

EVOLUTIONARY NATURALISM: SURVIVAL AS A VALUE

by Karl E. Peters

Evolutionary naturalism is a dominant viewpoint in the contemporary scientific community; it is the main paradigm for most if not all biological scientists and for some physical scientists and social scientists. For the purpose of this paper evolutionary naturalism may be described as follows: First, the realm of nature is all there is; there is no supernatural in the sense of a realm of knowable reality totally other than that which is open to some possible interpretation of everyday experience by some possible scientific theories. Second, nature is dynamic; it evolves. Change is not merely an appearance or an indication of a second-class reality but is essential to the way things are. Third, at least at the level of life, the evolution of nature is best understood by updated Darwinian mechanisms: a continuing inheritance by the replication of major bodies of information; continual, essentially random, small variations of these information systems; and environmental selection pressures favoring the reproduction of some variations over others and thus modifying in small steps the information heritage.

This viewpoint of evolutionary naturalism can be adopted with varying degrees of ease by liberal theists who stress the immanence of God, by pantheists who equate the universe with God, by religious humanists, and by agnostic and atheistic humanists. However, those who try to do their theological and philosophical reflection within the framework of evolutionary naturalism are often called upon to respond to questions regarding the significance of survival. Is reproductive success an important enough value on which to base a human being's life? Of course we all want to survive and pass on our heritage in some form or other to future generations, but is there not more to life than surviving or having offspring? If mere survival is all there is

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[*Zygon*, vol. 15, no. 2 (June 1980).]

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to living, do we not have a pretty paltry picture of ourselves?¹ The thrust of this kind of questioning is to imply that the survival spoken of by evolutionary naturalism is rather simplistic and trivial as far as values are concerned.

I would like to suggest that the idea of survival can be regarded as denoting a very complex process of the preservation and creation of knowledge. As such survival indeed may be an important value to affirm. Indeed it may be a central value of a religious outlook, worthy of, in Paul Tillich's words, "ultimate concern." I shall support this claim, first, by discussing what it is exactly that survives; second, by discussing how surviving is related to creating; and, third, by suggesting that the significance of an individual's life must be based more on the past and present than the future.

GENETIC REPRODUCTIVE SUCCESS

According to evolutionary naturalism what survives after death is not our identical bodies or our conscious identical awareness but our genes, provided of course that we and other members of our immediate families pass them on in the creation of offspring. It is this genetic reproductive success that often is regarded as trivial if one wants to use it as a foundation for reflection about human values. However, I do not believe it is trivial, especially if we stop to think what a gene is.

In one sense a gene consists of a collection of chemicals, combined to form deoxyribonucleic acid (DNA). However, it is not the chemicals themselves that make a gene. What makes a gene what it is is a particular chemical pattern that is called information. The chemicals are so arranged as to constitute a repository of knowledge. Just as books on shelves in a library are a set of materials that store human ideas, so the DNA chains on chromosomes constitute libraries of information that provide the basis for how various living things look and behave.

The psychologist Donald T. Campbell suggests that "any process providing a stored program of organismic adaptation in external environments is . . . a knowledge process."² According to this definition DNA, or the genetic code, contains knowledge. Even a simple paramecium, a one-cell creature, has knowledge—not conscious, conceptual knowledge, to be sure, but behavioral know-how. A paramecium, which has a program that instructs it to move about even if only randomly for food, in effect knows behaviorally that moving will bring food more readily than if it stayed put. Further, a paramecium has internal monitors for nutrition and chemoreceptors

to detect possible noxious conditions in the environment. It thus can apprehend what is good and evil in terms of nutritiousness and noxiousness. Finally the paramecium has as a small part of its DNA library a program that tells it how to reproduce itself—that is, how to reproduce its genetic code or its knowledge—through mitosis. Thus, even at this simple level of life, one finds the requisite knowledge for survival—knowledge about obtaining food or energy for life support, knowledge about defense against hostile agents, and knowledge about how to reproduce knowledge. One also discovers, perhaps, that genetic survival—even of the paramecium—is not so trivial after all inasmuch as it is the survival of a precious heritage of information on how to live. I am assuming of course that it can be agreed that knowledge is worthwhile.

Humans, like all other living things, are storehouses of genetic knowledge. The human genetic code is probably one of the most sophisticated biological libraries of programs for behavior on earth. While a bacterium has only about 1.5 million “letters” or nucleotide pairs in its genome, a human being has an estimated 2.9 billion to 5.5 billion “letters.”³ This number of letters, which makes up about fifty thousand genes on twenty-three chromosomes, indicates that we really are a library of information.

As in other living things, this DNA library, through directing the manufacture of proteins, informs us on such matters as nutrition, defense, and reproduction. More important, it contains the knowledge of how to create the human phenotypic capacity for thinking, speaking, and writing in abstract symbols and thus the capacity for formulating, storing, transmitting, and applying a whole new kind of knowledge, quite distinctive from genetic knowledge. This new level of knowledge makes up a large part of what we call culture. It extends and transcends our genetically programmed perceptions and motivations by representing the universe with words and symbols and by telling us how to live in this perceived-conceived universe.⁴ Science, religion, art, literature, philosophy—as well as the conceptually formulated commonsense wisdom that shapes our thought, experience, and behavior—are all parts of our cultural library.

In other words, we human beings are formed by two systems of knowledge, one inherited genetically from parents and the other inherited culturally through social institutions; from parents, relatives, friends, teachers, and other individuals; and via pictures, books, and other material substrates of information. Most of what we are is the result of these two systems of knowledge—genes and culture. It is not inappropriate to say that their combined heritages constitute the most

important aspect of ourselves. It is not surface phenomena of human beings, not what we observe when we look at one another that is the most important. Neither is it simply what we do. What I am suggesting is that the most important thing about us—that which makes us what we are—is the libraries of genetic and cultural information, which in interaction with our environment as we grow up determine our appearance and behavior. In effect these libraries constitute our “soul.”⁵ They are what survive when we die, provided that we or others have transmitted the knowledge of life within us to future generations, provided that we or others recopy the library, for all libraries need to be duplicated. Physical things such as books and bodies that store information are not permanent, but the knowledge can be preserved if part of it is used to generate new vessels for its own storage. Thus, when we look carefully at what it is that survives, we can conclude that it is not trivial to talk about the survival of genes—and for human beings, of culture. Survival is the reproduction of two types of knowledge in the history of life.

SURVIVING AND CREATING

However, a second set of more serious questions can be raised concerning evolutionary naturalism. Why is it that no library, whether genetic or cultural, gets copied in the next generation totally intact? Further, why are so many libraries, whether genetic or cultural, lost? Not only do individuals die, but entire cultures fade away. And not just cultures, but entire gene pools. Ninety-nine percent of the species that have lived on earth no longer exist. What happened to all these libraries? Why did they not survive? What is the purpose of reproducing our own genetic-cultural libraries if in the long run they fade away—or at least become so different from what they were with us that in effect our particular libraries have died? To answer these questions we shall have to take a look at the relation between surviving and creating as we answer a further question: How did we get here?

According to the second law of thermodynamics the natural tendency of the universe is to move toward random disorder. How then did the more complexly ordered entities such as living systems arise? European scientists, such as Ilya Prigogine and Manfred Eigen, have wrestled with this problem in the last decade. To resolve it they postulate that creation comes about through the interaction of chance and law. There seems to have been for the ten to twenty billion years of the universe's existence since the big bang a constant search for hidden stabilities in nature. The search is essentially a random one, often without results, until a particular combination of positive and nega-

tive energy uncovers a hidden stability, and a particular atom that is stable is formed. The same random search for stable states far from thermodynamic equilibrium continues as atoms form more complex stable arrangements called molecules, as molecules form still more complex arrangements that are self-reproducing and hence living, as living organisms discover new patterns of genetic knowledge that allow them to diversify and adapt to, or become stable in, particular kinds of environments. So the process of creation goes on in the random search for the actualization of an ever greater number of potential stable states until we humans appear on the scene.

However, for us to appear something interesting had to happen. Other species, in their uniqueness, had to die by the transformation of their genetic libraries. As J. Bronowski has pointed out, genetic inheritance is marvelous in that for the most part the complex DNA code of 1.5 million letters in bacteria to 5.5 billion letters in humans is accurately copied; but it is not surprising that, with the transmission of such complex libraries of information, errors are made in the copy. Genetically such errors are overwhelmingly detrimental to the organism inheriting them. However, every so often such an error leads to a new arrangement of DNA that is stable, and the continued occurrence of the rare errors in information that fit in their environment at times leads to new species.⁶

I and many others suggest that the same is true for cultural libraries stored in our brains and in books and manifested in our words and behavior. The reproduction of this information also is filled with copying errors, and many of the errors can destroy a part of the existing knowledge, making it nonsense. Yet every so often new and better ideas come into being through either unintentional or intentional copying errors. Examples of intentional copying errors are the denial of the postulate of parallel lines by the nineteenth-century non-Euclidean geometers and Albert Einstein's denial of the Galilean theorem of the addition of velocities in regard to light. A few such ideas that fit when tested against various rational and empirical criteria form new knowledge.

Survival, whether genetic or cultural, is never exact in every detail. If it were, nothing new would come into being. Survival of existing knowledge, even when that knowledge is our own genetic and cultural libraries, is not enough. For creation to take place some knowledge has to be transformed into new knowledge. Survival from the point of view of evolutionary naturalism is always to some extent death and transformation.

To use another metaphor, it is as if we were a part of a cosmic symphony. Underlying laws of nature provide the basic rhythms of

the universe. In keeping with these laws the universe, like a self-composing symphony, is searching out new melodies and chords. At the beginning the melodies are simple and many of these still continue today, but as the symphony continues to create itself the melodies become more varied, the harmonies more complex. Also, as the complex symphony continues, some of the melodies and harmonies die out. Whole movements come into being and pass away. This must be so, for unless this happens all we would have would be noise.⁷ Both music and the universe seem to have a basic requirement: For order to occur only a certain number of possibilities can be actualized in a given span of space and time. Thus, as John Muir, the environmentalist, has written, "nature is ever at work building and pulling down, creating and destroying, keeping everything whirling and flowing, allowing no rest but in rhythmical motion, chasing everything in endless song out of one beautiful form into another."⁸

As parts of the self-creating cosmic symphony, we inherit in our very being, in our genes and through our cultural environment, melodies and harmonies from the past. As we live our lives we continue the process of creation and pass on transformed harmonies as we help create future generations. And gradually the notes that we play fade and die out. It must be so, so that new parts of the symphony can emerge.

Max Rudolf Lemberg, a distinguished biochemist, expressed much the same idea as he reflected on his own prospect of dying and on how one survives. He wrote:

I believe that eternity does not begin after my death; it was before I came and will remain when I die. But above all it is during my life on earth, and this is indeed the only time during which I am responsible for my contribution to it. I have this responsibility, however little a single person can do. Any person with some nobility of heart will not make his relative insignificance an excuse for disobeying the categorical imperative. It is, I believe, untrue that what I have done during my life, however insignificant in itself, will not count from the viewpoint of eternity. What I mean is not that it will be remembered. Nobody remembers the man who split the first flint or lit the first fire, who made the first tool, drew the first painting of an animal on a cave wall, or made the first sculpture of a human figure, who had the first dawning of the awe of God, or loved his wife, his children, or his comrades of hunt or war. Nobody remembers the first woman who spun or planted seeds. My individual unity may be remembered for a few years and that of the great man, Jesus, for thousands of years. It is not important whether my name or any special deed of mine will be remembered; it will certainly not be remembered forever. However, what I have done, whatever it was, good or evil, has become eternal in the sense that it has become an indestructible and irremovable part and parcel of the tissue of the life of mankind. Not all life is sacramental, but much more than what we often believe is; and in this wider sense

it belongs to eternity. Not only books or discoveries or statements but even passing acts of generosity or lack of it—anything which has influenced other persons, adult or child, belongs to the eternal realm, even a mere loving act, thought, or gesture. That I shall not survive in my uniqueness of person may be a serious blow to my self-love, but the contributions of myself and millions of other persons are not in vain, . . .⁹

SIGNIFICANCE OF AN INDIVIDUAL'S LIFE

At this point, however, evolutionary naturalism faces a third set of questions. Why are the contributions of myself and millions of others not in vain? What in the long run does the survival of knowledge and the creation of new knowledge accomplish? What good does the continued production of genetic and cultural libraries of information serve when the human species itself eventually may go the way of other species and become extinct and when, according to the second law of thermodynamics, the universe eventually will run down, dissipating all physical structures that carry information and with this all the knowledge and other forms of organization that humans and other parts of the universe have created?

This set of questions exerts pressure on the evolutionary naturalist to expand his vision of what is possible so that the creative activity of the universe does not end its symphony on the plaintive single note of entropy but instead concludes the billions of years of creation in some glorious finale that allows the knowledge that has been created to survive in its fullest possible state. Such an outcome was projected by Pierre Teilhard de Chardin on two grounds. First, he postulated that the processes that make for increased complexity are rooted in energy forms that are as primal as those processes that make for entropy. He designated these energy forms, perhaps unfortunately, as "psychic energy." This psychic energy, in his view, might attain eventually an autonomy which would enable it to separate from the physical realm. Second, he argued that it is rational to believe that the universe will not abort its past creative efforts. Therefore the universe will move toward the complete development of consciousness and knowledge; the "noosphere" will attain its fullest possible realization in an integrated harmony centered in the divine omega point.¹⁰ In Teilhard's vision our contributions to knowledge and other forms of order are not in vain but are part of the universal symphony moving toward a grand climax and culminating in a state in which knowledge is preserved.

However, if one is unable to divorce thought from the physical substrate of nervous systems, and if one believes that the second law of thermodynamics holds for the universe as a whole so that event-

ally entropic disorder indeed will become the final state of affairs, one cannot be as sanguine as Teilhard in affirming that current human efforts in reproducing and creating information systems will have a final, glorious outcome.

Another attempt at making sure that human contributions are not ultimately in vain can be made from a Whiteheadian point of view. Most Whiteheadian theologians assume that the entire universe can be described on the basis of the model of human experience (e.g., everything has a physical and a mental pole), and all such theologians further assume that, although God partly transcends the universe, God can be described metaphysically in the same terms as everything else (in fact God is regarded as the highest exemplar of the metaphysical categories). With these assumptions Whiteheadians find it comfortable to speak of the "consequent nature" of God, which takes up the results of all "actual occasions" of the universe into a harmony that is everlasting. It is as if there is a divine memory which organizes and retains all the knowledge that is produced in the creation of the world.¹¹ Hence human efforts to promote the survival of information are not in vain because that information is retained in the mind of God. Metaphorically speaking, not only is God involved in the composition and production of the cosmic symphony but God remembers and enjoys the symphony as it is being played and will continue to remember and enjoy it after it is completed.

Again a hard-headed evolutionary naturalist, while recognizing the coherence of Whiteheadian thinking once certain assumptions are made, finds it difficult to accept this guarantee for the significance of human activity. Many evolutionary naturalists who are physicalistically oriented in their thinking have difficulty accepting the personalistic implications of the first assumption, and they also usually reject the second assumption that something transcends the universe because it denies the first proposition of evolutionary naturalism that this universe is all there is. Thus, if we adhere to evolutionary naturalism in its strictest form, we find ourselves facing the full power of the third set of questions: Is not all the creative activity of the universe, including the creation and retention of knowledge at the human level, ultimately in vain?

Although we cannot respond in the same manner as those who follow the thinking of Teilhard or Alfred North Whitehead, we can present an answer that is perhaps more meaningful for the present state of human activity than any discussion of final outcomes in some far-distant future might be. We can point out that asking what the preservation and creation of knowledge finally accomplish reveals

the teleological framework of the questions. Also, they imply that knowledge is only of instrumental value. However, while knowledge may be instrumental to the attaining of other goods in some cases, it also is regarded generally as being worthwhile in its own right. Certainly this is the impression one gets from many scientific, philosophical, and religious seekers after the knowledge that distinguishes truth from falsity and reality from illusion. Thus to ask what the maintaining and creation of knowledge accomplish misses an essential point of evolutionary naturalism—that our furtherance of genetic and cultural information systems is to be done not as a means to some further accomplishment but as an end in itself.

Furthermore, this consideration of both genetic and cultural knowledge as of intrinsic worth can be supported by recognizing that knowledge is a part of the more general order being created as the universe. Information is one form of organization but not the only form. What we see when we look at the world from the evolutionary naturalist's perspective is the continual process, over billions of years, of the creation of various patterns and levels of organization. We also can make the same affirmation that the theistically oriented author of Genesis I makes, that the universe itself is good because it is the result of an Ultimate Creative Reality. We can make this affirmation even if we pantheistically affirm that the Ultimate Creative Reality is coextensive with the universe (as Teilhard also implies at times) rather than assert the theistic position, which seems more compatible with the author of Genesis I, that the Ultimate Creative Reality transcends the universe. Further, we can affirm the goodness of the universe even if we regard divine creation as continual rather than once for all and even if we maintain that the universe is dynamic and not static. Thus, insofar as the order that is created is good because it is the result of divine creative activity, human beings who participate in the transmission and transformation of genetic and cultural knowledge are doing something worthwhile. The significance of what is being done does not depend on any glorious final outcome but instead on the intrinsic worth of order itself and on the understanding that human creative activity is an aspect of the "work of God."

Finally we can support the position of evolutionary naturalism in its stricter sense by pointing out the psychological danger of basing the significance of human activity on only presumptive final outcomes. Because the projected consummation of the universe is billions of years in the future, even if that consummation were glorious and preservative of all order and knowledge, any individual's contribution here and now would seem still to be insignificant. However, by focusing on what has been and is being accomplished in the ongoing crea-

tion of knowledge and other forms of order we are able to gain some sense of our own worth because, as parts of the evolving reality system, we are the present culmination of the past and the frontier of the future. In acknowledging this we perhaps discern with Jesus that the "kingdom of God" is in our midst here and now. When we look out from our immediate environment to the distant stars and recognize that we are looking back into the past, we become aware that our genetic and cultural information systems are the product of from ten to twenty billion years of creative activity. We also become aware that we are on the leading edge of our world's creative effort. It is this participation in the evolutionary process, which may be regarded as divine, that gives our genetic and cultural survival and transformation its significance.¹² Whether the cosmic symphony ends in a grand finale that rings on forever or on the single note of thermodynamic equilibrium, from the point of view of evolutionary naturalism, we can enjoy and marvel at its present beauty, and we can affirm reasonably the value of our lives as notes and movements in its ongoing creation.

NOTES

1. The question of survival as a religious value is posed effectively by Philip Hefner, "Survival as a Human Value," in this issue.
2. Donald T. Cambell, "Blind Variation and Selective Retention in Creative Thought as in Other Knowledge Processes," *Psychological Review* 67 (1960): 380.
3. Gerald Karp, *Cell Biology* (New York: McGraw-Hill Book Co., 1979), p. 454; Albert L. Lehninger, *Biochemistry*, 2d ed. (New York: Worth Publishers, 1975), p. 860.
4. For a more detailed statement of the relationship between genetic and cultural information systems see Ralph Wendell Burhoe, "Religion's Role in Human Evolution: The Missing Link between Ape-Man's Selfish Genes and Civilized Altruism," *Zygon* 14 (June 1979): 139-48.
5. A more extensive scientific-theological analysis of this view of the human self is elaborated by Ralph Wendell Burhoe in his "The Concepts of God and Soul in a Scientific View of Human Purpose," *Zygon* 8 (September-December 1973): 432-38.
6. J. Bronowski, "New Concepts in the Evolution of Complexity: Stratified Stability and Unbounded Plans," *Zygon* 5 (March 1970): 22-24.
7. Along with a summary of the work of Ilya Prigogine and Manfred Eigen, the musical metaphor is suggested to me by A. R. Peacocke's "Chance and the Life Game," *Zygon* 14 (December 1979): 310-17. Peacocke, however, speaks theistically of God as the composer.
8. Kent Danner, ed., *The American Wilderness in the Words of John Muir* (Waukesha, Wis.: Country Beautiful Corp., 1973), p. 58.
9. Max Rudolf Lemberg, "The Complementarity of Religion and Science: A Dialogue," *Zygon* 14 (December 1979): 373-74.
10. Pierre Teilhard de Chardin, *The Phenomenon of Man* (New York: Harper & Brothers, 1959), esp. pp. 273-90.
11. Charles Hartshorne, "The Development of Process Philosophy," in *Process Theology*, ed. Ewert H. Cousins (New York: Newman Press, 1971), pp. 47-66, esp. pp. 58-64.
12. For reasons for regarding the evolutionary process as divine see my "The Image of God as a Model for Humanization," *Zygon* 9 (June 1974): 112-13.