



**PERSPECTIVES
IN HUMANISM**
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**THE BIOLOGY
OF ULTIMATE
CONCERN**

**THEODOSIUS
DOBZHANSKY**

A MERIDIAN BOOK

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RUTH NANDA ANSHEN

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Ethical, ideological, and philosophical implications of evolution have been considered by many thinkers. Suffice it to mention Herbert Spencer, T. H. Huxley, Julian Huxley, and C. H. Waddington in England; John Dewey and G. G. Simpson in the United States; E. Haeckel, M. Hartmann and B. Rensch in Germany; and H. Bergson in France. It remained, however, for the inspired seer, P. Teilhard de Chardin, a French Jesuit and a paleontologist, to relate evolution to the ultimate concern, and to sketch a synthesis in which evolution is "a light illuminating all facts."

Teilhard's works have evoked enthusiastic praise as well as harsh, and even vitriolic, criticism. Scientists distrust theologians dabbling in science, just as theologians distrust scientists barging into theology. Teilhard was, however, both a scientist and a theologian. Some of his overzealous followers claim that his work is equal in importance to Darwin's. This can hardly be sustained, because the Teilhardian synthesis does not have the force of a scientific demonstration. Its intellectual grandeur may nevertheless be recognized even by those unconvinced of its validity. Teilhard's writings belong really to a class by themselves; an understanding of their singularity is essential for a comprehension of their contents.

Teilhard was a Christian mystic, who happened also to be a scientist, and who had in addition a gift of poetic imagery. He recognized that what he was writing about was his "fundamental vision" and "conviction strictly undemonstrable to science." And yet in his greatest work, *The Phenomenon of Man*, written between 1938 and 1940, published in French in 1955 and in English translation in 1959, he claimed that what he wrote was "purely and simply a scientific treatise." (Unless specified otherwise, all the Teilhard quotations given in the following pages are from this work.) The claim of being "scientific" made Teilhard easy prey for critics, who pointed out that his work deviates from the accepted style of scientific discourse. It is

nevertheless unfair to describe Teilhard's views as "mystical Christianity ostensibly derived from evolutionary principles" (Simpson 1965). The idea that Christianity can be derived from evolutionary principles, or from any other scientific findings, would have seemed monstrous to Teilhard. What he tried to do was something entirely different, namely to create a coherent *Weltanschauung*, including his mystical Christianity as well as his scientific knowledge.

It would, then, be nearer the truth to say that Teilhard saw science illuminated by his mystical insights. Teilhard's achievement is best describable in the words of Toynbee (1956, written not in connection with Teilhard's ideas, which were then unknown to Toynbee):

The Truth apprehended by the Subconscious Psyche finds natural expression in Poetry; the Truth apprehended by the Intellect finds its natural expression in Science. . . . On the poetic level of the Subconscious Psyche, the comprehensive vision is Prophecy; on the scientific level of the Intellect it is Metaphysics.

Teilhard was a prophet and a metaphysician in the special sense in which Toynbee used these words.

Some people feel that science and poetry mix no better than oil and water. They may as well spare themselves the effort of reading Teilhard's works. Teilhard has addressed himself to those unwilling to tolerate ideological schizophrenia. Those who are looking for an esthetically as well as rationally satisfying synthesis, instead of an intellectual life divided into isolated compartments, can find in Teilhard a help and an inspiration. It is not my intention to review here the whole range of Teilhard's ideas; it is rather to scrutinize his synthesis from the standpoint of modern biology, and perhaps to suggest some modifications. If my remarks seem to some of Teilhard's admirers to be too often critical, I can only say that nothing could be more damaging to his synthesis than to have it frozen in a fixed canon. Teilhard had his biological views formed mostly in

the nineteen-twenties, and much has happened in biology since then. If his biology is antiquated, that of Darwin is still more so. Nor should it be forgotten that any synthesis can have only a temporary utility, because at least some of the components of any imaginable synthesis will themselves be undergoing changes. Science and art and philosophy will, it is to be hoped, be different in the future from what they are today. Every generation will face the task of revising and renewing the synthesis.

"Men's minds are reluctant to recognize that evolution has a precise *orientation* and a privileged *axis*." This is the cardinal postulate of the Teilhardian synthesis. Evolution, human and biological and cosmic, is not simply a lot of whirl and flutter going nowhere in particular. It is, at least in its general trend, progressive. The evolution of life is a prolongation of the evolution of nonliving matter; human evolution is an extension of biological evolution; and the "megasynthesis" which Teilhard prognosticates will be a sequel to human evolution. Man's individual life is a component part of the evolution of the universe; man's ultimate concern, and his individual meaning and dignity are atoms of the meaning of the whole cosmos.

Some writers restrict the word "evolution" to biological evolution only. This seems to me gratuitous. The universe has had a historical development; so had life, and so had mankind. This historical development did advance to life from absence of life, and did ascend to man from non-human ancestors. Although inorganic evolution is due to operation of agencies different from the organic, and human evolution has again causes of its own, life is newer than the universe, and man is newer than life. As shown in Chapter 3, the origin of life and the origin of man may be regarded as evolutionary transcendencies which opened up possibilities for developments of new kinds. Viewed in the perspective of time, these transcendencies do represent breaks in the evolutionary continuity, but not events unprepared by the foregoing developments. They show that

evolution as a whole has been progressive, if the word "progress" is to mean anything.

Teilhard's assertion that the evolutionary process has a definite orientation must be very carefully examined. Evolutionary changes taking place at any given time are conditioned by the changes which preceded them, and they will condition the changes that take place in the future. This is especially obvious in biological evolution—the evolutionary past of a living species is, as it were, inscribed in its genes. Evolution is not a collection of independent and unrelated happenings; it is a system of interrelated events. Life could not have arisen until cosmic evolution had produced at least one planet capable of supporting life. A being such as man, with a capacity for symbolic thinking and for self-awareness, could not have appeared until biological evolution had generated organisms with highly developed brains. Since certain evolutionary events could have happened only on the foundation of a series of preceding events, the history of the universe may be said to have an "orientation." We may choose to call the evolutionary line that produced man the "privileged axis" of the evolutionary process.

"Orientation" may, however, be understood also in a different manner. The process of evolution may be oriented, guided, and propelled by some natural or supernatural agency. Evolution was then able to follow only a single path, so that its final outcome, as well as all the stages through which it had to pass, were predestined and have appeared in a certain fixed order in time. Some minority schools among biologists believe in such a foreordained orientation. For example, the finalists posit that all evolution occurred for the express purpose of producing man, and that evolutionary changes at all times were guided toward this goal by some supernatural power or powers. Another school maintains that evolution, at least biological evolution, is orthogenesis. The changes that occur are sequences of events determined by factors inside the organ-

ism, by the structure of its genetic endowment, and proceed straight toward a fixed objective, such as man. The evolutionary development follows, then, a predetermined path, and its final outcome is likewise predetermined.

In contradistinction to finalism, orthogenesis does not necessarily assume supernatural forces guiding evolution. The favorite "explanation," which is really nothing more than an attractive analogy, is that evolutionary development (*phylogeny*) is predetermined in the same way as is the development of an individual (*ontogeny*). A fertilized human egg cell does not contain a homunculus, a little human figure, and yet from this egg cell arises an embryo, which undergoes many complex transformations and growth and finally becomes an adult man. Did the bodies of our remotest ancestors, or even primordial life, contain all the rudiments needed to produce all evolutionary developments? If evolution is orthogenesis, then it is what the etymology of the word "evolution" implies, i.e., unfoldment of preexisting rudiments, like the development of a flower from a bud. Finalism and orthogenesis have this much in common: the evolutionary history of the living world was predestined at the beginning of life and even in primordial matter. If true, this would make evolution a rather dull affair. Evolution produced nothing really new, since all that it did produce was ordained to happen. It lacked all freedom and creativity.

Teilhard declared it to be his "considered opinion" that orthogenesis is "essential and indispensable." The meaning which he ascribed to this term was, however, an unusual one. He gave two definitions on the same page (page 108 of the English version of *The Phenomenon of Man*). One of them is: "a law of controlled complication, the mature stage of the process in which we get first the micro-molecule then the mega-molecule and finally the first cells." The other is: "The manifest property of living matter to form a system in which terms succeed each other experimentally, following the constantly increasing values of centro-complexity." What this seems to mean is a statement of the

undoubted fact that, seen in retrospect and in its totality, evolution was indeed progressive, and in this sense directional and oriented.

The evidence of progress and directionality in biological evolution is clear enough if the living world is considered as a whole. To be sure, in some groups, such as various parasitic forms, evolution was often retrogressive (loss of organs, particularly degeneration of the nervous system); in other groups evolution was seemingly given to production of endless variations on the same theme. And yet, the net outcome of evolution is that today the earth is no longer populated exclusively by primordial viruses and amoebae. Numerous complex organisms, with body structures that can only be compared to works of art, have appeared. Most remarkably, evolution has produced organisms with highly developed nervous systems, which convey to them information about the states of their environments. To some extent, such organisms can dominate their environments, instead of being dominated by the latter.

Now, it is the totality of evolution that occupies Teilhard's attention almost exclusively. The only particular evolutionary line which interests him is that of man, and this because he believes that in man evolution as a whole is, as it were, brought into focus. He even envisages the entire living world as being a single organism: "Taken in its totality, the living substance spread over the earth—from the very first stages of evolution—traces the outlines of one single and gigantic organism." This is a very perceptive, and beautiful, metaphorical statement of the unity of life. The evolution of the symbolic supraorganism is, however, a problem separate from that of the evolution, or better the evolutions, of the millions of particular species of living beings which inhabit our planet at present and inhabited it in the past. Moreover, orthogenesis is a hypothesis which endeavors to explain what causes evolution, rather than a summary description of the evolutionary history of the living world.

This puts me, willy-nilly, in the peculiar position of hav-

ing to argue that, in spite of himself, Teilhard was not an exponent of orthogenesis. Concerning the causes of evolution he had actually little to say. Although the latter part of his life coincided with the development of the modern biological (synthetic) theory of evolution, he had only a hazy idea about it. And yet his general conception of the nature of evolution harmonizes with the fundamentals of biological theory far better than with that of orthogenesis. And let this be made clear: what is here involved is not a technical biological problem; the issue is critical for the whole Teilhardian synthesis.

If evolution follows a path which is predestined (orthogenesis), or if it is propelled and guided toward some goal by divine interventions (finalism), then its meaning becomes a tantalizing, and even distressing, puzzle. If the universe was designed to advance toward some state of absolute beauty and goodness, the design was incredibly faulty. Why, indeed, should many billions of years be needed to achieve the consummation? The universe could have been created in the state of perfection. Why so many false starts, extinctions, disasters, misery, anguish, and finally the greatest of evils—death? The God of love and mercy could not have planned all this. Any doctrine which regards evolution as predetermined or guided collides head-on with the ineluctable fact of the existence of evil.

Philosophers have struggled with the problem of evil for more than two millennia. Teilhard certainly knew all this, and knew that the only hope for a solution lies in the replacement of predestination by freedom as the mainspring of creation. On the human level, freedom necessarily entails the ability to do evil as well as good. If we can do only the good, or act in only one way, we are not free. We are slaves of necessity. The evolution of the universe must be conceived as having been in some sense a struggle for a gradual emergence of freedom. The outcome of evolution is not predestined because, in Teilhard's words, "There is a danger that the elements of the world should refuse to

serve the world—because they think; or more precisely that the world should refuse itself from perceiving itself through reflection." Here Teilhard's ideas draw near those of many other thinkers, such as Hartshorne (1962), a philosopher who is at least aware of evolutionary problems.

Teilhard describes the method of evolution as groping ("tâtonnement"). This is a more poetic and impressionistic than a rigorously scientific characterization, and yet it is remarkably apposite. Some of the fundamental tenets of modern biological theory have been outlined briefly in Chapter 3; here it is necessary to consider some of them further from the standpoint of their bearing on the problem of predetermination vs. creativity of biological evolution. Is evolution merely a painfully, and seemingly needlessly, slow maturation and unfoldment of what was always there, preformed and foreordained to be unveiled in the course of time? Or can it be a succession of trials and errors, some of them resulting in inventions? Can evolution be the realization of just a tiny fraction of an infinite series of potentialities? And can it be understood as in any sense a response of the creation to its Creator in increasing freedom? Are the pain and struggle and evil connected with this gradual expansion of freedom?

Evolution has three stages or levels: (1) production of genetic raw materials through mutation, (2) formation through natural selection and Mendelian recombination of genetic endowments adapted to survive and reproduce in certain environments, and (3) establishment of species barriers by reproductive isolation. Mutations are changes in the genes and chromosomes. Their outstanding property is adaptive ambiguity. This means that a mutation arises regardless of whether it may be useful or harmful to the organism. In point of fact, most mutations are harmful, many produce hereditary defects or diseases, and some are lethal. How, then, is it possible that mutation supplies the genetic raw materials of evolution? The answer is that a minority of mutations are not harmful but useful, espe-

cially when the environment in which a biological species lives is altered. Some of the old genes then become no longer adaptive, and some mutant genes replace them.

The harmfulness of most mutation is a dramatic demonstration of the absence of guidance in evolution. At the level of mutation, evolution is neither directional nor oriented nor progressive. It is the very antithesis of orthogenesis. Mutation alone would cause chaos, not evolution. Natural selection redresses the balance. Harmful genes are reduced in frequency, and useful ones perpetuated and multiplied. As pointed out above, some authors liked to compare natural selection with a sieve, which retains some particles and lets others go through. This is too crude an analogy. Natural selection works not with genes but with whole genetic endowments; what survives or dies, begets progeny or remains childless, is not a gene but a living individual. A gene useful in combination with some genes may be harmful in combination with others. The changes which natural selection promotes at present depend upon the changes that occurred in the past. Natural selection is comparable not to a sieve but to a regulatory mechanism in a cybernetic system. The genetic endowment of a living species receives and accumulates information about the challenges of the environments in which the species lives. The evolutionary changes are creative responses to the challenges of the environment. They are not alterations imposed by the environment as Lamarckists mistakenly thought.

Almost all higher organisms and many lower ones reproduce sexually. Sex is a supremely efficient method to generate countless new genetic endowments, which are exposed to the arbitrament of natural selection. This is a corollary of Mendel's laws; in a population which has n genes each represented by two variants, 3 to the n th power of different genetic endowments are possible. If n is of the order of hundreds or thousands, the number of potentially possible gene combinations far exceeds the number of in-

dividuals of any species existing on earth. In a sense, the Mendelian mechanism is, then, more efficient than it needs to be. A vast majority of potentially possible genetic endowments will never be realized.

The consequences of this prodigious efficiency are nevertheless very interesting. First, every individual in a sexually reproducing species, such as man, has a genetic endowment which is unique, unprecedented, and nonrecurrent (identical twins are, however, an exception, being genetically identical or very nearly so). Secondly, evolutionary changes are unique events; for example, the evolution of man from his prehuman ancestors is infinitely unlikely to be either repeated or reversed. If life exists on some planets other than our earth, it is utterly improbable that the evolutionary process there went exactly as it did here. Thirdly, among the myriads of the gene combinations that could be formed, some would be adaptively harmonious and others disharmonious. How to maximize the frequency of the former and to minimize the latter? Life has evolved different organisms adapted to different environments and different ways of life. Mixing their genes would almost always be disadvantageous. There are at least two million (some estimates double this figure) biological species on earth. The species do not interbreed and do not exchange genes, or do so rarely. They are reproductively isolated or nearly so. The reproductive isolation is accomplished in a great variety of ways. The species may breed at different seasons, may occur in different habitats, the sexual attraction between them may be weak or absent, the hybrids if produced may be inviable, weak, or sterile, etc.

Two kinds of evolutionary changes can be distinguished. First, there is anagenesis: as its environment changes with time, a biological species undergoes changes that maintain or improve its adaptedness, but continues to be a single species. The second is cladogenesis, splitting up of a single species into two or more derived ones. This happens most

these distinctive marks of human history may be present in rudimentary form on the biological level as well.

"The blind phantasy of large numbers" has played an important role in the entire evolutionary process—from cosmogenesis, through biogenesis, to noogenesis. Cosmic evolution gave rise to multitudes of galaxies, suns, and planets. Life, and eventually consciousness and self-awareness, appeared on at least one of the myriads of celestial bodies. Large numbers are involved also in human evolution. Mankind is multitudinous and is growing more so. Are the multitudes supererogatory? They may seem so, in view of the fact that the intellectual and spiritual advances are chiefly the works of elite minorities. To a large extent, they are due to an even smaller minority of individuals of genius. The destiny of a vast majority of humans is death and oblivion. Does this majority play any role in the evolutionary advancement of humanity?

It may well be doubted whether the elites could exist by themselves without the nameless multitudes. The function of the multitudes is not limited, however, to serving as manure in the soil in which are to grow the gorgeous flowers of the elite culture. Only a small fraction of those who try to scale the heights of human achievement arrive anywhere close to the summit. It is imperative that there be a multitude of climbers. Otherwise the summit may not be reached by anybody. The individually lost and forgotten multitudes have not lived in vain, provided that they, too, made the efforts to climb.

The thesis that all human beings are partners engaged in "the common enterprise" was argued forcefully by the eccentric but original Russian thinker Fedorov (1832–1903; see about him in Zenkovsky 1953). Unaware of this predecessor, Teilhard develops similar arguments in an evolutionary context: "No evolutionary future awaits man except in association with all other men." Reluctant to admit it, Teilhard enters here the realm of prophecy. Yet he does not allow his prophetic vision to soar out of sight of

the solid ground of cumulative knowledge. His prophecy is not scientifically provable; if it were so it would be prediction rather than prophecy. However, a prophecy may be compatible with, or contradictory to, scientific knowledge. This gives us a warrant to examine Teilhard's prophecy from the point of view of evolutionary biology, which is, after all, the same point from which Teilhard himself takes his departure.

The trend prevailing in the evolution of the noosphere, the noogenesis, is toward "planetization" and the "megasyntesis." This implies a radical convergence and integration of the physical, cultural, and ideological branches of mankind. Branching, cladogenesis, has played a subordinate but not unimportant role in human evolution for the last million or two years. It has created racial, national, social-class, and cultural divisions. Like the diversity on the biological level, human diversity served to "try everything so as to find everything." The other side of the coin is not pretty; differences among men have often inflamed hatreds, cruelty, strife, war (hot and cold), genocide, concentration camps. Social Darwinists, as un-Darwinian as they are anti-social, contend that strife and all its grim consequences are merely the wages which mankind has to pay for progress. Some biologists still sing paens "in praise of waste."

Teilhard rejects social Darwinism. In noogenesis, the most powerful impetus toward progress comes not from strife or waste but from love. Replacement of strife by love already began in biological evolution, biogenesis. The classics of evolutionism described natural selection as a consequence of the struggle for existence. The "struggle" does not, however, always mean strife. Our modern view of natural selection sees it promoted by cooperation as well as by competition. Moreover, the importance of cooperation relative to competition has been growing as biological evolution has advanced. By and large, it is greater among higher than among lower animals. Teilhard makes love a basic agent of all evolution: "Driven by the forces of love,

the fragments of the world seek each other so that the world may come to being. This is no metaphor; and it is much more than poetry." Well, it is a metaphor, it is poetry, and as such it manages to convey an important insight.

To make a paradox in the Teilhardian style, let us say that in progressive evolution we find a competition for cooperativeness. There is also an evolution of love; love ascends from sexual love, to brotherly love, to love of mankind, to love of God. Love unites without casting off the diversity. On the human level it is the means whereby a person as well as the species achieves self-transcendence. The megasynthesis is "a gigantic psycho-biological operation" in which love is the main agent, and which leads to the unity in diversity. As early as in 1920 (published in Teilhard 1964), Teilhard wrote:

It is Mankind as a whole, collective humanity, which is called upon to perform the definitive act whereby the total force of terrestrial evolution will be released and flourish; an act in which the full consciousness of each individual man will be sustained by that of every other man, not only the living but the dead.

The "planetization" of mankind is, in Teilhard's view, made inevitable by the swiftly increasing facility of communication and by increasing knowledge. Mankind inhabits the surface of only one rather small planet. Unless means are found to emigrate and to colonize other planets, people will finally have to learn to live harmoniously or at least peacefully with more and more numerous neighbors. The main point here is not only that population densities have grown and are growing, but even more that technological inventions facilitate travel and make possible almost instantaneous transmission of information and ideas to every corner of the world. Knowledge promotes spiritual growth as well as unification—"to be more is in the first place to know more."

Teilhard's prophecies of eventual planetization and megasynthesis may seem to be daydreams of a visionary, taking no account of the forces of evil and of the darker sides of so many human natures. Teilhard realized that his ideas are liable to be misconstrued as advocating a reduction of mankind to a state of vapid uniformity for some benign stereotype. Nothing was more alien to his thought. He faced the formidable problem of how to reconcile unanimity and megasynthesis with individuality, freedom, and what Brinton (1953) so aptly called "multanimity." It is best to quote his own words:

The Earth not only covering itself with myriads of grains of thought, but enclosing itself in a single thinking envelope, to become functionally a single vast Grain of Thought on a planetary scale. The multitude of individual reflections grouped and mutually reinforced in the act of one single unanimous Reflection.

Far from becoming all alike, or undergoing amalgamation or coalescence, as the noogenesis approaches the consummation of megasynthesis the human personalities are expected to grow in depth and to maximize their individual uniqueness. The meaning of an individual life is its inclusion in the evolutionary upswing of noogenesis. Even on the animal level, individuals are not interchangeable, because they are neither genetically nor developmentally identical. Noogenesis leads to affirmation, not to leveling of individuality.

Is there anything more than Teilhard's burning faith to bear out the bright hope of the megasynthesis? Can one rule out the polar opposite: disunion, dispersion, and arrogant self-assertion of the individual against mankind? The antithesis to megasynthesis is the ideal of the Dostoevskian Grand Inquisitor and the Nietzschean Superman. Without specifically mentioning Dostoevsky or Nietzsche, Teilhard recognizes the danger. Human freedom enables man to choose also a direction away from megasynthesis. Mankind may become a dust of independent and dissociated

sparks of consciousness. Some of those sparks, being stronger, brighter, or perhaps simply luckier, than the rest, will "eventually find the road always sought by the Consciousness towards its consummation." Teilhard rejects this possibility as leading into an evolutionary blind alley. Spiritually matured mankind should be able to extricate itself from such a blind alley, because man is the only form of life which need not accept the direction of the evolutionary forces acting upon him, but can direct his evolution. An isolated individual is biologically as well as humanly an anomaly. Hermits and anchorites lived in vain, unless they somehow communicated their insights to other people, provided, of course, that they had insights worth communicating.

Self-assertion which makes an individual break away from humanity is inimical to the growth of the person as well as of humanity. Healthy growth is fostered by love and arrested or stunted by egocentrism or egoism. Self-fulfillment is possible only through love for, and in a spiritual union with, others. "The true ego grows in inverse proportion to egoism." Teilhard parts company with the Buddhist ideal of blending and dissolution of the human personality in a union and eventual fusion with the Deity. Teilhard rejects such a dissolution. Man must "seek to reconcile the hopes, indispensable to him, of an unlimited future with the perspectives of his individual death which is inevitable."

The eventual consummation of all evolution is envisaged by Teilhard as a convergence in the Omega. "I am the Alpha and the Omega, the first and the last, the beginning and the end" (Rev. 22 : 13). This Christian religious symbol is beyond doubt the source and the inspiration of Teilhard's vision. He makes this unmistakably clear in his "Turmoil or Genesis?" (English version, 1964):

To the Christian, for whom the whole process of hominisation is merely the paving of the way for the ultimate Parousia, it

is above all Christ who invests Himself with the whole reality of the Universe; but at the same time it is the Universe which is illuminated with all the warmth and immortality of Christ.

It is evidently the inspiration of a mystic, not a process of inference from scientific data, that lifts Teilhard to the heights of his eschatological vision. Yet he remains a consistent evolutionist throughout. The point which he stresses again and again is that man is not to be a passive witness but a participant in the evolutionary process.

The consummation of the World, the gates of the Future, the entrance into the Superhuman, they do not open either to a few privileged or to one chosen people among all peoples! They will admit only an advance of *all together*, in a direction in which all together could join and achieve fulfillment in a spiritual renovation of the Earth.