilegious. Thus began the process which first emerged from its chrysalis in ancient Greece, as the scientific study of nature, and which in the last few centuries has trained its wings to ever greater and more astounding flights.

But as human reason worked on matter, so it could not help working on the powers which it perceived behind matter. As matter became better known, more controllable, so the spiritual beings who were thought to direct its activities were thought to be less capricious, more human, fewer in number. As human thought became more conscious of itself, as justice and pity, reason and purpose came to have more part in determining action, so, too, the nature of the imagined spiritual beings changed, and changed in the same direction.

Look at the gods of any advanced polytheistic people, such as the ancient Egyptians or Greeks. They are easily seen to be of compound nature. In part they are a deification of the powers with which the people are perpetually striving, a projection of the idea of human personality into the forces of nature; and for the rest they are a wish-fulfillment, a deification of human ideals—ideals given the victory, wishes made to come true by being given life among the gods.

Later there came a gradual unification of our ideas concerning matter. Different kinds of matter were seen to change one into the other, different kinds of energy to be

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transmutable. The conception of a uniformity of nature underlying all material phenomena came into being.

So in respect of our ideas of spirit. If all the diversity of material fact were the manifestation of a single matter, then the diverse powers seen operating through matter must be manifestations of a single spiritual being. Then, too, the unity of mind was better realized, and at the same time the units of human society enlarged. And so the little gods died or merged in new and greater—the individual fetich, the family Lares and Penates, the tribal gods like early Jehovah, the gods of place like the Roman Termini, the gods of special time or season like Adonis, of a trade like Mercury, or of one aspect of the human mind, like Pallas Athene—the splendor of all these faded, and their life was sucked out of them—into beings of greater splendor and fuller life.

Finally, in due course of time, both scientific and religious thought came to the terminus of their advance, a bound beyond which no further progress was possible without a change of fundamental idea. Science has brought us to the final uniformity of natural law, the unity of all matter and all energy: religion has brought us to the most thoroughgoing monotheism, in which not only is a single spiritual being supposed to be behind all material happenings, but all logical consequences of ascribing personality to such a being are worked out to their conclusion. And the two systems in their simple and unmodified forms are incompatible.

We stand now at the threshold of a new phase of human outlook on nature; science seemed to have brought us to a locked door, but now science herself is forging the key to that door. Let us see a little more clearly how matters stand. Physics and chemistry, as was natural, took the first

great step. Both matter and energy were found to be indestructible, and every form of either to be interchangeable with other forms. The last twenty-five years' work in physics has put the final story on the building. Matter is not only indestructible, but all of it is literally one; as all the millions of different substances are built up of a few dozen elements, so these elements are built up of units of the one pre-elemental stuff. The different elements represent essentially but so many different numerical arrangements of identical units, the electrons; and these electrons, though the basis of matter, are the basis of energy, too. And so all material phenomena come back to arrangement and movement of the eternal army of electrons. As corollary of this, scientific uniformitarianism and determinism is justified and enthroned. In the realm of matter, there is no longer room for any miracle, save for the eternal miracle of existence itself.

Then comes biology. With one gesture she links life with not-life, showing that the same matter and the same energy is in both, and in both works in the same way. With another she gives us evolution, thus linking all life in one, and further posing the question of mind's relation with life, and so with matter.

Evolution and physiology, together, extend over the whole field of life the operation of the same natural laws which physics and chemistry found for dead matter. That is not to say that no further natural laws exist in life, but that the physico-chemical laws are the same in all nature.

Subsequently the sciences of animal behavior and psychology came into being, and showed that mind, too, was a proper subject for science—with what results I shall attempt to show later.

For the present let us confine ourselves to biology. What

of ourselves does she show us in her glass? She dethrones man from an old throne, to seat him on a new. Before Copernicus, Kepler, and Galileo, our earth was the centre of the universe—or was, for us, the centre; they, and later astronomers, have made it nothing but a minor planet of a minor star in one out of a myriad cosmic systems. But man continued central. What matter if earth were but a planet? Man was still the objective of creation, the meaning of the scheme. Right up to the middle of the last century, the most eminent men of science could and did continue to discuss the properties of matter, the nature of the earth, and its animal and plant inhabitants solely from the standpoint of their utility to this egotistic human demigod.

From this self-erected pedestal he was cast down by Lyell and Darwin. They threw their searchlight into the dark places, and it was at once seen that neither the earth nor its animals and plants had been created to serve and minister to man. The oak or the vine, the dog or the horse, existed because they were fit to exist, because capable of survival; the life of each living thing was centred, though unconsciously, upon its own ends only, and the capacity to live was sufficient and sole justification for its presence on earth. Not merely this, but more: not only were they not created with human needs in view, but man came into being in a certain real sense with reference to them.

He, like all other living things, must be adapted to the world he lives in. This means that his attributes, both physical and mental, have been, and are, continually being molded to fit the world in which he lives. Thus, far from the world having been deliberately shaped to go with the character of the star actor, this actor himself owes his very nature and his part in the play to the pressure of the world and the ages of its slow, blind molding. Not only that,

but if evolution is the fact it so indubitably proclaims itself, then there is no reason to suppose that the evolutionary process has reached its limit in man—he is an unfinished as well as a one-sided being.

Here we have the principle which may be called biological relativity. Man's nature, like that of all other organisms, can be understood only in relation to the rest of his world, living and not-living; if that had been different, he would have been different. If there had been no beasts of prey, his sense of fear would have never developed as it actually did; if X-rays were not absent in nature, but had been passing through our atmosphere abundantly like light, he would have possessed sense-organs to detect them, and a skin to keep them from penetration; if sugar were poisonous, and yet as common in nature as it actually is, we should be so constructed as to find sweetness profoundly disagreeable. Bergson took the most far-reaching step in this direction when he pointed out that the very methods of our intellect, the particular ways in which our reason works, appear to have been developed in relation to the material necessities of life, to the need for controlling the behavior of separate material objects. The intuitional side of thought has had relatively little survival value in the critical early evolution of man, and remains to this day under-developed.

Meanwhile comparative psychology, studying the behavior and mind of animals, shows the line along which mental evolution has progressed. Retentiveness of memory, readiness of associations, efficiency and variety of sense-organs (the entrance channels of all knowledge), intensity of feeling and of will—all these, starting from the mechanical uniformity of response and narrowness of knowledge seen in the lowest organisms, have gradually increased. Recent work has especially emphasized one point: that

higher animals are enabled to comprehend and act intelligently when faced with situations which are too complex for lower animals. Stand in an enclosure of wire netting with the door open behind you and throw some food over the wire. If you have a dog with you, it will, after a few ineffectual attempts to get through the wire, grasp the situation and make off through the door and round. A child of eight would have gone straight round; but the average barn-door fowl will never grasp the situation as a whole, and continues to make ineffectual efforts to get through until it is tired.

What is there to prevent the evolution of a brain and mind as much more capable than ours of complex grasp as is ours than a hen's? Already in men of genius we see adumbrations of such power. Mozart, in some way as unconveyable by words to lesser minds as is sight to a blind man, tells us that he could experience the whole of one of his symphonies in one instant of time; great mathematicians often see the answer to a problem in a flash, and then have to spend days in verifying it step by step; the great mystic gathers all his knowledge and all his feeling in a point of aspiration and contemplation, and enjoys an experience unknown to smaller minds.

Man thus becomes a product of the evolutionary mill like any other. Like the snail or the pine-tree, the tiger or the duckweed, he exists, and existence is his justification no more and no less than it is theirs. He might have been stronger, with more avenues of knowledge, or incapable of fear or anger, or endowed with a comprehension beyond that of genius; he is, in actuality, a product of his environment, and a product at a definite and not necessarily very high level of development.

And so he has been turned out of that throne. But there

is another, in which we may justly install him. The study of the actual course of evolution, as revealed in fossils, in embryos, in comparative anatomy, shows clearly enough that evolutionary change has not been completely at random, but that it has a chief direction. Through the millions of years during which life has existed on this planet, there has been an increase in certain properties of life, or, more accurately, in their maximum level. These properties are size (up to a certain limit), efficiency, complexity, harmony of parts; and on the mental side memory, power of learning, greater intensity of emotion and of will. You can sum them up under the still more general heads of greater independence, greater control, greater intensity of mental process. This increase has not been universal. Some types appear to have remained stationary, others to branch out all on the same level, others to specialize up blind alleys of complexity, others to degenerate into sedentary sloth or shapeless parasitism. But the maximum level of the qualities I have mentioned goes on increasing from epoch to epoch. The direction may appear to be reversed, the whole scheme of progress overturned, as when the marvellous great beasts of the age of reptiles were extinguished and their places taken by the early mammals, smaller and less powerful. Yet the whole mammalian plan was more advanced than the reptilian, and the temporary reverse was a necessary preface to further advance—advance which would have been impossible but for two new characters brought in by mammals, warm blood and the nourishment of the young by the mother, pre-natally in the womb, later by the mother's milk.

In spite of degeneration and temporary reversal, the advance at the highest level was continued; and it is this

evolutionary direction which we may, I think justly, call biological progress.

What is our justification? The fact that there is a direction in evolution is remarkable enough. But progress is more than direction, it is movement in the *right* direction. And we are legitimately using the word progress here, since the direction in which pre-human evolution on the whole has moved in the past is the same as that which is in our human minds when we speak of progress.

If then we look again at man in the light of this new idea of evolutionary progress, we find more reason for congratulation. Man may be a mere spurt thrown out by evolving life in its blind course, he may be only a step towards as yet undreamed-of possibilities—but whatever he be, he has one actual and tangible claim: he is the highest organism yet evolved; he stands at the present pinnacle of evolutionary progress, and his own ideas and ideals are pointing him to a path which continues in the same direction as was followed by that progress in the past.

On the other hand, if a tapeworm could discover and reflect as man does, it could not derive the same satisfaction from a knowledge of evolution. If, also, it could keep the fair-mindedness of pure reason, it would have to admit that the path which its ancestors had trodden, the gradual adaptation to a parasitic life, the loss of limbs, of eyes and ears, of digestive organs, the narrow specialization which fits it to one and only one home, one particular part of the bowels of one particular animal—it would have to admit that the direction of its evolution was definitely the reverse of that of the chief trend of life. Life was continually producing new combinations, new levels of existence were continually coming into being, and the novelty was

predominantly in one direction; but the tapeworm's movement was definitely away from this.

Even a beautifully specialized creature like a deer, a bird, or a lion would (again if it could reason!) be compelled to admit that it, too, was out of the main line. It would find that intense adaptation in one direction, at the expense of other directions, had invariably meant surrendering the possibility of advance to a new level of biological progress. Over-specialization, however beautiful and in their way perfect its results, leaves the organism, whether plant, animal, or man, in a cul-de-sac.

Thus man, in asserting biological progress and himself at the head and front of it, is not merely projecting his own ways, his own work and wishes and hopes into biology, but is finding that his wishes and ways of working are but part of something far greater than himself, which *was* æons before he ever came to the birth, and *will be* æons after he has given birth, like Chronos, to his own successor and destroyer. He and his hopes do not stand isolated, a feeble candle flickering with pathetic bravado in the midst of an appalling and alien universe, but are the culmination and condensation of a long age of travail that has gone before. Here biology becomes of profound importance to religion, for here it gives to man firm ground for his faith and tangible assurance that the belief which is in him is not vain, not mere delusion. This will be a corner-stone of any theology which attempts to take account of science.

Now let us return to the point where we left the two streams of scientific and religious development and started on our excursus into biology. Let us look at the matter from a somewhat different angle.

In the Middle Ages, European civilization had a single underlying theory of existence. It found room for all

aspects of the world, philosophical, scientific, devotional, and practical, within this one scheme; and this scheme was a particular elaboration of monotheism.

Any such universal scheme must take account of all sides of man's experience. This scheme accounted for external nature and its operations as the creation of an absolute and personal God; it satisfied man's metaphysical needs with the scholastic philosophy; it accounted for those facts and events of the human spirit which in theological terminology we call the sense of sin, conversion, the sense of grace, mystical experience, inspiration, possession, by reference to the Christian scheme of theology. The sense of sin depended on the fact of original sin, and that on the fall of man; conversion and grace were possible only as the result of the incarnation; mystical experience was a direct communion with a personal God; inspiration was a true inspiration by divine beings; possession the result of the activities of devils. The instinctive demand for justice which man feels in a world in which fairness seems often so conspicuously absent was satisfied by a system of rewards and punishments in another life. Plagues, earthquakes and other natural catastrophes were ascribed to the anger of God; the sense of the incompleteness and futility of this life, the desire for existence as such, and the inevitable longing that the partings brought about by death should not be eternal were met by the doctrine of personal immortality. The necessity which the average man feels for authoritative guidance was embodied in the Church, which claimed to be the sole true interpreter of the voice of God; the spirit of sacrifice was also catered for within the scheme by the establishment of the various religious orders; and the contrast between the violent world of secular life and the beliefs of the church could be bridged in practice by the doctrine of salvation by

faith, which made a holy death of more importance than a lawless life. In fine, every activity of man could find its place within this vast, dominant and coherent scheme, and the original basis of the scheme was the existence of a single omnipotent, personal God. This was assumed unquestioningly as the first foundation on which all the rest of the edifice was subsequently reared. It was the major premiss of the whole argument; the minor premiss was found in the nature of things as the men of that time saw and understood them; from these premisses conclusion upon conclusion directly and logically flowed.

Since that time, the advance of thought, philosophical, moral, and scientific, has necessitated a gradual but steady revision of this position. Never since the Reformation has there been that same triumphantly single and embracing outlook underlying all Western civilization.

I have not the space for detail. Everyone knows that the original Western church has split into dozens of churches, that new religions have sprung up, that free thought has gradually, in the face of persecution, won for itself the right to exist, and that an increasing number of thinking men and women are finding it impossible to adhere to any church. In every European country there are great bodies of people who are cramped and hindered either in their intellectual or their religious life or both because of the conflict between orthodox science and orthodox religion. Some gain peace of mind by shutting their eyes to the facts of science. That was the case of the great scholastic philosopher Cremonini, who, after one look through Galileo's telescope at Jupiter and his satellites, said that he would never look through it again, as it was contrary to Aristotle; so, too, of an old lady in Western America of whom a biological friend recently told me. At a scientific soiree in the local college,

one of the exhibits was a living cell under the microscope; the old lady looked, drew back, shook her head, and said: "No, Professor Smith, you may look at such things, but I prefer to stay by my Bible."

Others, accepting the commonplace view of science, can only rationalize their state of mind and lead a self-consistent life by belittling all religion. Some, like Voltaire, brand the whole of it as imposture. Others regard it as a primitive survival, or as the mere outcome of superstition; still others, as a beautiful figment of the imagination; they envy believers its enjoyment, but find that, alas, it is not for them.

Some, like Jung the psychologist, have the hardihood to say that while they personally believe religion to be only the false rationalization of primitive thought and superstition, yet they also believe that it is necessary for the bulk of humanity, and therefore encourage its practice. Such a position appears, I must confess, as a denial of any rationality or coherence in the universe, and is in the long run a counsel of despair. There are still others who try to ride two horses at once—and find that this method of locomotion is neither comfortable nor very practical. But there are many who believe in the general reasonableness of things, and to them it is certain that there must be a way out of the deadlock. It may be that it is in the long run our own reason which, so to speak, gets into phenomena—but even if this extreme view were true, our reason none the less *is* reason, and is itself a product of the order of things which it is making reasonable. To them it will seem that the time has come to examine our premisses again, and to see if a fresh start would not make it possible to reconcile the apparently irreconcilable.

The mediæval conception of the universe and man's

relation to it was based upon a theological premiss. The greatest single difference between the Middle Ages and to-day has been the rise of the scientific or naturalistic spirit, the investigation of nature as she is, in the search for the truth of phenomena, without prejudice and in the confidence that truth is the first pre-requisite for mind's right living. Should we not be justified in seeing what would happen if we took the scientific standpoint as our basis, and started on the construction of our philosophy of life from a naturalistic premiss?

What does such a premiss imply? It implies, first, that our philosophy and view of the world must be a deduction from observed facts, and that supernatural and unprovable explanations are inadmissible when natural and scientific ones are available. It must refuse to accept any theory or belief, however desirable it may seem, unless it be brought into some kind of harmony with the rest of our knowledge. It must accept the unity, the orderliness of nature, its coherence and its congruity with itself. It must "accept the universe" and not seek to live in the imagination.

What then are the bases for our naturalism? First we have the inorganic world, made intelligible to us by physics and chemistry: one matter and one energy without end. Out of the independent electrons are organized structures of a higher order, the atoms; atoms join up to inorganic molecules; and finally (so it appears is the only way in which we can fill the gaps in our knowledge of the past), from more complicated carbon-containing molecules was generated living matter. The original world-stuff thus became progressively organized on higher and higher levels of complexity, becoming capable at each level of new performances, acquiring new properties. Even the evolution of dead matter is creative in Bergson's sense. Living matter then takes

up the story, and, as we have seen, becomes organized in more and more complex and efficient forms, culminating along different lines in the ant and the bee, the giant cuttlefish, the bird, and the mammal; and the mammal takes the highest step so far taken, to culminate in man.

Consciousness *appears*, as we usually say, in higher animals. As we have seen, the easiest way to look at this problem is to think of this not as a wholly new appearance, but as an intensification of processes at work from the beginning, which were not detectible before because their intensity was too low for us to detect their effect. What is probably a real parallel is seen in the electrical properties of matter. All changes in matter, dead or alive, are accompanied by electrical change. Every time one of our muscles contracts or glands secretes, there is a minute electric discharge—but so small that it can only be detected by very delicate apparatus. But in the electric eel and a few other fish certain muscles have been charged in such a way that they can administer a really powerful electric shock. It is probably in a parallel way that we must look at the brain—as an intensifier, an organ which makes it possible for mental processes, or at least processes of the same essential nature as those which we call mental, to become intensified. Doubtless such essentially mental processes accompany all activity of dead and living matter—but at such a low intensity that they are not detected, and remain mere accidental by-products. But finally in the brain the generation of intense mental processes becomes one of the main functions of the organ; and their presence becomes of the greatest biological value to their possessor.

That is to say, our naturalistic philosophy must be monistic—it must not assert duality of matter and spirit as fundamental, but must believe in their unity as different

aspects of a something more fundamental and more single.

Professor Matthews, one of your leading biochemists, has recently voiced the same idea, which implies at the start that the purely materialist view of things is wholly false, since it leaves out of account the most essential aspect of the reality we know.

We see further, as I pointed out before, that there is a main direction in evolution, a biological progress, and that in man this progress finds its present summit.

The change from prehuman to human is comparable in its evolutionary importance to the change from not-life to life, or from the electronic to the atomic level of matter. It involves the attainment of a new level of complexity. Through this change, the world-stuff acquired new properties, new possibilities of performance. The precise method by which the change was brought about does not particularly matter to us. There can, however, be no doubt in the mind of any one who has considered the evidence, that modern man sprang from more beast-like prehistoric types; they in their turn from an organism which, though certainly not one of the existing anthropoid apes, was of a general ape-like character; this again from a type which would be classified among the old-world tailed monkeys, this from a lemur-like animal, and this from some small and primitive type of insectivorous mammal.

However, especially in this democratic age, more importance is attached to a man's performance than to his origins; and it is the results of the change which alone are of special interest to us in our present quest.

The new level on which man emerged when he ceased to be brute was characterized by the power of tool-making, of speech, of the power of framing concepts, of making use of rational thought, and, therefore, of self-conscious-

ness. Out of these original properties are automatically generated the further properties which characterize man as man. Other properties, such as gregarious instinct, maternal love, the erect posture, and so forth, are found in other creatures as well.

One of the direct consequences of the step was the creation of a set of conscious values. Animals can pursue one end in preference to another, but they apparently are incapable of framing a set of conscious values with reference to these ends. What is more, what we may call the unconscious values of the animal are supplemented in man by a whole new crop of conscious values of a different character. Through his power of framing concepts and thinking logically, man can construct so-called absolute values. Men can understand what is meant by abstract ideas such as truth, justice, love, beauty, and will regulate their lives by them.

As reason and good-will work on the problem of existence, values change, and often ideas that once seemed incompatible are later found to be mutually helpful. This is one of the greatest difficulties in the intercourse between different nations, classes, sects, and individuals—in part that the various parties have a different scale of values, in part that their values are on different levels. When this last is the case, intelligent and full intercourse is impossible—the two parties are really speaking different languages.

As further results of the change, new activities and new kinds of behavior, previously unknown in evolutionary history, are brought into being. Only among mankind, not among dogs, birds, or ants, do we find science, literature, religion, art, laws, political activity. Now, this is where many materialistically-inclined minds appear to go astray. They are willing enough to analyse those parts of human activity which allow of such analysis into a set of chemical

and physical processes; but when they are confronted with phenomena *not* analysable into physics and chemistry, they simply ignore them or attempt to explain them away. But these, just as much as the others, are phenomena. They are all part of the single reality of nature. While science was still preëminently chemical and physical science, such an attitude was more or less natural; but the rise of biology and psychology makes the position futile. The materialistic science of the latter half of the past century could be materialistic only because it was incomplete. The science of to-day must be monistic, and take the mental as well as the material properties of the world-stuff into consideration.

Science must attempt to explain the existence of scientific enquiry itself; among the raw materials of which it must take account are facts such as that men are willing to die for an idea, or to devote their lives to the pursuit of beauty. The almost universal existence of religion, in one form or another among men, is equally a fact of science with the fact that water is made of molecules each consisting of two atoms of hydrogen and one of oxygen, or that the stomach secretes a digestive juice. Our new premiss thus rejects supernaturalism and demands a naturalistic attitude towards religion.

That being so, science asks, "What then *is* religion in practice?" It examines all the religions of humanity, savage, barbaric, and civilized, and orders its results. And so we have a new branch of science—the Comparative History of Religion.

What have we gained by such a study? Some of it we have briefly touched on in the early part of this lecture. Looked at from our present standpoint, the most important fact which emerges from it is the universal or almost universal existence of a religious sentiment, or, as it is often inaccur-

ately called, a religious sense or instinct, in humanity. Viewing man biologically, as would the proverbial Martian scientist, we thus find that one of his characteristic activities is religion, in the same way as is hive-building to a bee, or contraction to a muscle. This, of course, tells us nothing of the desirability, or otherwise, of religion.

We have, however, not yet asked ourselves the question, what religion *is*, in what its essence consists. To many, the idea of a personal God is taken as being an essential part of any and every religion. Even such a capable thinker as Martineau fell into this error. Somehow or other he and others who have the same idea manage to forget the fact that Buddhism, one of the three great historic religions of the world, is in its true form (still practiced by very large numbers of people) completely atheistic. It neither denies nor affirms a god; it manages to exist and to satisfy the religious craving of its devotees without one.

The study of primitive religion has further revealed a whole level of religious thought in which no conception of God or gods existed, but where, since no clear demarcation seems to have been made between self and not-self, there was a fine confused theory of existence in which inanimate forces and human personality, matter and spirit, imagination and reality, wishes and facts were all inextricably interwoven, giving us the fetichism, animism and magic of the earliest religions.

Many and various other definitions of religion have been given. After thinking over a number of them, I tried to frame one myself, which I shall venture to quote to you because no less a personage than Dean Inge held it up as one of the best he knew. "Religion," I wrote, "religion, itself, is the reaction between man as a personality on the one side, and, on the other, all of the universe with which

he comes into contact." And I still feel that that embraces most of the facts of religion, without being too broad to admit other activities within its bounds.

Further, we can trace a higher and a lower in religion, a progress in its evolution as in other evolution. Undoubtedly, monotheism represents an advance on polytheism or fetichism; undoubtedly, the highest forms of Christianity have rid themselves of superstitions, fears, and barbaric rituals with which earlier religions have been encumbered. Undoubtedly, too, the ideas embodied in the orthodox beliefs of Christianity represent (if I may use the word *represent* in a rather special sense), the realities of actual experience very closely and often very wonderfully.

But (and you will now see why I use the word *represent*), a representation may be of various kinds. It may, for instance, be realistic like a photograph; or it may be highly symbolic, like many works of art and literature.

It is my personal belief, which I put before you for what it is worth, that the representation of religious reality given by orthodox Christianity is in many important respects only symbolic, and that that is the reason why it conflicts with modern knowledge.

In religious practice and experience the Christian churches (or some of them) are more advanced than any others. The facts of the religious life to which Christianity devotes special attention are the highest and most essential facts. The sense of sin and of atonement; communion; the fruits of meditation; the experience of conversion and of grace; the value of humility, self-sacrifice and love; the hunger and thirst after righteousness; the desire for a unified and coherent explanation of the universe in which we find ourselves—these, and many others which I could mention, are

facts of reality which must be taken into account, and taken into account especially by religion.

But the particular way in which they are accounted for, the particular forms which they are given by Christianity—these need not necessarily have more than symbolic value. That is already a great value. But we must be careful not to let the symbolism come into open conflict with hard fact—which it can only do when it believes itself also to be hard fact.

In my belief, the fundamental symbolization of Christianity is the symbolization of the forces acting in the universe as a personal, omnipotent, divine being. It is this one interpretation of reality that provides the premiss for that whole set of conclusions which are the bone of contention between Christianity and Science to-day.

If we proceed dispassionately, and in the same scientific spirit with which we analyse other phenomena, to analyse the idea of God as actually held by men of various religions at various times in the world's history, it is possible to find out what minimum and what maximum of meaning attaches to the idea of God in this, we may say, anthropological usage of the term. Let me read what I have written elsewhere on this subject.¹

We may either call the sum of the forces acting in the cosmos the manifestations of God, who in this case must be the Absolute God, and unknowable except through these manifestations, or we may confine the term God to its anthropological usage, as denoting the actual objects of human religion, in which case we must admit that the term God as understood by man is constituted by *man's idea* of the forces acting in the cosmos, so that not only are these forces involved, not only a possible Absolute God behind them, but also the organizing power of the human mind.

I wish you here to agree to my adopting the second alternative. . . . We can therefore now say that God is one, but

¹ "Essays of a Biologist," London, 1923, pp. 262-265, 283-284.

that though one, has several aspects. There is one aspect of God which is neutral to us, in a way hostile, mere Power operating in the vastness of the stellar universes, apprehended only as orderly, tending in a direction which appears to be in the long run inimical. . . . There is another aspect, which is the one seen operating in that sphere which comprises the whole of life upon this earth. . . . This aspect of God is our refuge and guarantee, for here we find our assurance that our human life is a part of a whole that is not antagonistic, but moves in the same general direction as do our history and our aims. There does exist, in Matthew Arnold's phrase, "a power, not ourselves, that makes for righteousness." And this second aspect is not wholly separate from the first, . . . for the first is its parent, physically and temporally, and the direction of biological progress is the continuation of a line of development marked out, within the opposed inorganic direction, even from the first.

Next, there is . . . the third aspect of God, which enshrines the directive forces operating in man. These directive forces are our instincts, our needs, our values, our ideals. When those are harmonized with each other and with the outer world by reason and experience, they form a power which we can see has been directive, normative in the past, and will continue to be so in the future. . . . Although in a sense this aspect is the smallest, as comprising the smallest physical field, yet in another it is the largest, since man's ideals are in themselves unlimited, non-finite. . . . This third aspect is again historically the offspring of the second, and through the second of the first. . . .

God in this sense is the universe, not as such, but so far as grasped as a whole by a mind, embodied in an idea, and in consequence capable of influencing that mind, and through it the whole course of events. . . . There exists no other meaning of the term which, on analysis, is found to convey anything scientific or comprehensible to us. We may reason that there is an Absolute [Personal] God behind the universe and our idea of it. But we have no proof of this statement, and such an Absolute God is, as Spencer pointed out, an Unknowable, and accordingly no concern of ours. That part and those aspects of the universe which have been grasped by us are proving to contain the key to many of our difficulties; meanwhile we can only be humble and admit that our idea of God, even in this restricted sense, is still extremely incomplete: and in this sense there is a God far greater than our present idea and knowledge of God, only waiting to be discovered. . . .

By organizing our knowledge of outer reality after the pattern of a personality, we make it possible for it to interpenetrate our private personality. If, therefore, we have, in any true sense of the word, "found religion," it means that we shall have so organized our minds that, for flashes at least, we attain to a sense of interpenetration with the reality around us—that reality which includes not only the celestial bodies, the rocks and waters, not only evolving life, but also other human beings, also ideas, also ideals.

This, to my mind, is what actually happens when men speak of communion with God. It is a setting, an organizing of our experiences of the universe in relation with the driving forces of our soul or mental being, so that the two are united and harmonized. There is a resolution of conflicts, an attainment of profound serenity, a conviction that the experience is of the utmost value and importance.

. . . Here we see religion in operation. It is a relating of the personality as a unit to external reality as a unit—and in a relation of harmony. First the inner structure of the mind must be organized into a harmonious unit, then our knowledge of external reality organized similarly, and finally, in religious experience, the two must be harmonized in interpenetrating union.

That is to say, it is possible to say that the term God is a term denoting the sum of the forces of the cosmos as perceived by and acting upon mind, and symbolized as a personality.

That this statement of the case should be possible and even coherent does not imply that it is true. The reality is often far more complex and far more wonderful than our human approximations. I merely speak of it as a solution, which, at my present stage of intellectual development, satisfies me and has helped me to bridge the rift between science and religion which for many years appeared unbridgeable.

In any event, what I am firmly convinced of is that the naturalistic view of religion, which has been made possible only by evolutionary biology and psychology, is right in its fundamental tenet. It assures us that religion is a natural and high function of the human mind, not something de-

pendent only on authority, or on revelation, or on ritual or propitiatory sacrifice.

I spoke in my previous lecture of health as an art like other kinds of living. Religion, too, is an art, which must be practiced vitally if it is to have the fullest meaning and value.

Too many men and women, though passively accepting the orthodox formulations of their church's creed, are still really in the magic stage as regards their religious practice. They regard religion as alchemy regarded the philosopher's stone, as something external to them, which you can obtain, and with which once obtained you can perform all sorts of miraculous tricks, such as attaining salvation at one bound, or being entitled to look down on believers in any other creeds as heathen or heretics.

Such ideas are the ideas of a savage or of an undisciplined mind which has not reached a higher level of thinking than the savage. Precisely as with health, or with love, or with the scientific spirit, religion is an active internal principle, a natural function of the living man—or it is nothing. I will read you, if I may, a couple of quotations. The first is from the pen of Söderblöm, the Archbishop of Upsala. He speaks of a certain attitude of mind towards purely intellectual negative criticism, and says: "I feel it . . . most markedly in strong young intelligences in Germany which are passing through the ordeal of starvation and humiliation. They say: 'Thanks, we have had enough of modernism. It was a helpful drug to a previous generation, agonizing under the pressure of tyrannical formulas and a Bible-worship lacking the historic view. But now we have had enough of it. We have the great epoch of historic research in Holy Writ and religions behind us. It is most interesting to know more and more of the relativities of

history in their interdependence. But our hungering soul cannot feed on them. Modernists sometimes forget that the walls, not the windows, make the building. Where in the moving phenomena of religious evolution is the rock, the Truth?' An eminent young German theologian has called that tendency: *das Heimweh nach dem Unbedingten*, the nostalgia after the unconditioned. I am persuaded that metaphysics and systematic construction will occupy in the next generation of religious research the same dominating place that historical investigation has had in our times."¹

In fact he implies that future work will be chiefly devoted to a search for the underlying basis of religious experience, and a definite attempt at new positive construction on that foundation.

Let me read you a quotation from that sane and sage spirit, Havelock Ellis²:

"How is Religion still possible?" This question is posed by so able a thinker as Dr. Merz as the question of paramount importance, and he can find only a paradoxical answer.

It is a question which still seems to be taken seriously by many otherwise intelligent persons who are thereby stranded in the end on all sorts of hidden sandbanks. They do not ask: How is Walking still possible? They do not ask: How is Hunger still possible? Yet it is really the same kind of question.

It is always marvelous to find how people worry themselves over unnecessary problems and spin the most fantastic webs of abstruse speculation around even the simplest things. Religion, if it is anything at all, must be a natural organic function, like walking, like eating, better still, one may say, like loving. For the closest analogy, and indeed real relationship, of religion, is with the function of reproduction and the emotions of sex. The functions of walking and eating are more or less necessary to life in their rhythmic recurrence, and it is legitimate in their absence to endeavor to stimulate them into action. But the function of religion, like that of love, is not

¹ *The Forum*, 1924, p. 334.

² *Ibid.*, pp. 324-5.

necessary to life, nor may it with any certainty be stimulated into activity. Need it? These functions are either working within you or they are not. If not, then it is clear that your organism is in no need of them at the present moment, and perhaps is born without the aptitude to experience them. And if so, there are those who will tell you that you represent a superior type of humanity. Therefore whether if not so, or whether so, why worry?

I do not, indeed, myself think that the inaptitude for the function of religion—ancient as the religious emotions are,—represents a higher stage of development. But I am sure that either the function is there or it is not there, and that no intellectual speculations will take its place or hasten its manifestation. Religion, like love, develops and harmonizes our rarest and most extravagant emotions. It exalts us above the commonplace routine of our daily life, and it makes us supreme over the world. But, like love also, it is a little ridiculous to those who are unable to experience it. And since they can survive quite well without experiencing it, let them be thankful, as we also are thankful.

If we are conditioned beings, produced by an evolution which has always been related to the world around, one-sided, unfinished—and this is the humility which biology enjoins—we cannot afford to be intolerant, for such presumption becomes ridiculous.

Furthermore, our toleration must not be merely passive, a tired intellectual gesture; it must be active, springing from the belief and knowledge that truth is too large to be revealed in but one form, or one creed, or one way of life.

We must really accept the hard saying that out of diversity alone comes advance, and that any one human mind is too small to grasp more than a little truth, to live more than a little reality.

Listen to one more quotation from Havelock Ellis: "The diversity of the world, therefore, is natural. Yet not less natural is this inability to accept its own diversity. It is by limitation,—the limitation which all art involves,—that Nature becomes diverse, fantastic, seemingly artificial. It

is by that same limitation that these diverse forms cannot accept each other. I recall the critical, disdainful gaze of a small terrier as he stood still to watch a great goose pass by. Let us, therefore, accept with joy the diversity of the world, and with equal joy its inability to accept its own diversity. For that also is delightful.”¹

I must close, and I will do so by affirming another belief which I hold tenaciously. It is that only by having some ground-work of common belief, will it be possible for humanity to set out with a happy prospect of success upon the problems which press on it from every side. There is, at present, not only a conflict between the beliefs of orthodox science and orthodox religion, but also between those of nationalism and internationalism, and of materialism and idealism. Yet a common underlying basis would help solve all the antitheses.

It is possible for such a common basis to be attained: it is only possible for it to be attained by utilizing every source of knowledge and feeling: and it will, I believe, be found that biology has made some of the most important contributions on the intellectual side towards the construction of such a basis.

JULIAN S. HUXLEY.

¹ *Ibid.*, p. 326.



