

AN ESSAY ON RELIGION, DEATH, AND  
EVOLUTIONARY ADAPTATION*by Theodosius Dobzhansky*

Religion is one of the cultural universals of mankind. The universality of religion shows clearly enough that religion satisfies some deep-seated and vital need of the human psyche. Émile Durkheim, one of the greatest students of comparative religion, maintains that "It is inadmissible that systems of ideas like religions, which have held so considerable a place in history, and from which, in all times, men have come to receive the energy which they must have to live, should be made up of a tissue of illusions. How could a vain fantasy have been able to fashion the human consciousness so strongly and so durably? Surely it ought to be a principle of the science of religions that religion expresses nothing which does not exist in nature; for there are sciences only of natural phenomena." An evolutionary biologist is driven by such statements to enter the ground "which angels fear to tread"—what are the evolutionary origins of this need so obviously inherent in human nature?

The philosopher Whitehead (1941) said that the lives of individuals may seem to be "passing whiffs of insignificance." Hartshorne (1962, 1963), another philosopher, describes religion as "man's accept-

Theodosius Dobzhansky is professor of genetics at Rockefeller University. This paper was presented to our 1964 summer conference of the Institute on Religion in an Age of Science. Under a different title it appeared in *Context and Meaning in Cultural Anthropology*, ed. M. E. Spiro (New York: Free Press, 1965). It is reprinted here with permission.

## ZYGON

ance of his own fragmentariness." Man overcomes his transience and insignificance by becoming, at least in his imagination, a part of some sublime and eternal life. The anthropologist Malinowski has stated this very clearly: "The existence of strong personal attachments and the fact of death, which of all human events is the most upsetting and disorganizing to man's calculations, are perhaps the main sources of religious belief. The affirmation that death is not real, that man has a soul and that this is immortal, arises out of a deep need to deny personal destruction, a need which is not a psychological instinct but is determined by culture, by co-operation, and by the growth of human sentiments."

Is, then, an individual's life something more than a "passing whiff of insignificance"? May it have some meaning? There will never be a convincing, definitive, doubt-proof answer to this question. An influential school of philosophy cheerfully proclaims that the question is meaningless. People nevertheless persist in asking this question. I agree with Crane Brinton that to urge them to stop doing so is as pointless as to ask them to do without sex relations.

### WHERE BIOLOGY MAY HELP

It can be neither proven scientifically nor rigorously ruled out that man's existence, or the existence of the world in which he lives, is either meaningful or meaningless. Biology and science as a whole are not asking any such questions. Scientific hypotheses must be submitted to tests before they can be accepted or rejected. There is simply no way to put to a test the hypothesis that the world is or is not meaningful. Should a biologist at this point declare: "Full stop"? I do not think so. As scientists, we are constrained to inquire how and why it came about that man, individually and collectively, persists in asking questions about the meaning of things. It is a most extraordinary fact that one of the at least two million existing biological species, a peculiarly made-over ape called "mankind," has started to ponder such difficult and perhaps insoluble problems. This fact does fall within the province of evolutionary biology and anthropology. The present essay is a tentative attempt to examine the evolutionary implications of this fact.

Whether religion can be regarded as an evolutionary adaptation is a meaningful problem. Its solution is to be sought in the consequences of man's refusal to accept "his own fragmentariness." A refusal constitutes a rebellion against life, which invites a biological, as well as a spiritual, disaster. An analysis, unexcelled in the world literatures, of the outcome of such a rebellion is that given by Dostoevsky in *The*

*Possessed.* Kirillov, the rebel, can find no sense or meaning in the world he knows. The world is only "a devil's vaudeville." And yet, in the midst of this world, there is a being, Kirillov, who understands that the world is senseless. And he realizes that he happens to be, without his consent, placed in the role of an actor in this "devil's vaudeville." There is no escape other than self-destruction. A freely arrived at decision to commit suicide is the only road Kirillov sees toward assertion of his "new awesome freedom." He not only kills himself, but does this in a way which assists a bunch of scoundrels to perpetrate the crime of killing another person whom Kirillov pities and respects. But why worry, if we are caught in a devil's vaudeville anyway!

The adaptive function of religion has been described very aptly by Feibleman (1963), a psychiatrist with a philosophical bent. In his words: "Theologies are qualitative response systems which promise survival. Irrespective of their truth or falsity (and since they conflict, no more than one of them can be true), the overwhelming statistics as to their prevalence indicates that they are necessary for some need-reduction in the human individual. The need is, of course, the need for survival, for ultimate security, for the escape from the pain of death. The human individual knows that he must die, but has thoughts larger than his fate. . . . Religion is an effort to be included in some domain larger and more permanent than mere existence." The inclusion does not necessarily imply a belief in a personal immortality. This is most obvious in Buddhism, which regards the release from the cycle of rebirths, that is, from the incarnations and reincarnations, the greatest spiritual achievement open to man. A person's individual existence may then be ephemeral; what really matters is that this existence is believed to be a part of something that endures eternally. Emotional responses elicited by hopes of participation in a life everlasting are sometimes strong enough to overcome the fear of death itself.

Socrates maintained that "True philosophers are ever studying death." It is debatable whether this is, or was, true of all philosophers or only of the "true" ones. There is, however, no question that every human being, above the idiot level and over the age of childhood, knows that death is sooner or later inevitable. Man lives in the awareness of the certitude of death. Some people contemplate the prospect with a composure mixed with awe, others with fear and dread. A coolly rational acceptance is feigned more often than achieved. Tolstoy, in one of his stories, has a poignant description of a person's predicament in the face of death. A man begins to realize that his death is near. He tries to be sensible about it; he recalls an example of syllogism in a

## ZYGON

textbook of logic: "All men are mortal; Gaius is a man; Gaius must die." Suddenly he recoils from this logic: "What does all this have to do with me, I am not Gaius."

### THE SPECIAL PLACE OF MAN

Living creatures other than man are also mortal. Man is, however, unique in knowing that he will die. This is difficult to prove rigorously, especially since philosophers like Whitehead and Hartshorne, and biologists like Rensch (1959), argue that everything, down to atoms, contains some spark of life, spontaneity, and freedom. It may just as well be imagined that all animals, and even all organisms, have a trace of some kind, however faint, of a foreboding of death. I fail to see any basis, or any advantage, in such a speculation. However that may be, this much can hardly be questioned—man's awareness of the inevitability of death is uniquely and unambiguously clear.

Most informed people now accept, albeit not a few of them a bit grudgingly, the story of the evolutionary origin of mankind from animal ancestors. There is nevertheless some hedging on the part of certain theologians and philosophers. Man's body is a product of evolution, but evolution has allegedly nothing to say about the essential human nature, sometimes designated the "humanum." Man's awareness of his transience, with all the intellectual and spiritual consequences of this awareness, unquestionably belongs to his "humanum." The evolutionary origins of this awareness are indeed a difficult and strongly challenging problem. I believe that this problem nevertheless does fall within the competence of the evolution theory.

Mankind, the human species, has evolved from ancestors that were not human. A being who knows that he will die thus arose from ancestors who did not know this. The appearance of this new kind of being was an evolutionary event, certainly unprecedented on earth, possibly and even probably unprecedented in the cosmos. Where, when, and how this event took place is conjectural. This may never be known, since human thoughts are not preserved in fossil condition. Fortunately, some of the products of these thoughts are preserved, and from them the nature of the thoughts may with some plausibility be inferred. Only man buries his dead, and a burial is a sign of some reverence for death which can hardly be felt by anyone who does not know that he too will die. There are some hints of concern with death in humans as ancient as Peking Man, a representative of the species *Homo erectus*, presumed to be ancestral to *Homo sapiens*. With the Neanderthal race of *Homo sapiens*, the evidence becomes unambiguous. Vener-

ation or fear of the dead is, of course, common if not universal among primitive peoples, and the remains of ancient civilizations are mute testimony of a great intensity of these emotions.

It is not likely that an awareness of one's mortality would be a help, and a lack of such awareness a hindrance, to the so-called instinct of self-preservation. This is a misleading designation anyway, since there is no such "instinct." True enough, all organisms, from the highest to the lowest, react to some stimuli of their environments in ways which tend to maximize the chances of their survival, either as individuals, or as species, or (usually) both. The reactions are, however, not automatically and unconditionally beneficial; the organism does not always "know" what is good for it. By no means do all environmental agents elicit objectively beneficial reactions. It is chiefly environments which the species had encountered regularly and frequently in its evolutionary history that evoke beneficial reactions (termed "modifications" by Schmalhausen [1949]). Reactions to novel or unusual environments are far from always beneficial. Examples of unadaptive responses (Schmalhausen's "morphoses") are not difficult to find. Moths are attracted to bright lights, where many of them burn to death. The tanning of the human skin by sunlight is an adaptive modification, but X-rays may cause morphoses—burns and cancers. The beneficial reactions obviously do not result from an instinct which "knows" what is or is not useful for preservation of health and of life; such reactions are built into the genes by natural selection in the evolutionary past of the species.

Attempts to understand the origin of the death-awareness by itself are futile; considered in isolation from other human attributes, its origin in human evolution is inexplicable. Evolutionary changes are shaped by natural selection in response to the challenges of the environments in which the species lives. Changes induced by natural selection are adaptive, at least in the environments which prevail where and when they are selected. In short, they are selected because they are adaptive. An ability to recognize the approach of a danger is evidently useful if one can do something to avoid that danger. If such an ability is even in part genetically conditioned, natural selection promotes its development. But what is the advantage of knowing that death is inevitable?

An escape from the impasse may be found if the death-awareness could be shown to have been a by-product of some other evolutionary change directly advantageous to the species. The hypothesis to be considered is that the death-awareness is a sequel to self-awareness. That

## ZYGON

self-awareness is adaptive in man is fairly obvious. The argument in favor of this view has been stated most clearly by Hallowell: ". . . psychological functioning at a level of self-awareness is as important for rational personal adjustment as it is for the functioning of sociocultural systems." Only after having developed the ability to see himself as an object among other objects, did man gain a perspective in which he could begin to understand the relations between processes and events, including the consequences of his own actions. Some understanding of these relations is obviously indispensable for survival in human environments at even the most primitive cultural levels. A concomitant of self-awareness is, however, death-awareness. The adaptive value of death-awareness was at best doubtful, at least until man had reached the stage when a parent could begin making provisions for the maintenance of his progeny in anticipation of his own demise.

The reasons why useless and even harmful traits can become established in evolution controlled by natural selection must be made unambiguously clear. First of all, let it be understood that a "trait" is not a genetic or a biological unit but, rather, a semantic device. An organism is not an aggregate of independent traits; we make it seem to be such an aggregate when we describe it in words. The height, and weight, and color are not entities separable from the body which is measured or weighed or viewed. Apart from semantics, different "traits" have to be distinguished because different operations are performed to investigate them; the trait "head length" is measured with a pair of calipers, while the "blood group" is discovered by observing the agglutination of erythrocytes. Moreover, there is no one-to-one correspondence between a gene and a trait; expressions like "the gene for eye color" are metaphors. And finally, natural selection does not select, eliminate, or promote separate genes; it does not even select genotypes; it operates only when individuals which carry certain genotypes survive more often and leave on the average more progeny than do carriers of other genotypes.

### THE MEANINGS OF FITNESS

No genetic endowment is best in all environments. The Darwinian fitness is not an intrinsic property of a genotype; it is contingent on the environment in which the carrier of a genotype happens to live. A genotype may confer a high adaptive value on its carriers if it gives them some important advantage in some respect. What must be stressed here is that such an advantage may compensate for one or several minor disadvantages. Probably no organism is ideal in all respects, and

it remains alive because its weaknesses are compensated for by its strong points. As an example of such a compensation, consider the grossest unadaptive feature of human physiology: the difficult childbirth. How could such a biological absurdity have become established in human evolution? It certainly could not possibly have been selected by itself, on its own merits. Difficult childbirth appears, however, to be a concomitant of the erect body posture. The erect body posture is, in man, an obviously adaptive feature; it has permitted the development of hands capable of handling tools and performing operations which would be, at the least, difficult for appendages used also for walking. Women suffer childbirth pains because they (and also men) are bipeds instead of quadrupeds.

According to Hallowell (1953), "A human social order implies a mode of existence that has meaning for the individual at the level of self-awareness. A human social order, for example, is always a moral order. If the individual did not have the capacity for identifying the conduct that is his own and, through self-reflection, appraising it with reference to values and social sanctions, how would a moral order function in human terms?" Since man controls his environment by means of his social and moral order, and since self-awareness is a key, or even *the* key, to his social and moral order, it follows that the self-awareness, or rather its genetic basis, is a product of adaptive evolution. A by-product of the self-awareness is, however, the death-awareness. Man has discovered his transitoriness and mortality, and he had to learn to live with the consequences of his discovery. He strove to do so presumably ever since he became recognizably human but never fully succeeded. Is this what Socrates meant by his assertion that philosophers "are ever studying death"? Man's struggles with his death-awareness belong, of course, to the cultural rather than to the biological level of existence. Cultural events have, however, biological consequences, and vice versa. Some of the consequences of the death-awareness are biologically adaptive and others unadaptive. Quite certainly, they are important to man.

Since man knows that he is mortal, the strategy of "eat, drink, and be merry, for tomorrow we die" seems to be the simplest to adopt, and therefore a most popular solution. Unfortunately, this is a meretricious and illusory solution. It does not make it easy to accept the certitude that the eating, drinking, and merriment will presently end. World literatures are forever busy with this vexing problem. Existentialists of all varieties, from Kierkegaard to Sartre, have made the human anxiety in the face of the problem of death the keystone of their philos-

## ZYGON

ophies. This anxiety is probably species-wide in man, although its pitch varies greatly. It intrudes upon the consciousness more when the primary needs for food, drink, sex, and safety are satisfied than when they are not. It is stronger in those whose hold on life is weak than in those more secure, higher among the unwell than among the healthy. There probably exist also constitutional, very likely genetically conditioned, differences among people which make them more or less anxiety-prone.

### ANXIETY AND LOVE

The problems of anxiety have received a great deal of attention by psychoanalysts, from Freud to the present day. Erich Fromm (1959) has expressed some ideas, the implications of which are particularly interesting to a biological evolutionist. Man is a being which "Even if all his physiological needs were satisfied, . . . would experience his state of aloneness and individuation as a prison from which he had to break out in order to retain his sanity." People consequently strive for a union with, and for relatedness to, other human beings. A union may, according to Fromm, be sought by submission to others, or by domination, or finally by love of others. The first two methods are misguided because only "In an act of loving, I am one with all, and yet I am myself, a unique, separate, limited, mortal human being. Indeed, out of the very polarity between separateness and union, love is born and re-born." If Fromm's view is valid, then it would seem to follow that a biologically unadaptive trait (anxiety-proneness), which is itself a by-product of an adaptive one (self-awareness), rebounds to yield another highly adaptive one (love).

Love and devotion to one's progeny is easiest to understand, introspectively as well as biologically. Though an individual's life is transitory, yet he may hope that a trace of himself will somehow be perpetuated in his children, and the children's children, and so perhaps forever. Parental care is, of course, by no means limited to man, but only in man is the relatively weak instinctual component reinforced by striving for the relatedness and love; and only in man is the parental devotion liable to produce a disappointment, a parent finding in his children alienation and rejection instead of continuity and love. It is also true that self-sacrifice by the parents on behalf of their progeny is not unknown among animals, including insects. In some species of birds and mammals, an individual may place itself in a position of danger from an enemy's attack, shielding from peril the young who may or may not be the defender's progeny. Whether this objectively



self-sacrificing behavior is comparable to human altruism is quite another problem. It is likely that the genetic endowment of the human species is a necessary (though certainly not sufficient) condition for the manifestation of altruism.

Identification can be established with groups larger, and presumably more enduring, than one's offspring and one's family. A clan, a tribe, a nation, and finally mankind as a whole may abide much beyond the span of an individual's life, even unto eternity. Hopefully, so may an enterprise, such as science or art; a movement such as a church or a sect; and an institution, such as a political party or a community. Time after time, people have shown themselves to be willing to sacrifice their lives for real or imaginary benefits of groups or "causes" which continue to exist when the person who sacrifices himself is dead.

The human ability to acquire identification with groups, movements, and institutions evidently confers a cohesion upon the latter. The importance of this cohesion in human cultural evolution is difficult to exaggerate. It makes human history different from biological history. In man, the group cohesion is predicated upon his self-awareness. It is, therefore, different from the cohesion of a herd, a flock, or an anthill, which stems from instincts handed down through the genes. This enhances greatly the biological adaptive value of self-awareness as a human genetically conditioned trait. Whatever might have been the adaptive significance of self-awareness when it first arose in man's evolution, it became vital with the development of human social organization to which the self-awareness is the key.

Social cohesion based on self-awareness suffers, however, from a weakness from which the instinctual cohesion of the anthill is free. No institution and no enterprise has an obvious and unconditional meaning or utility not subject to doubts and misgivings. Identification with groups or enterprises which endure beyond an individual's lifetime does not confer upon this life a value that cannot be called in question. Everything may be only "vanity and a striving after wind," everything including the universe itself. And it is science that is alleged to have suggested, or even demonstrated, the meaninglessness of everything. Is this allegation warranted?

#### THE IMPACT OF SCIENCE

It cannot be gainsaid that science has made necessary serious alterations in the world image inherited by Western civilization from its more ancient predecessors. Nor can it be denied that the prescientific world view was in some ways more comfortable and snug than is our

## ZYGON

present one. God was believed to have created the world as recently as some six thousand years ago and, moreover, to have created it expressly for man to live in and to enjoy. Even though man misbehaved and was banished from God's proximity, God has lost interest neither in mankind nor in each individual person. He watches every one of us constantly from his dwelling somewhere above the clouds. He is open to our prayers and entreaties.

The scientific image is cold and detached. In expanding the world immeasurably, science has seemingly deflated man. After Copernicus, it appears ludicrous to suppose that the vastness of the cosmic spaces was devised for man, even if he becomes a cosmonaut. Darwin allegedly completed what Copernicus and Newton had begun. Instead of having been created in God's image, man has only recently departed from a monkey's image. Instead of a pre-established moral order, science can see in the world, and even in living bodies, an only slightly mitigated molecular disorder. Freud has attempted to give a coup de grâce to man's self-exaltation; far from being good by nature, we are bundles of subconscious strivings, mostly of rather contemptible sorts, kept in check only with difficulty by something called the "superego." Is it, then, not ridiculous to presume that the God of a universe billions of light years across may set some store by the doings of a human person, an evanescent speck on the surface of a minor planet whirling around a second-rate sun? Has science added to our self-awareness, first a death-awareness and then an awareness of being unwilling actors in the Dostoevskian "devil's vaudeville"?

The above "scientific" world image is neither as full nor as compelling as we have been assured by some writers that it is. It overlooks the most essential contribution to human thought made by Darwin and by the evolutionists who followed him. Whatever else the world in which we live may be, it is certainly not an unchanging world. It is an evolving world. Regardless of what man's ancestors were, and regardless of whether the present state of mankind is or is not satisfactory, man is not unalterable. This is what makes the Darwinian world so completely different from the Newtonian world. The world of Newton was a marvelously well-ordered high-precision mechanism. It did not, however, have either much of a past or, presumably, much of a future. Its very perfection precluded improvement with time. Darwin's world is the antithesis of stability. Even the billiard ball-like atoms of classical physics have been split and shown to have arisen in a process of cosmic evolution. Life is a relative newcomer; it arose on earth some two or three billion years ago, and the existing living creatures are very dif-

ferent from their ancestors. Man, with his consciousness, self-awareness, and death-awareness, is a much more recent arrival, his period of existence being a mere flash on a cosmic time scale.

The Darwinian world is on the move. Whither is it going? Where will it be when we are no longer here? These are questions to which there may possibly never be clear and incontrovertible answers. And yet seek for answers we must, even in the face of the admonitions that the questions may be meaningless. This is, indeed, man's "ultimate concern," which cannot be abandoned unless we have lost interest in our own existence. A gallant attempt to outline a new set of answers to these questions has been made in the works of Teilhard de Chardin.

#### THE CONTRIBUTION OF TEILHARD DE CHARDIN

Teilhard's (1959) views must be considered here, of necessity very briefly, because they bear on almost every issue alluded to in the present essay. Teilhard was a thoroughgoing evolutionist; he regarded biological evolution as a prolongation of the cosmic, and human cultural and spiritual evolution as a prolongation of the biological. The whole universe is, to him, one vast evolving system, in which the human species is the main growing point. Hallowell (1960) has described man's distinctive character as follows: "Man, unlike his animal kin, acts in a universe that he has discovered and made intelligible to himself as an organism not only capable of consciousness but also of self-consciousness and reflective thought." Teilhard expressed himself in almost identical words. But he goes much beyond this; to him, man not merely accepts but overcomes his fragmentariness when he realizes that his individual existence is a part of an existence more enduring. The destiny of man is to be the leading part of the progressive evolution of his species, the living world, and the cosmos.

Teilhard's writings have met with a mixed reception, ranging from hero worship to outright hostility. The nature of his work and his message is frequently misunderstood. Strange to say, it was misunderstood by Teilhard himself, who begins the Preface to his *The Phenomenon of Man* (1959) by the following statement: "If this book is to be properly understood, it must be read not as a work on metaphysics, still less as a sort of theological essay, but purely and simply as a scientific treatise." How completely erroneous is this bidding is shown by the other writings of Teilhard, which expound much the same doctrine as *The Phenomenon of Man* and make no claim of being science pure and simple. Teilhard's self-deception proves only how difficult it is to

## ZYGON

keep one's mind divided in compartments, the contents of which are not allowed to contaminate one another.

Teilhard was a Christian mystic as well as a scientist. His insights were those of a man trying to assimilate the discoveries of science into his mystical vision of the dazzling and formidable universe, not to build a scientific substitute for his vision. He often tries to speak about the ineffable. This can be attempted only by means of poetic imagery, if it can be done at all; poetic imagery does not, however, fare well if it is mistaken for a scientific discourse. And yet not all scientists despise poetry, or succeed in keeping it wholly separate from their science. The interest and significance of Teilhard's thinking lie precisely in the synthesis which he was able to achieve. Some scientists, for example, Julian Huxley (1959), have claimed the ability to state Teilhard's doctrine in purely scientific terms (or even to have discovered it before Teilhard). The result can most charitably be compared to a *Hamlet* without the prince.

Teilhard's synthesis does not have the force of a scientific demonstration; in this respect it is not at all comparable to Darwin's work, as some of Teilhard's overenthusiastic followers are ready to claim. The intellectual grandeur of this synthesis may, however, be recognized even by those who are not fully convinced by it. Teilhard sees the universe as a product of evolution and an evolving whole. The center of his doctrine is that evolution has a discernible direction or trend. It is a struggle between "the unified Multiple and the unorganized Multitude." And: "Man, the center of perspective, is at the same time the center of construction of the Universe. And by expediency no less than by necessity, all science must be referred back to him." The whole evolution is seen as a continuous progression, or an ascent, from atoms, to atomic compounds, to mega-molecules, to living organisms of increasing complexity, to differentiation of nervous systems, to the origin and growth of consciousness, to formation of the noosphere (the "thinking layer"), to "a harmonied collectivity of consciousnesses equivalent to a sort of super-consciousness," to an eventual confluence in the Point Omega, which is Teilhard's symbol for God.

Teilhard's evolutionism is cosmic and at the same time frankly anthropocentric. He has stated this splendidly: "Man is not the center of the Universe as we naively believed, but something much more beautiful, Man the ascending arrow of the great biological synthesis. Man alone constitutes the last-born, the freshest, the most complex, the most subtle of the successive layers of life." The immensity of the universe does not contradict the evolutionary centrality of man. The evolution-

ary process has a destination in the Point Omega, and man is its greatest achievement so far. An individual man passes; mankind, however, not only abides but forges ahead; mankind is not merely one of the many independent and equivalent evolutionary lineages but the vanguard of the evolution of the cosmos.

The evolutionary vision of Teilhard is not derived from biology or from science, but it includes science as a component part. It is a vision of a religious mystic, but of a mystic not only familiar with the evolutionary doctrine but one to whom this doctrine is of paramount importance, as shown clearly by the following statement: "Is evolution a theory, a system, or a hypothesis? It is much more—it is a general postulate to which all theories, all hypotheses, all systems must henceforward bow and which they must satisfy in order to be thinkable and true." This situation is frequently misunderstood by Teilhard's proponents and by his opponents. The proponents like to think that, since Teilhard was a scientist, he was able to give a scientific demonstration of his mystical vision, and Teilhard's above-quoted Preface to his great book seems to show that, at least for a moment, he himself nurtured such an illusion. The opponents (among whom G. G. Simpson [1964] has given the best reasoned critique) rightly point out that the vision does not necessarily follow from the scientific evidence.

I think that the proponents and the opponents are equally in error because they mistake a part for the whole. The greatest interest of Teilhard's work is that it represents a synthesis of science, metaphysics, and theology; this synthesis is stated, as such a synthesis can only be stated, in a language of poetic inspiration. Now, the validity of a synthesis depends on that of every one of its components, although the components do not necessarily validate or invalidate each other. Teilhard's synthesis need not be taken for a completed structure; on the contrary, it doubtless should and will be revised and improved as the different branches of human thought which have contributed to its construction achieve improved knowledge and insight.

From the biological side, such a revision is patently necessary; Teilhard was insufficiently familiar with the theories of biological evolution which were current when he was writing his works, not to speak of the changes since then. It would be out of place in the present article to enter upon technical biological criticism of Teilhard's works. One point must, however, be mentioned at least briefly, since it may cast Teilhard's thought in a wrong perspective. Teilhard lays great stress on the evolutionary history of the universe being a directional process. This is, indeed, the key postulate in his synthesis. To him, the direc-

tionality is evident in the cosmic (inorganic), in biological, cultural, and spiritual evolution. This directionality he repeatedly calls "orthogenesis." Now, orthogenesis is a technical term in biology. It signifies that the evolution is impelled by internal forces residing in the organism itself, rather than by natural selection which is a challenge-response mechanism involving interaction between the organism and its environment. Orthogenesis is a unilinear evolution, unfolding or unveiling something that has been preformed and preordained. Orthogenesis may be interpreted mechanistically, but more often it has been conceived as involving some transcendental, spiritual, or divine guidance.

Orthogenesis never was more than a minority opinion among biologists, and at present its adherents are not at all numerous. Of course, majorities are not always right; but what is more relevant here is that the notion of orthogenesis is so clearly uncongenial to the general tenor of Teilhard's system of views that one cannot help wondering whether the author himself realized its implications. Orthogenetic evolution is, in the last analysis, a spurious evolution; nothing genuinely new is permitted to arise, and no room is left for creativity or freedom. Orthogenesis envisages the evolution of the living world as something like the operation of a music box, the spring of which was wound up at some time in the past, and which gradually sends forth the program stored in it.

Evolution can well be directional without being orthogenetic. That biological evolution does have a discernible over-all trend or direction is substantiated by evidence; the evidence comes mainly from paleontology, the discipline with which Teilhard was personally most familiar. The trend has been, without doubt, on the whole progressive. Although a satisfactory definition of what constitutes progress in biological evolution has never been formulated, it is a fact that the most ancient organisms were less complex, and especially that they had much less developed nervous systems than the more recent organisms, especially the vertebrates. Man is, on the geological time scale, a very recent arrival indeed. The noosphere is accordingly more recent than the biosphere.

Orthogenesis is a possible, but neither a necessary nor even a very plausible, explanation of the progressive trend observed in the history of the biosphere, culminating in the emergence of the noosphere. The explanation preferred by most evolutionists is philosophically more interesting as well as more in accord with the spirit of the Teilhardian system. Its main advantage is, of course, that it is well supported by the evidence accumulated in biology and paleontology. Very briefly, it is held that living species respond to challenges of their environ-

ments by adaptive alterations; these responses, mediated by natural selection, are the building blocks of the evolutionary changes. Adaptation and progress are not predestined and not automatic; they have to be struggled for. The struggle leads often, but not always, to success; however, the evolution is sometimes regressive. Adaptive changes may be opportunistic, making the organism highly fit in environments which are only temporary. Such changes may cut off the ability of the organism to respond to further environmental challenges and thus result in extinctions. A living species may be described, somewhat metaphorically, as groping for ways to widen and improve its hold on its environment. It may "discover" new and advantageous paths, but it may also become stranded in blind alleys.

The universe is an evolving product of an evolutionary process. It is not an accident; it is an enterprise. Life has an important place in this enterprise; it is, in Teilhard's words, "the spearhead of evolution." Mankind is the spearhead of life, because it is the product of evolution which is becoming conscious of its role in evolution. Again in Teilhard's words: "Mankind as an organic and organized whole possesses a future: a future consisting not merely of successive years but of higher states to be achieved by struggle. Not merely survival, let us be clear, but some form of higher life or super-life." An individual human is conscious of his own fragmentariness. However, it is up to him, to some extent at least, to make his existence something more than a "passing whiff of insignificance." He can, if he so chooses, contribute toward the achievement of a higher life for himself and for the world of which he is a part.

#### REFERENCES

- Feibleman, J. R. *Mankind Behaving*. Springfield, Ill.: Charles C Thomas, 1963.
- Fromm, E. "Value, Psychology, and Human Existence," *New Knowledge of Human Values*. Edited by A. H. Maslow. New York: Harper & Bros., 1959.
- Hallowell, A. I. "Culture, Personality, and Society," *Anthropology Today*. Edited by A. L. Kroeber. Chicago: University of Chicago Press, 1953.
- . "Self, Society, and Culture in Phylogenetic Perspective," *Evolution after Darwin*, Vol. II. Edited by Sol Tax. Chicago: University of Chicago Press, 1960.
- Hartshorne, C. "Man's Fragmentariness." Virginia Wesleyan College Lecture, 1962
- . "Real Possibility," *Journal of Philosophy*, LX (1963), 593-605.
- Huxley, J. Introduction to P. Teilhard de Chardin's *The Phenomenon of Man*. New York: Harper & Bros., 1959.
- Rensch, B. *Evolution above the Species Level*. New York: Columbia University Press, 1959.
- Schmalhausen, I. I. *Factors of Evolution*. Philadelphia: Blakiston Co., 1949.
- Simpson, G. G. *This View of Life*. New York: Harcourt, Brace & World, 1964.
- Teilhard de Chardin, P. *The Phenomenon of Man*. New York: Harper & Bros., 1959.
- Whitehead, A. N. "Immortality," *The Philosophy of Alfred North Whitehead*. Edited by P. A. Schilpp. New York: Library of Living Philosophers, 1941.