

POTENTIALS FOR RELIGION FROM THE SCIENCES

by Ralph Wendell Burhoe

While the dominant views of the past century have held that religion is a division of culture inherently divorced from that of the sciences, there have been some who hold that he who has found science in opposition to religion has never properly understood either. While few in number, these have included some of the most distinguished of scientists, if not of theologians, philosophers, humanistic scholars, and poets.¹ Among these there has begun a reexamination of the relevance of the sciences for illuminating human values and religion.

HOW CAN RELIGION BE DEFINED?

Since much contemporary opinion about the nature of religion is such as to make the proposal of a scientific approach to it as ridiculous as Columbus's proposal to sail west to get to the East was to those who believed the world to be flat, before proposing some of the particular possibilities I have in mind for scientific resources for religion, I should present the picture I hold of the nature of religion which makes it sensible to speak of using the sciences to map its contours.

It would, indeed, be ridiculous if one were to suppose that the sciences would prove that the sun stood still for Joshua; that the gods ruling over human destiny are anthropomorphic ghosts who dwell on the "firmament" conceived of as a platform that holds the waters above the earth; or that we could settle with a microscopic examination just how many angels could stand on the head of a pin.

But the following picture of the nature of religion, which is derived from recent scientific as well as religious scholarship and insight, will make it possible, I hope, to see that the sciences may be as useful for advancing religious theory and for improving religious practice (concerned with the general salvation of man) as they are for medical theory and practice (concerned with human salvation limited primarily to general organic problems).

The meaning of the word "religion," like the meaning of many terms, is defined by its use in language, defined by the way people use it, by the

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things or behaviors people point to when they use it, by the other words by which they define it. Some words, and "religion" is one of them, have so many different meanings established by many variant forms of use that it is difficult to employ them unambiguously. Such words carry about them a cloud of associated meanings, some of which are so different from others that confusion and disagreement are common. In order to avoid ambiguity and increase the effectiveness of rational discussion, it is customary for scientists to adopt some more logically coherent and limited specification of some commonly observable class of phenomena to which the word or symbol they are using refers. In our proposals for finding scientific resources for religion, it would seem both appropriate and necessary to follow this practice. For religion to come alive in the world of scientific language, it is necessary to use "religion" (and all the related terms that religions use) in the context of scientific language.

I shall, therefore, use a definition of religion that I trust will give it a coherence and relevance in the language of the sciences, yet be faithful to some of its traditional meanings, perhaps to its more significant meanings.

The nature of religion, medicine, and the other arts or techniques under which human cultures thrive can be better understood if we look at them not in terms of the particular practices or ideologies under which they operate in any particular culture or time, but rather in terms of the function or needs which they serve in any or all cultures and times. Much of our trouble with understanding "religion" stems from our narrow identification of its meaning with some specialized characteristics of some particular form of it, perhaps obsolete or irrelevant for us and for those with whom we are communicating. We would have similar problems in discussing transportation if we insisted on fixing our notions of it on canoes or on airplanes. Transportation is defined by neither, and by both, and by much more.

As a matter of fact, the transformation of the role of religion in the cultural evolution from the prescientific to the scientific age is analogous to the parallel transformations of the mechanisms of transportation. The basic functions of religion or transportation, when carefully analyzed, will be seen to be invariant and unchanged, although the specific details of the mechanisms would indeed be different. The analogy is also helpful for our seeing the radically new and radically transformed character of human life which the sciences seem destined to bring to it shortly: the new environment of scientific technology in which we live is as different for personal and social living from pre-industrial agricultural economies as airplanes are from canoes.

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Without the corresponding transformation of the religious practices and images, men in this new age will not have values that are adequate for the new circumstances of life.

RELIGION DEFINED AS AN ELEMENT IN EVOLVING CULTURE

A useful picture or model of the nature of religion and the other cultural arts or technologies, and their relations to the sciences or ideologies that explain them, can be derived from the historical evolution of the institutions of human society.

In this picture we can view the rites (or behavior patterns) and the myths (or verbal representations of behavior) of religion, medicine, or other technologies, as cultural modifications or extensions that supplement the basic biological processes for sustaining and advancing life. At first the culturally transmitted customs or behaviors were generated not so much by conscious problem solving as by the natural selection by men of ways that they more or less accidentally found to be desirable, workable, useful, or salvatory. A solution of some human need had been discovered out of the many largely random trials made by communities of men (or by communities of brain cells in a single man). I do not mean that conscious effort to solve problems was absent, but only that most of the accomplishments of human brains and much of the evolution of human languages, customs, arts, or technologies were not in the past and still are not consciously designed by rational deductions from some already existing valid premises.

Before the rise of systematic and scientific bodies of information, the early evolution of languages, religions, and technologies would seem to be describable as accumulations of know-how and wisdom without human design or plan—that is, so far as human conscious intent is concerned, they were accidental or chance happenings. The successful discoveries or improvements may be said to have been fixed or made a permanent part of human behavior by the genetically established conditioning mechanisms in the nervous systems of individuals, where particular patterns of response were reinforced (selected) by the results of each individual's interactions with other individuals or groups, or with cultural artifacts, or with any elements of the larger nonhuman environment. Overall, the retention or selection of these neurologically learned modifications of the genetically based operations for maintaining life through longer periods of time, according to a new notion about cultural evolution which has been greatly stimulated by Sir Julian Huxley and others, is by the relative viability or fitness they bestow on different and competing social groups.² In some cases, and always in the

end, the failure of organisms to survive will eliminate any unfit class of behavior in organisms.

In this long history or evolution of human culture one can picture the relatively unconscious growth of linguistic structures, religious and medical practices, patterns of social organization, and various technologies for food, clothing, shelter, transportation, communication, manufacture, war, etc. That men were barely conscious of what was transforming their patterns of life in no way detracts from the wisdom or usefulness of the cultural patterns that evolved. Children speak (and their ancestors evolved) languages with a logical grammar long before they become cognizant of logic or grammar.

When the factors providing these cultural modifications of the basic, genetically produced, biological patterns of life-promoting behavior were largely unperceived, explanatory statements of their nature and meaning often did not appear until many generations after the original discoveries took place. At first the explanations were imaginative speculations or plausible myths. It is only recently that we have begun to generate conceptual models or myths that are sufficiently detailed and reliable that they give a very adequate understanding why a sailboat can sail against the wind, why we need to eat sources of vitamin C, how a language came to be, or why death is a necessary good for human progress rather than a meaningless frustration of central values. Many scientists, moreover, feel our best scientific theories are still only plausible myths.

But even before the stage of crude, plausible myths, cultural evolution had much earlier provided implicit know-how or *savoir faire*. Men are well endowed to "know how" to do many complicated and useful things long before they can make clearly understandable statements explaining very fully what they are doing—for instance, breathing, digesting food, making babies, cooking food, raising crops, telling the stories of their culture, or spraying DDT. Whether conscious or unconscious, the behavior of living systems is always informed by goals and know-how to accomplish them to maintain life. When this information is incorrect, the living system fails and is no more.

In this picture of cultural evolution (or the historical advance of the socially transmitted know-how of the arts and techniques of human living), the role of consciously manipulable conceptual models and of the breadth of conscious awareness increases in the course of time relative to the role of trial-and-error behavior that is reinforced or selected largely by unconscious genetically programmed neurophysiological mechanisms and by the survival of social institutions.

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In the last few centuries, theoretical knowledge or science has become increasingly effective so that, when applied to these traditional arts of life (such as agriculture, communication, medicine, transportation, etc.), the new knowledge has made possible revolutionary advances. In this paper I am suggesting this is also possible for religion. I am suggesting the possibility of a scientifically informed religion, a theology that is congruent with the other modern sciences.

We can summarize that religions, like the other arts and techniques of human culture, have roots in a billion years of genetic evolution and have a history of hundreds of thousands of years of semiconscious cultural evolution; and it was only two or three thousand years ago that they began to advance significantly by the application of conscious, analytical, and deductive reasoning, during the period when the scriptures of the Judaic, Christian, and other great world religions were written. The rational analysis of religious custom and myth (theology) thus began at about the same time as that of history, geography, physics, astronomy, and mathematics.

It can be said that, at whatever the stage of evolution of life, the relation of information (conscious or unconscious) to viable patterns of life is that of hand and glove. Living systems are always informed about their own needs, about the environmental requirements (resources and threats), and about how to behave in this situation to save the living system from death and give it more abundant life.³

It seems fair to say that for more than a billion years the functional precursors of science (science being understood as today's best way of gaining valid information) have always been in close alliance with the precursors of religion and the other arts of life. In the light of this history it seems strangely out of place that the dominant opinion of the present learned world should suppose that science and religion were inherently alien and separate from one another after so long being tied together.

I have thus far defined religion by pointing to its reality in human history as one among the arts of human cultures which have evolved to serve some aspect of human needs. But now I should indicate the definition or specification that distinguishes religion from the other arts or techniques of human life.

RELIGION DEFINED IN TERMS OF VALUES

If all the arts of culture serve in some way man's requirements for life, how do we define the particular role of religion? Theological scholars

have suggested that religion is the area of ultimate concern or highest values.

In trying to represent the domain of religion among the complex elements of man's conceptual or verbal structures, we may say that it is possible for man to arrange his concepts of what is valuable in the form of a logical pyramid where the numerous concrete and mundane values are represented in the large area of the base of the pyramid, and the single word or abstract concept that represents man's supreme value is at the highest peak of the pyramid. In such a pyramid there are logical connections structuring the arrangement of elements on each level and also structuring the connections from concrete values at the base to the most general, most abstract, overall value at the top. The several layers of words or ideas near the peak of the pyramid would be the region representing my definition of religion, where we would find words representing comprehensive systems of positive values such as "life."

Going down the logical or verbal pyramid from the peak region of words representing the most sacred, religious values, one would come to levels containing larger networks of terms representing various more particular and concrete expressions of the more general or abstract terms of the layers above. Down a bit toward the base of the pyramid one would, for instance, place such words as "air," "water," "food," "friendship," "honesty," etc., all of them being essential elements for one word in a superior layer, such as "life." And further down toward the base of the pyramid one would find many particular words, where several of them would represent logical equivalents to one of the words or symbols higher in the hierarchy. For instance, related to the logically superior word "food" would be "carbohydrate," "protein," "fat," "vitamin," etc. And below this level one could go down to hundreds of words that represent different sources of "carbohydrate," such as "bread," "potatoes," "cake," and "pie." There would be nothing particularly sacred about "pie" unless in some circumstances it became the only source of the carbohydrate necessary for life.

This reminds us that the priority of values in the lower levels of the value pyramid is circumstantial or situational. The priority of a particular value in a lower plane of the pyramid shifts as the circumstances shift. At one moment "water" may represent a top priority, and at another it may be dangerous or even lethal. But terms representing higher levels in the logical pyramid of values do not shift or change so much with circumstances. Thus "life" remains a very good value word under all kinds of circumstances, and this more abstract value, as the

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court of appeal for competing, more concrete values of a lower level of the value pyramid will, in conjunction with the existing situation or circumstances, tell us whether water is good or bad or what other lesser value is most important at the moment. It is such words that represent the most general and most invariant and the ultimate values that are associated with and define the area of religious concern.

If, instead of speaking of a logical or subjective hierarchy, we wanted to demonstrate it objectively, we could point out parallels to this logical pyramid of values in living organisms, such that the most sacred or religious area would in fact be concerned with the adaptiveness of the organism to the ultimate requirements of life. For instance, the central nervous system will cut off air (by causing us to hold our breath) when our heads are pushed under water. Thus one rather sacred condition or value for life at a lower level (air) is stopped (for a few moments at least) in order to serve a higher-level value, life itself. Scientists have revealed a complex and marvelous picture of how the animal (including human) organism is given life by means of a complex hierarchy of homeostatic mechanisms, all nicely arranged to order, to repress, or to sacrifice many minor needs in favor of a value more essential for the total system of life. In primitive species, the genetic book, written in the language of DNA, is a primary organizer of behavior to give priority to the needs higher in the pyramid, such as the needs of the total cell or organism. If a certain protein molecule is in too short supply, this organizer will increase its manufacture; and as the number of these molecules reaches an optimum, the organizer will inhibit excessive manufacture.

Even at the level of organization by DNA, one already finds that the organizer of values rates some values higher than that of the life of the individual cell—the value of the organism; and a value higher than that of the individual organism—that of the species; and (according to some biologists) a value higher than that of the species—that of the total life system in the ecosystem.⁴

In more complex organisms of animals, the DNA has elaborated an assisting mechanism to keep the value hierarchy of the organism such that the higher values of life are served by the way the mechanism orders, restrains, or even sacrifices lesser values. This assisting mechanism is the central nervous system, which serves higher animals as the unifying and ordering center, imposing a hierarchy of priorities on the tremendously complex machinery and operations of the total organism so that each of the millions of the subunits of the organism does just what is necessary for the life of the whole.

In the cultures of human societies, anthropologists have noted that religions have performed the function of societal structuring of value priorities. Religious rites or behaviors and their corresponding myths, ideologies, or theologies, constitute the central cultural institution for the accumulation and transmission of the supreme values in the pyramidal hierarchy of values. Religion relates man to such basic problems as that of life in the face of death, of personal values in conflict with social values, of the relation of man to the ultimate sources and determiners of his destiny—in short, it relates the central values of human life to the total reality upon which that life depends, insofar as an individual's values or goals require social conditioning in addition to the basic accumulation of genetic wisdom.

Ideally, and probably to a large extent in fact in history, all the other social institutions and their characteristic arts or technologies may be said to be integrated into the service of the general goals or values set by the religions. Cultural anthropologists have been clarifying this picture of the centrality of religion for the values of a society. Clyde Kluckhohn said, "Religions have been the traditional repositories of moral values. . . . It is an induction from the evidence at the disposal of the anthropologist that religion in the broad sense is essential to the health and survival of any society. That is, there must be codes which unite individuals in adherence to shared goals that transcend immediate and egocentric interest. There must be intellectually and emotionally acceptable orientations to some of the deeper inevitables such as death."⁵

Another significant anthropological contribution to a scientific understanding of religion is found in a paper entitled "Religious Revitalization: A Function of Religion in Human History and Evolution," by Anthony F. C. Wallace.⁶ After reviewing what anthropologists have come up with on the matter of religion, Wallace suggests that this "leads to the view that religious belief and practice always originate in situations of social and cultural stress, and are, in fact, an effort on the part of the stress laden to construct systems of dogma, myth, and ritual which are internally coherent as well as true descriptions of a world-system, and which thus will serve as guides to efficient action."⁷ He then goes on to summarize the essence of the religious process as the effort to discover the essential keys to life—the way to achieve organization, order, or life in the midst of decay and death all around:

The most diverse creeds unite in the attempt to solve the Sphinx-riddle of the relationship between life and death, between organization and disorganization; the ideas of the soul, of gods, of world cycles, of Nirvana, of spiritual salva-

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tion and rebirth, of progress—all are formal solutions to this problem, which is indeed felt intimately by all men.

But religion does not offer just any solution: characteristically, it offers a solution which assures the believer that life and organization will win, that death and disorganization will lose. . . . And religion further attempts to elucidate and describe the organization of self and the cosmos. Religion, then, may be said to be a process of maximizing the quantity of organization in the matrix of perceived human experience.⁸

All the arts of life—including those concerned with food supply, housing and clothing, medicine, manufactures, transport, communication, and government—obviously contribute to producing this maintenance and advancement of life; but religion in human history is seeking to provide solutions to the grand, overall problems, which may be said to lie in the apex of man's pyramid of interrelated needs if he is to live most fully, man's ultimate, most general, and overriding concerns. Religious values interrelate with and provide a general order for all other culturally shaped values. If theology today were the scientific or rational account of the problems or functions of religion in this sense, it might well be called, as it was in the past, the queen of the sciences.

While medicine, agriculture, manufacture, and the other arts of human living contribute to the solution of the various subdepartments of life's needs, the function of religion in this view has historically been the salvation of the whole man in the context of the total reality in which he lives. It attempts to relate us to our ultimate goals and conditions. Having defined religion as an evolving cultural art concerned with the top of our value hierarchy, our problem now is: In the light of the new scientific images of the nature of man and the total reality upon which he is dependent (including his new scientific technologies), what are or should be the overarching values that order his ultimate concerns?

In stable, slowly evolving cultures, we would turn to the traditional religion for this. But, in the middle of the twentieth century, the religions of human culture themselves suffer from a disease of increasing disorder which threatens not only their own continuation but also the continuation of man as a viable species, if an equivalent or more effective guide to the order of the central values of human life is not shortly forthcoming. And without a new form or reformation of religion capable of discerning basic values in the realities revealed by science, man is threatened with the suffocation or lethal absence of the necessary life-giving value structures, just as were fishes which found themselves in the new atmosphere of dried up lakes before they

had a chance to evolve adequate mechanisms for taking oxygen from the air. Our suggestion is that the solution of this problem is basically one of finding a rational order for religion which links it to the rational order about reality which the sciences are rapidly developing. Kluckhohn said:

We lack a system of general ideas and values to give meaning to human life in the mid-twentieth century. We live in a period when all of our universals have been challenged.

We can huddle back into the older orthodoxies. We can bear chaos as best we are able and wait for the miracle of a new religion to occur—this is what some of our “wise men” seem to be telling us to do. Or—and this is my thesis—we can bring scientific method and outlook to bear upon these problems. Dewey has warned us “a culture which permits science to destroy traditional values but which distrusts its power to create new ones is destroying itself.”⁹

A WAY TO RELATE RELIGION TO SCIENCE

The image of “science” for many people may be as much of a problem as their image of “religion,” and hence as much of a stumbling block to their viewing with any hope or enthusiasm the supposition that the sciences can be as useful to religion as to medicine. In this section I am not going to try to define science, since I think a scientifically useful definition of this cultural institution for gaining valid knowledge about anything men can know is readily available. But I must reform a no-longer-valid myth about the sciences. Many believe the myth that the sciences can deal only with facts and cannot deal with values. Some of the growing refutation of this myth is found in the above-mentioned paper by Kluckhohn, also in the seven papers of the March 1969 issue of *Zygon*, and in other journals and books.

At the present moment in history, many poets and prophets are so out of touch with the new pictures of the proper nature and meaning of the scientifically validated models or pictures of “reality” and their potential relevance for a new vision of human values and destiny, and so many of the scientific and scholarly world have shut themselves off from serious concern with these problems, that our primary task is to build a new community of minds in which the new knowledge or information about facts in general is directly connected with the basic facts about life’s values. This need calls for a return to the relation between fact and values found dominantly in all previous evolution, where the instruments of knowing about self and environment have always been geared to instruments that are genetically informed to provide responses productive of life, that is, geared to the ordering and motivating of the value hierarchy.

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We might say that, in this scientific view, the "will" (the motivational program of the central nervous system) is a program of processing information as much as is the "intellect," and that both "values" and "reason" are factual processes or mechanisms investigatable by the sciences. Moreover, in living systems (including human cultures) we find the valuing mechanism tightly geared to the other fact-gathering and analyzing mechanisms. Studies of the brain show this. We properly are frightened at the thought of any further disjunction between the realms of our facts and our values; for natural selection seems to rule that, in any cell, organism, society, or other living system, when the information input about the state of the environment and of the system is not effectively geared to the internal information that structures the values or goals of producing or saving the life of the whole, then neither the information system reporting the state of external affairs nor that registering the internal goal system will survive. Any system of life which is fed and motivated by information that is either erroneous in itself, or inadequately motivating of those responses that are necessary for the viability of the system, would seem to be doomed.

The fear that in our times human culture is undergoing a lethal severing of its value system from its general information system has been increasingly sounded as an alarm by great artistic and scholarly observers of the human condition in the past century. Leaders from both sides of this lethal schizophrenia of our culture must find ways to tie them together. This defines the task of a center for the study of how religion (as I have defined it) may grow and prosper in the light of the sciences.

I do not view the general method of research in this approach to religious or theological problems through the sciences as being primarily a matter of employing the scientific method at the empirical, testing level to develop new science, at least not for the near future. It would seem more fruitful to consider our problem as one of applying the already scientifically validated conceptual models of "reality" (including the reality of values) to the problems of religion. In this sense, religious science (theology), like medical science, would be primarily an area of applied science. The area of the applied science in each case is defined by the traditional problems of human salvation or therapy in religion or medicine. When any relevant information already existing in any of the sciences is brought to bear upon the solution of such religious or medical needs, we have an example of "applied science."

For religion this does not necessarily mean that all of the more ancient religious ideas and practices will be cast aside. In my opinion

much of these more ancient formulas for salvation, both genetic and cultural, still today constitute a significantly valid core in medicine as well as in religion, and will only gradually shift with further evolution. This is particularly clear in medicine, where even the precultural wisdom of the body or the genotype is so far ahead of any synthetic wisdom of medical science that we would not survive a minute without it. And so far as modern scientific medical theory and practice are concerned, there are those who have questioned whether the negative impacts of medical care on the human gene pool are not more deleterious than all the temporary relief it has provided. It should be clear that modern science may be a rather feeble light so far as overall and long-range human values are concerned, even at the level of medical health and genetics. But, granting that, the present crisis in human values, combined with the new potentials of the sciences for helping man to understand, advance, and reinforce his values at the most sacred levels of religion as well as at the level of medicine, constrains us to examine how the various sciences might contribute to the rise of a more effective modern religion.

The solutions to religious problems—man's ultimate hopes and fears, his supreme values, the basic purposes or meaning of his life, his proper attitudes and responses to his fellowmen and to the ultimate realities upon which his destiny depends—are, like solutions to problems of medical health, partially supplied by the following three sources of wisdom: genotypic, organic, and anciently evolved cultural formulas. A fourth source is applied science. Although the sciences have been applied more quickly to other cultural arts, I suspect that man's capacity to survive depends on his success in finding a new, rational, and scientific illumination and ordering of these religious problems now even more than problems of medicine, politics, economics, or any of the other arts of living. It is my belief that the wealth of information in the contemporary sciences about the nature of human life and the conditions or requirements imposed by the realities upon which it depends offer the best hope to those who would seek viable answers to these problems of man's ultimate concerns or values. Even if this proposal to translate and strengthen religious values in the light of the sciences seems to be but a wild dream, it may deserve serious effort just because nothing more sensible is being done to stop the increasing moral, emotional, and social disorder of our times which threatens man's continued viability. Even random attempts to resolve the problem are clearly better than no attempts, as the billion-year history of evolving life indicates. We may have to learn to breathe values in the new atmosphere of

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science or else we may suffocate and perish from the face of the earth. I turn now to some of the religious problems where I think the sciences offer rich resources.

AGENDA FOR THE DEVELOPMENT OF THEOLOGY IN THE LIGHT OF THE SCIENCES

In the following section I present some of the religious questions or problems for which I think the sciences already have or soon may provide new insights and help, either to confirm ancient religious insights and make them more effective in today's conditions of life, or to revise or reform them to this same end. This is an agenda for scientists and theologians in collaboration.

Although these areas and the questions under them are largely expressed in language relating them to the conceptual schemes of the sciences and the philosophy of science, and are somewhat unorthodox for theological jargon, a careful reading will reveal some of the primary areas of traditional theological doctrine.

1. *The Sources of Valid Information—Especially about Basic Human Values.* The problem of truth or validity has always been a major concern of religion and these epistemological problems are among the most critical for contemporary theology. Two major questions are: How is valid information about himself, the world, and the paths to life revealed to man? How is knowledge of right and wrong (values) converted into right behavior?

Among the areas of the sciences which may be fruitful for this exploration are the following: (a) the new epistemology which has grown primarily out of the physical sciences, one which has given man a powerful tool for acquiring new truth much more rapidly and surely than the older processes of reason, tradition, and intuition; (b) the psychological (including behavioral and neurophysiological) pictures of the nature of learning and knowing, and of the neurophysiological ties linking information to feeling and behaving; (c) the social science pictures of the evolution of social traditions of know-how and of conceptual images or models of reality; (d) the general biophysical pictures of cybernetics, dynamic homeostasis, and information theory showing a relation between life, order, and information, including the cumulative, natural selection of better-adapted forms and transmission of their successions of increasingly ordered codes of information about how to live and to live more abundantly.

While area *a* in the above paragraph taken by itself has had a history of constant warfare with many theological traditions, it has great

significance for theologians who are concerned with credibility and validity. The inclusion of the other three areas makes room for such religiously fertile concepts as "life-giving wisdom accumulated in cultural traditions, far beyond the power of any single generation to build up from scratch," and "life-giving information accumulated in genotypic and phenotypic structures." Areas *b*, *c*, and *d* also provide the close tie between science and values, which in the light of area *a* alone has often been erroneously asserted to be nonexistent. The pictures in areas *b-d* would further seem to provide important new clues for that ancient problem of theology—the relation of knowing to behaving—in words ascribed to Saint Paul: Why do I do that which I would not, and fail to do that which I would? Taking all four areas together, there would seem to be a rich harvest for understanding the nature, source, validity, and improvement of man's knowledge about those things which are of ultimate concern for human life or ultimate values of life. There are grounds for new understandings of the nature and validity of mystic experiences and of the dynamics involved in the sifting or selection of the sacred rituals, beliefs, and literature of a culture. There is enough material in this general area alone for a major transformation and growth of theology.

2. *Toward an Enlarged Doctrine of Man.* From earliest religious myths to the most recent theologies, the basic values inherent in human life have been pictured as something more enduring and significant than meets the eye of casual observation. Similarly, the contemporary scientific pictures of man, showing him to be the product of cosmic forces operating in stellar and planetary evolution which give rise to living organisms up through human societies, would seem to be a rich source for extending the validity and range of man's notions of the enduring role and values of his nature in the cosmic scheme of evolving life; of his vital relation to the cosmic powers that ordain his life; and of his consequent meaning, his destiny and duties, and his hope for the salvation of his ultimate values thereunder. Perhaps the greater richness of this new revelation of the source and destiny of man is proportional to the millionfold extension of the time span of the familiar biblical story of a few thousand years from the creation of man until today to the few billion of contemporary evolutionary theory.

The sciences provide rich new information on such questions as: What is man? What is this wonderful, invisible "soul" or invisible and persisting "spirit" of human values inscribed in a DNA code, so comprehensive for directing life and yet so small that the complete DNA details for generating all of the approximately three billion existing

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different human forms could be held in one hand? What are the essential elements and values of individual life behavior in this context? How do these elements and values find continuity to survive and evolve through millennia of time? What novel characteristics did the creative processes of evolution bestow upon man that made him unique and in some senses supreme among all creatures of the earth?

In what ways and to what degree has man been endowed with the powers and the responsibilities for consciously aiding the creative processes of advancing life on earth? How did man's discovery of the tree of knowledge (which was genetically provided by an expanded neocortex of the brain and by nongenetic storage and transmission of learning by culture) present him with the agonizing consciousness of this fate: to labor consciously all his days to seek the good and shun the evil and yet inevitably to suffer evil and to die? Why are suffering and death necessary for the evolution of life? What vital and core elements of human nature persist beyond death, other than the genotype? In what sense is motivation of the individual to self-sacrificing behavior for the welfare of the extended family, of the local society, and ultimately of the whole species and even the total ecology of life a value incorporated in the genotype and phenotype, incarnate in the motivational mechanisms of the central neuroendocrine systems, in the socially transmitted mores and moral codes? How are men (and animals) motivated to perform and to find pleasures even in activities seen to be destructive or lethal to the organism but which are beneficial for the gene pool of the species or for the survival and welfare of the local society? What may this imply for the cultural amplifications of the same general types of behavior?

How may we today conceive of the central core of the system of realities which constitute the central values of life-producing structures and events in man? To what extent do they extend beyond the concrete and relatively temporary pattern of particular atomic particles, molecules, cells, organs, organisms, societies, and even species that constitute mankind? To what extent does man's reality and meaning lie in his society, species, or ecosystem? How far can one describe the value-increasing or enhancing direction of life and human life in terms of the search (random or guided) toward increasing levels of order, organization, or dynamic homeostasis? How far can "order" and life be related to the notion of entropy consumption suggested by Schrödinger in his *What Is Life?* To the extent that we can clarify scientifically man's central values, how far can we go in a self-conscious program to enhance the life of man in the various aspects of his nature: genetic

(in a program of eugenics), personal (in a program of cultural shaping by education of the phenotype), and social (in a program of improving the life-sustaining and enhancing structures and functions of the community of men within the ecosystem)?

Why are men created so differently from one another, such that some may be more successful under some conditions and less successful under others (genetic and cultural polymorphism)? Why should we suspect there may be virtues hidden in the most unlikely and sometimes seemingly abhorrent characteristics of ourselves and other men (i.e., the values of polymorphism)? What new insights do the sciences provide on human predestination or determinism and freedom or responsibility?

In terms of contemporary sciences, how should we understand the meaning of such terms as "mind" and "body"? What is the meaning of the fact that certain behavioral scientists claim there is no such thing as "mind" and certain physical scientists claim there is no "body" outside of those that are experiences or phenomena of the "mind" and some scientists allow for the usefulness of both terms "mind" and "body" or their equivalents? Have some scientists or semanticists provided some clarification of the meanings of these terms and a reduction of the paradoxes they have led us into? Within the conceptual schemes of the basic sciences, what meanings can we assign to terms like "self," "person," "personality," etc.? What about "soul," "spirit"? Can the meanings of these terms be related to the more basic science pictures of man as "organism"? Are there in man two independent systems of reality? If so, do they interact in any way? Is careful, scientific use of language a solution to the paradoxes that arise out of certain terms used in trying to describe aspects of human nature?

All the sciences—physical, biological and psychosocial—would seem to contain the materials for a greatly enriched and more valid story of the genesis, nature, destiny, and hope of man.

3. *Toward a Richer Doctrine of the Realities on Which Man's Life Depends.* Religions have long pictured or formulated the ultimate sources of events determining human destiny in symbols of super-human, often invisible, entities: spirits or gods. A most significant opportunity may await an imaginative attempt to formulate the ultimate ground, source, and determination of human destiny in terms of the rich new pictures of the sciences. To what extent can this source be formulated as a single, universal, interconnected whole? Is the totality of all things and events (the cosmos) in some sense interrelated, one

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and single? Or, is there more than one separate and independent system of reality and power? Is there a basic discontinuity between the determinants or the laws governing biological and those governing social behavior? Is there a mental or psychic world that is independent of other things? What other things are there which are not aspects of direct perception?

How does man know about the realities which create, sustain, and enrich his life? To what extent is man integrated with and a part of the total reality upon which his life depends? Are the values of the open systems or islands of order or life (decreasing entropy) on earth (or other planets in the cosmos) definitely doomed ultimately by the heat-death hypothesis? Is the cosmos a closed system? Whence came the lower entropy of earlier states of the system? Is there no escape from the fear of the triumph of death over life? Are there escapes by valid transformations of our conceptual models of who we are? Is there any escape or any reason to seek escape from the ultimate power of the cosmic system in which we find ourselves?

Can man define his own heaven and achieve it regardless of the cosmic circumstances and laws? Or, is he forced to bow before some objective reality or realities which say what he may (and what he may not) do if he is to have life, and life more abundant? What then is his proper attitude and response to such a reality? To what extent did, does, and will man's life depend on his adaptation of his own will to the conditions required by the realities of his environment? Is there any limit to the capacity of living systems, including men, in seeking, finding, and incorporating (or adapting to) ever more fully the elements of the objective reality on which his life and its further progress depends? Are there grounds in the scientific pictures of man and the reality that made him and determines his destiny which would lead man to rejoice and possess hope and courage under the events of our times? Are there reasons to stand in awe of the program of creative evolution, to praise its wonder and glory, to be grateful for the grace that has brought us into being and set before us a responsibility for the maintenance and advancement of life?

What is man's proper attitude to this course of his life? Is it to be feared? Is it to be loved? Is it to be respected? In the scientific world view: What is sacred? What is holy? What is required? What are the commandments? What is grace? Is the source of life objectively independent and unchangeable, or can man in some way change it? By magic? By persuasion? By petition? If the scientifically portrayed cosmos or ultimate ecosystem, as it evolves in time and spreads out life (including

man) to cover the face of the earth, is that on which man's life depends, and if the cosmic unfolding is ultimately independent of anything that man can do to change it, does man have any recourse but submission to the requirements for life thereby laid down? What can the terms "freedom" and "responsibility" mean in such a world view? Do the modern sciences offer any better answers than the theological concepts of "pre-determinism," "fate," "destiny," "wheel of life"? Can the scientific picture of man's place in the evolving system of life be translated so as to lead man to feelings of security, salvation, joy, even ecstasy?

4. *Revised Visions of Human Goals and Hopes.* What can the religious term "salvation" mean in the light of the sciences? Is it pleasure? Is it life? Life more abundant? To what extent is it a gift of forces beyond human ken? To what extent may or must man act consciously to achieve it; what requirements are placed upon man to achieve it?

How can meaningful salvation for an individual be made sensible in the face of the denial of happiness or fulfillment by such seeming evils as disabilities and insanities produced (a) by the genotype, (b) by inadvertent environmental events, (c) by inadvertent social accidents, (d) by social injustices, (e) by social necessities, (f) by inevitable death (sometimes prematurely) of each organism and species?

To what extent is the welfare of the society necessarily incompatible with the welfare of the individual? Are life and life's achievements ultimately doomed by the nature of the cosmos? How can knowledge or truth about what can cause man to flourish become dynamic in moving him to behave accordingly? How do individual needs find suitable integration with those of society? What is the ideal or optimal solution for the system containing individual and society?

Is it possible in the light of the sciences to say anything about man's goals, purposes, meaning, function, or role in the cosmic scheme of things? What are the contributions beyond those already suggested?

5. *Some Implications for the Nature of Future Institutions Which Transmit Basic Human Values.* Do the psychosocial or other sciences provide new insights into the role of social or cultural institutions in providing men with better information and motivation for higher values and attaining more abundant life? In this light, and in the light of the previous theological inquiries, what kinds of institutions can we envisage for optimum effectiveness in improving and propagating human values? How are values imparted, taught? To what extent is or should the church (or its successor) be an educational institution?

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What is the role of doctrine in the imparting of values and the corresponding behaviors and feelings? What is the role of artistic and aesthetic rituals or devices such as incense, music, bodily motions, architecture, drama, images, etc.? What are the roles of the members of a religious community in relation to one another? What sanctions or behavioral-pattern reinforcers does or can the church have for its moral and other teachings?

To what extent is a pluralism of religious institutions desirable? What institutions that do not commonly go under the name "religious" are in fact performing traditional religious functions such as transmitting the central values of the society, salving the anxieties and agonies of people, educating people to realize their highest potentials, etc.? What new "religious" institutions have arisen outside the formally recognized churches? To what extent are television, psychotherapy, communism, etc., religious in their impact? How independent should the church be from the state and from other institutions of the society? To what extent is it desirable for local religious institutions to be tied to other bodies and to be tied to a hierarchy of regional, national, or worldwide leadership for supplying guidance or control of forms, instruments, literature, education, etc.?

To what extent is a new holy scripture called for? Is Henry Alexander Murray's¹⁰ call for a new Bible based on world literature of all cultures and of recent as well as ancient sources, of science as well as drama, called for? What can be suggested for motivation and emotional satisfaction in view of recent discoveries of the organic relation between information and feeling and behavior? How can the scientific portrayal of the drama of man's history and his destiny be made more effective? Can it provide a resolution to conflicting sacred dogmas and cultures through reason, evidence, and persuasion instead of by warfare? Can it provide clarity and enthusiasm where there is confusion and apathy? To what extent does the present human genotype limit the development of any necessary tolerance, reason, cooperation, or altruism? Do we need to and how should we alter the characteristics of the gene pool in order for man to improve or to continue in being? Are there as yet unused means of transforming and civilizing the phenotypic outcome of the genotype by better environmental forces, conditioning procedures, reinforcement programs, educational methods, etc.? Can we do these things in time?

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The above are only samples of basically religious questions where the various sciences offer a wealth of recent information for clarification

and for the building of new or reformed models or concepts. Theologians and men charged with the "propagation of the faith" of whatever present tradition from Confucian to Communist and from Hindu to Hebrew and Christian can restate them in their own languages. It is urgent that this task be undertaken now, if it is in fact the case that man is gasping for spiritual breath of life as he is evolving into a new culture dominated by science and technology.

But the above samples of the theological questions where modern science could help give better answers are primarily valid for theoretic ordering or models of the realities of religious concern. Even if a clear, orderly, and valid theoretic picture could be produced, we are still a long way from producing that necessary element of religion or medicine called the "rituals" or "clinical practices," the actual behaviors that are effective for delivering men from evil. Before any theory (including theology) can be usefully applied to basic human needs or values, it must be transformed into simple formulas that can be successfully performed by any man or child, such as pushing the button, taking the pill, or singing the song. The complex concepts underlying television, medication, or man's ultimate good have to be translated into forms and procedures effectively usable by children. We have promises to keep and miles to go before we sleep.

NOTES

1. The authors and literature cited in *Zygon* provide a sample.
2. See Ralph Wendell Burhoe, "Five Steps in the Evolution of Man's Knowledge of Good and Evil," *Zygon* 2 (1967):82-83, esp. n. 28.
3. See n. 2 above and Ralph Wendell Burhoe, "Values via Science," *Zygon* 4 (1969):65-99.
4. See, for instance, Alfred E. Emerson, "Dynamic Homeostasis: A Unifying Principle in Organic, Social, and Ethical Evolution," *Zygon* 3 (1968):129-68, esp. p. 157.
5. Clyde Kluckhohn, "The Scientific Study of Values and Contemporary Civilization," *Proceedings of the American Philosophical Society* 102 (1958):470; reprinted in *Zygon* 1 (1966):232.
6. Anthony F. C. Wallace, "Religious Revitalization: A Function of Religion in Human History and Evolution," presented at the 1961 summer conference of the Institute on Religion in an Age of Science and published separately by the Institute; later published in Anthony F. C. Wallace, *Religion: An Anthropological View* (New York: Random House, 1966).
7. Wallace, *Religion*, p. 30.
8. *Ibid.*, pp. 38-39.
9. Kluckhohn, "Scientific Study of Values," p. 470 (in *Proceedings*); p. 233 (in *Zygon*).
10. Henry Alexander Murray, "A Mythology for Grownups," *Saturday Review*, January 23, 1960, pp. 9, 11-12.