

# RELIGION AND AN EVOLUTIONARY THEORY OF KNOWLEDGE

by *Karl E. Peters*

*Abstract.* This paper outlines an evolutionary theory of knowledge involving not only conceptual but also behavioral and experiential knowledge. It suggests human knowledge is continuous at the behavioral and experiential level with that of nonhuman animals. By contrasting an evolutionary understanding of ultimate reality (God) with the more traditional, personalistic understanding, the paper shows how an evolutionary epistemology applies to religion in terms of both general and special revelation. Finally, the paper explores how one might respond to the problem of religious knowledge in a pluralistic age and how a nonpersonal, evolutionary understanding of God might be religiously adequate.

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Lying beneath much of the ongoing discussion and debate between various religious traditions and various scientific communities is the problem of knowledge: how do we come to establish truth in science and in religion? On this issue religions will often appeal to some traditional authority and will use sacred writings as a major criterion in assessing the correctness of religious ideas and practices; in contrast scientists today usually appeal to a combination of predicted experiences, controlled observations, rational inferences, and to such auxiliary criteria as simplicity, elegance, and fruitfulness.

In this paper I offer a new approach to the problem of knowledge that, if it works, will unify scientific and religious ways of knowing, will set human knowing in the more extensive context of knowing by all living creatures, and will relate the creation of knowledge to the creation of order in the universe. This approach is an evolutionary theory of knowledge, based on the Darwinian ideas of random variation, natural selection, and inheritance.

Karl E. Peters, *Zygon* editor, is associate professor of philosophy and religion, Rollins College, Winter Park, Florida 32789. He presented this paper at the Twenty-eighth Summer Conference ("Truth in Science and Religion") of the Institute on Religion in an Age of Science, Star Island, New Hampshire, July 25-August 1, 1981.

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In presenting this theory of knowledge I shall provide working definitions of "religion" and "ultimate reality"—what we usually call God. In relation to these definitions I will outline the epistemological problem in terms of three types of knowledge: conceptual knowledge, behavioral knowledge, and experiential knowledge. Next I shall sketch briefly a more traditional understanding of knowledge in Christianity as divine communication from a personal God; then I shall describe in some detail an evolutionary model of the formation of religious knowledge, which regards the divine or ultimate reality as a nonpersonal creative process, and which employs the Darwinian variation-selection-retention pattern. In doing this I shall be dealing with what Christian theologians have called "general revelation," but I shall go on to suggest how an evolutionary theory of knowledge might apply also to "special revelations." Next I shall explore how the nonpersonal understanding of God underlying an evolutionary theory of religious knowledge resolves the problem of cultural-religious pluralism and how this resolution can be incorporated into a personal understanding of what is ultimate. Finally, I shall indicate how a nonpersonal understanding of God might be judged as religiously adequate.

#### WHAT IS RELIGION?

We begin by offering an Aristotelian-type working definition of religion that, first, states the class of things to which religion belongs and then gives religion's distinguishing characteristic. A religion may be defined as a "system of thoughts, actions, and experiences that relates individuals and/or societies to what is ultimate." By suggesting that religion generically is a system of thoughts, actions, and experiences we are placing it in a more general class of things involving these three aspects of human existence. In this more general class, for example, one may speak of the thoughts, actions, and experiences of politics, of art, or of the various sciences. Many areas of human activity involve sets of interrelated thoughts, actions and experiences—with the distinguishing characteristics being the subject matter or that to which the thinking, doing, and experiencing relate human individuals.

In the context of this part of the definition, I would like to introduce my version of the epistemological problem. The problem of what is knowledge can be formulated initially in terms of three questions—all which imply some kind of decision-making or problem-solving process. The question, what is knowledge, can be asked as (1) what ought we to think or believe? (2) what ought we to do? and even (3) what ought we to experience? It may seem peculiar at first that I phrase these normatively—what ought we . . . ?—but this formulation is important in today's world, because in our thoughts,

actions, and experiences we are confronted with the problem of pluralism. In an era when we are constantly bombarded with new information, we are called upon to make decisions as to which information is correct—whether that information be in the form of possible ideas, possible actions, or even possible experiences.<sup>1</sup>

As far as religion is concerned, the problem of pluralism has two general sources. The first is the proliferation of the modern sciences, which are themselves methods of reaching decisions about what to think, which through resulting technologies are suggesting new possibilities for action, and which at least indirectly in terms of the scientific world view suggest what it is we might appropriately experience. Scientific materialism tends to exclude, for example, mystical and psychic types of experience. The other source of pluralism is the growing awareness by educated people of the diversity of the world's active religious traditions. As a result of the advances in the sciences and technologies of both transportation and communication, people who were once culturally isolated and relatively unaware of major religious options are confronting more than ever before the question, what ought we to think, do, and experience religiously?

In trying to decide this question, one seems to be dealing with three kinds of knowledge. The first is conceptual knowledge. Here one is attempting to decide among alternative hypotheses which is the most true. The second is behavioral knowledge, the knowledge of what to do—for example, what is right and wrong—and how to do it. The third is experiential knowledge, sometimes called knowledge by acquaintance and at other times called “knowledge of,” which means knowledge by direct experience.<sup>2</sup>

If we are allowed to use the word “knowledge” in these three basic meanings, then there is an important implication which has a bearing on our evolutionary epistemology for religion. The implication comes from the apparent possibility of being able to know what to do and how to do it without conceptualizing it. For example, by imitating others one can learn how to hammer a nail without any concepts regarding the physics of this task or even without the names for the objects used. Also, it is apparently possible for someone to experience something without having verbally formed a concept of what it is. It thus is possible to have experiential knowledge and behavioral knowledge without having conceptual knowledge. If this is correct, then it means that all manner of living creatures other than *Homo sapiens*, other species without a highly developed neocortex and hence without much capacity for linguistic conceptualization, can still have knowledge, both behavioral and experiential knowledge. In their own ways, I will suggest below in outlining an evolutionary epistemology, but more on a species-wide than individual basis they too develop

answers to the questions we have conceptually formulated—what they ought to do and what they ought to experience—even though they resolve them as problems related directly to survival rather than as conceptual questions.

The distinguishing characteristic of religious knowing is that it seeks to determine what are the proper beliefs, actions, and experiences relating individuals and/or societies to what is ultimate. Following the thinking of people such as Paul Tillich I have chosen the term “ultimate” to designate what various religious traditions, for example, have called Yahweh, Allah, God, Brahman, Nirvana, and Tao.<sup>3</sup> The usefulness of the modern term “ultimate” is that it does not prejudge what exactly is meant in various religious traditions but allows each of them to suggest its own understandings of ultimate reality.

In spite of various understandings it is still possible to offer a general definition of “ultimate” so that the more specific understandings of many, if not all, religious traditions are included. I suggest that for something to be ultimate in religion it must be metaphysically ultimate, valuationally ultimate, and existentially ultimate.<sup>4</sup> Something is metaphysically ultimate if it is the source of all existence, not simply in some temporal sense but in the sense that it constantly undergirds, gives rise to, and is present throughout the universe. Examples of metaphysical ultimacy are Aristotle’s “Unmoved Mover,” Tillich’s “Ground of Being,” the omnipresent and omnipotent God of traditional Christianity, and the Hindu notion that the entire universe is an outpouring or differentiating of the undifferentiated Nirguna Brahman.

Something is valuationally ultimate if it is the highest good. Often the highest good is portrayed as something at the end of an individual’s life, the life of a society, or the universe. Concepts such as the Buddhist’s Nirvana, the Christian’s Kingdom of God, or Heaven, and Pierre Teilhard de Chardin’s Omega, all picture a state or relationship between humans and the divine that is the final goal of life. However, the highest good may not always be in the future; it can be a past golden age or garden of Eden, or a present “Kingdom of God . . . in the midst of you.”<sup>5</sup>

The religious object is existentially ultimate if people can be related to it here and now so as to give their lives meaning and purpose. Whatever the set of religious beliefs, actions, and experiences, at least some of them must not just refer to the future or to some so-called heavenly realm. Neither can they just conceptually point to the equivalent of the Ground of Being, but they must also relate the individual person and/or society to God here and now. Ritualistic practices such as the Eucharist and beliefs such as “atman is Brahman” or “God is at work in the world through the Holy Spirit” are some traditional expressions of existential ultimacy. Further, the idea and practice of

worship as derived from "worthship" seems to combine the ideas of existential and valuational ultimacy.

However, in the context of this threefold understanding of ultimacy, we still have the problem of knowledge. In a pluralistic religious age and in an age of science, are some religious beliefs about what is ultimate more true than others? Are some actions or practices purporting to relate us to the ultimate more right than others? Are some experiences of it more real than others? How do we *know* what to think, to do, and to experience in relation to ultimate reality?

#### MODELS OF REALITY AND KNOWLEDGE

From the point of view of religion, the answer to these questions is straightforward: All knowledge, like everything else, comes *from* ultimate reality or from God. But how one develops this deceptively simple answer depends in part on the basic analogy or model being used to conceptualize the nature of ultimate reality.

In terms of general methodology both science and religion attempt to understand observed phenomena through conceptualized realities that are not directly observable. In their own ways both science and religion construct pictures about what may be called the "invisible world" in order to account for the things we observe. However, these pictures of the invisible world often are based on analogies drawn from the phenomena we experience. One historical example in science is the billiard-ball model used in the kinetic theory of gases. At the time this theory was developed gas molecules were not directly observed, but on the basis of the billiard-ball model a theory of gases was developed from which the then known and confirmed gas laws could be deduced. Another example from the history of science is Niels Bohr's planetary model of the atom. Science often uses analogies from our direct experience to postulate hypothetical, unobserved entities, which constitute in part a scientific theory explaining visible phenomena.

A similar mental process seems to take place in the development of religious ideas. Like the sciences, religions (as one of their tasks) are interested in how the invisible world accounts for our various experiences. But because religion focuses on the invisible world in terms of ultimate reality, it attempts to understand the very ground of all existence and how individuals and societies may be related to it so as to find meaning, purpose, and fulfillment. Ultimate reality, like everything else that is hidden, is to some extent mysterious.<sup>6</sup> However, humans still try to develop concepts about the nature of ultimate reality and what it requires of humans. We do this by making analogies from the world of our experience and applying them to the ultimate, invisible source of this world.

Although models of ultimate reality in religion can be very complex, most religious theories, first, seem to conceive of the ultimate somewhere on a continuum between the one and the many and, second, they use as root analogies either the human person or something that is nonpersonal and drawn from the nonhuman world.

If we combine these two general features of religious models, we can develop a fourfold typology of religious conceptions of ultimate reality. First, the ultimate may be many and personal. This is reflected in polytheistic religions that personify the forces of nature in terms of animal or human-type agents. It is also exemplified in religions treating the hidden reality that creates and controls the world in terms of a divine family or divine court—a development of the personal analogy that may reflect the state of a human society at a particular period of its history. Such divine families or courts are interesting because this model is able to reflect the many and sometimes contradictory characteristics one finds both in human families or societies and in nature.<sup>7</sup>

Second, the ultimate may be conceptualized as many and nonpersonal or physical. This is not often found in religious thought, perhaps because when the ultimate origin of things is conceived in terms of force, for example the Polynesian concept of “mana” (or in the movie *Star Wars*, “the force”), it is thought to be a single reality manifesting itself in many different forms. However, there might be a modern example of nonpersonal polytheism (or “polyism” in contrast to monism) if one were to regard the system of forces and their laws of operation portrayed by the physical sciences as the fundamental origin of all phenomena and hence, at least, as metaphysically ultimate.

The third type of model claims ultimate reality is one and personal. This is common in the Judeo-Christian tradition, but even here there are a variety of theological understandings. At one extreme are the child’s concept of an invisible, divine parent who cares for and yet may discipline the child for the child’s good. At another extreme is the sophisticated personalistic theologies of the Whiteheadians. The latter use introspective human experience of the self as the basic analogy and combine this with a metaphysical assumption that the ultimate is the highest exemplification of a set of categories used to interpret all creation instead of being categorically different from the world. Thus Whiteheadians portray the ultimate as a creative process with a physical and a mental pole, constantly acting within the world and yet beyond the world: all is in God.<sup>8</sup> Further, theologians who use a personal model are not always in agreement as to which human characteristics should be used or negated to elaborate the moral and metaphysical attributes of ultimate reality. Arguments occur over the degree of power, knowledge, and goodness in ultimate reality. Nevertheless, most personal models seem to want to affirm that, like

human persons, the ground of being is in some sense intelligent, purposive, able to fulfill purposes, free to choose which particular purposes to fulfill in carrying out an overall plan, and responsive to the world and humans in a manner that can be described as caring or loving but also, sometimes, as judging and disciplining.

In terms of such a model of the ultimate, how does one obtain religious knowledge? The answer is not absolutely clear cut, because often personalistic theologies will employ physical metaphors in speaking of religious knowledge, for example, Jesus is the light of the world. But in keeping with the personal model the most appropriate image for knowing seems to be "the Word." The ultimate, personally conceived, "speaks" to us and discloses his nature, his purpose, and how we are to respond.

An example of this is the threefold understanding of the Divine Word found in some Christian theologies.<sup>9</sup> The primary word is the second person of the Trinity, which can be spoken of as the *logos* of the universe. From the human perspective this word is "heard" in God's activity in nature and history. It is experienced by humans as God speaking through the natural order to human reason (general revelation) or through special, religious experiences to selected individuals, for Christians primarily through Jesus as the Christ (special revelation).

Secondary to this primary word of God is the written record of general and special experiences of God, a written record from a particular period of history that becomes canonical or normative for all subsequent religious thinking, acting, and experiencing in a particular religious community.

Third, this word of God is the spoken word over the centuries as preachers seek to expound on the written word that embodies the divine *logos*. Through preaching, accompanied by the inspiring work of the Holy Spirit, Christians who live centuries after the original word was "spoken" may experience not only the written word of God but the divine *logos*, Jesus as the Christ. In this personal understanding of ultimate reality, the way in which humans gain knowledge about God and God's will for humans—conceptual knowledge, behavioral knowledge, experiential knowledge—is consistent with the basic personal analogy about the nature of the ultimate. It is the ultimate disclosing itself to humans via the word.

A problem with this understanding of the ultimate and its corresponding way of knowing comes to light if one tries to extend it beyond its usual Christian context to all religions. Of course most Christians traditionally have excluded the knowledge offered by the other religions, accepting only that which was compatible with the Christian revelation or could be regarded as leading up to it.<sup>10</sup> In either case the

Christian revelation is understood as presenting eternal truth about salvation, valid in all times and places. Nevertheless, in a pluralistic cultural world, I suggest that one of the general tests each model of ultimate reality must meet is how well it accounts for the plurality of religious beliefs, practices, and experiences. If one uses the personal model of the ultimate with knowledge coming through the "Word of God," then it seems as if God has communicated somewhat different sets of concepts, different moral codes and ritual practices, and perhaps even different estimations of the importance of different types of experience to various societies in different times and places. Of course, it is possible to develop a more complex conception of humanity's relation to the ultimate in order to suggest that at least some humans have distorted or misunderstood the same basic communication. Or one might argue that God speaks differently to different peoples, depending on their circumstances, just as a physicist must speak differently to a group of professional colleagues than to a group of people only modestly versed in physics. Nevertheless, if ultimate reality is really ultimate in the metaphysical, valuational, and existential senses referred to above, and if this ultimate is the primary communicator of all knowledge as the Christian personal model implies, then one would expect more uniformity of religious belief, action, and experience than one finds in studying the history of religions.

This, of course, is a problem for any understanding of ultimate reality. In the rest of this paper, I will develop the fourth type of model in the many-one, personal-nonpersonal typology—a nonpersonal, evolutionary conception of the ultimate and its corresponding theory of religious knowledge. Then I will show how the problem of pluralism in religion can be addressed by this understanding, and I will conclude by suggesting how well an evolutionary model of ultimate reality meets tests implied by the basic conception of the ultimate as metaphysically, valuationally, and especially existentially ultimate.

#### KNOWLEDGE IN AN EVOLUTIONARY PERSPECTIVE

The basic analogy for an evolutionary conception of the ultimate comes from modern biology. It is Charles Darwin's idea that all living things come about through a process of continual creation characterized by three features: in contemporary terms they are a continuing inheritance by the replication of major bodies of information; continual, essentially random, usually small variations of these information systems; and environmental selection pressures favoring the reproduction of some variations over others and thus modifying the information heritage. Like the analogy of human persons, this Darwinian variation-selection-retention model arises out of the world of



our experience. The theological task is to see to what extent it can be generalized to portray ultimate reality or the source of all that exists, including the source of all knowledge and all value.

Elsewhere I and others have written about how some form of this Darwinian model, in varying degrees of specificity, can be applied to the creation of the universe at the physical-chemical, biological, and cultural levels of existence.<sup>11</sup> Although much still needs to be done to understand in detail how the evolutionarily conceived, creative process works at these levels of existence, I think the possibility of generalizing the analogy from biology to all creation has been shown to the degree that, if ultimate reality is defined as the "evolving universe as a whole," the Darwinian model is at least a possibility for conceptualizing, in terms of a general pattern, the nature of ultimate reality.<sup>12</sup> I will try to show how the Darwinian analogy of variation-selection-retention pictures the creation of knowledge and resolves questions of what we ought to believe, do, and experience.

Campbell states that "any process providing a stored program for organismic adaptation in external environments is included as a knowledge process, and any gain in the adequacy of such a program is regarded as a gain in knowledge."<sup>13</sup> If we add to this that such a stored program can include stored experiences, stored behaviors, or stored concepts, then Campbell's definition of knowledge is compatible with the definitions of "to know" in Webster's Third New International Dictionary. Webster's definitions include both experiential knowledge and conceptual knowledge, since it defines "to know" as "to apprehend or grasp with the mind or senses" or "to have cognizance, consciousness, or awareness of." Webster also refers to behavioral knowledge in the definition "to have a practical understanding of a distinct skill."

Humans, and perhaps higher animals to some degree, can apprehend experiences or concepts, and can engage in behaviors without having knowledge. The important feature of knowledge is that it involves not only spontaneous and accidental experiences, behaviors, or concepts but also these are organized into what Campbell calls a "stored program." Webster's dictionary also stresses this when it adds to its definition of knowing as apprehending the phrases "to apprehend as being the same as something previously apprehended" and "to apprehend as being distinct from something previously apprehended." Accordingly, knowledge involves "memory" or a stored program that discriminates and shows the relations between various experiences, concepts, and behaviors; and the growth of the ways in which they are linked together constitutes the growth of knowledge.

In many ways Campbell's definition of knowledge compares with other standard definitions, but the idea that knowledge "is a stored

program for organismic adaptation" clearly reveals his evolutionary perspective. The notion of organismic adaptation provides the basic criteria for the testing of possible knowledge. If we ask the questions, "what ought we to think," "what ought we to do," "what ought we to experience," the initial answer is, "think, do, and experience that which allows for survival." However, survival is just the starting point. What follows is an outline of how the evolutionary process, beginning with survival as the basic criterion, builds up animal, human, and even religious knowledge and also builds up a hierarchy of means for gaining knowledge.

If we ask what a stored program for organismic adaptation or survival should contain, we conclude that any viable organism first needs some subprogram for maintaining an internally stable system. It must know how to monitor and control temperature and other physical factors necessary for maintaining a state of dynamic equilibrium. Second, most organisms need to know how to transport themselves in the world, and they must also be able to determine which experiences are beneficial and which are harmful, so that in their movements they know what to seek and what to avoid. Third, related to this, organisms need to be able to determine what is nourishing and what is not, and they need to know how to get what is good for them and defend against that which is harmful. Finally, stored programs for organismic adaptation must contain knowledge of how to reproduce, or the means by which knowledge of how to maintain internal stable states and knowledge regarding locomotion, nourishment, and defense are passed on to future generations of the organisms. If reproduction is not successful, then the knowledge is lost. Survival is not just survival; it is the passing on of knowledge of how to survive.

How do animals, including humans, come to know what to do and experience regarding locomotion, nourishment, defense, and reproduction? According to Campbell the process of acquiring and enlarging stored programs of organismic adaptation is a "blind variation-selection-retention process." Blind variation means three things: (1) the variation trials are *not* correlated with the solution or what is selected, (2) the trials happen independently of the environmental conditions of the occasion of their occurrence, and (3) a variation that follows an incorrect trial is not a correction of a previous trial. In short, "blind variation" is Campbell's expression that there is a separation between the means of variation and the means of selection-retention. In terms of human conceptual knowledge, this implies that the origin of an idea is unrelated to the tests of its validity.

At the genetic level, selection refers, first, to the already-existing complex set of internal stable states of an organism. For example, George C. Williams points out that one set of requirements a new

genetic variation must satisfy is the physical-chemical conditions for being a gene in relation to other genes.<sup>14</sup> Second, selection refers to the already-existing, external environmental circumstances that act on the phenotypic expression of the genetic program containing the new variation. The heart of this selection or testing process is the degree to which genetic programs and their phenotypic expression are capable of reproducing themselves. DNA codes providing the kind of experiential and behavioral knowledge that assures the organism will live long enough to reproduce itself adequately, relative to the reproductive rate of other genetic-phenotypic programs in its environment, will survive; the information or knowledge contained in the code will be passed on to or retained in succeeding generations.

Campbell gives an example of a simple genetic program in which an organism seems to know its environment in such a way as to be successfully adapted. The paramecium is programmed genetically to make various trials by moving around its world in search of food. Its search is blind or random in that it has no idea in advance where the food is. It also has no idea where danger is and, while it has a program for reproduction through mitosis, it is a real struggle to find nourishment and avoid enemies so that it will survive long enough to reproduce. However, it is assisted by having a program that directs it to move about; it seems to know behaviorally that moving about will make food more readily accessible than if it remained stationary. But it also must be able to determine experientially when both food and danger are present. To do this it has internal monitors for nutrition and chemoreceptors that detect possible noxious conditions in the environment. It thus can apprehend what is good or evil in terms of nutritiousness and noxiousness.

These monitors were themselves created by blind variation and natural selection. However, now they are vicarious substitutes for aspects of the environment. The interreceptive sense organ that monitors the nutritional level substitutes for the death of the whole organism; rather than starving to death the paramecium gets "hungry." The chemoreceptors are, Campbell states, "vicarious representatives of the lethal character of the environment" and they constitute a criterion, now internal to the organism, for making an initial selection of its own trial and error locomotor activity.<sup>15</sup>

#### VICARIOUS VARIATION-SELECTION-RETENTION

Campbell has written extensively on the importance of *vicarious* devices as essential in the acquisition of knowledge.<sup>16</sup> In fact one might say the history of evolution itself is the trial and error variation and selection of vicarious devices that themselves assist in the variation-selection-retention process of individual organisms as they seek to get

around in the world, seek nourishment, try to defend themselves, and reproduce. The vicarious devices of stored knowledge programs allow animals to postpone the final judgment by the environment regarding their continued existence and thus serve to protect the organisms and help insure their survival.

Let me give some examples of evolved vicarious devices for locomotion, nutrition, defense, and reproduction. Many locomotion devices seem to be involved both in behavioral and experiential knowledge; they provide know-how about getting around in the world that substitutes for physical movement and also for direct, tactile experiences of the surrounding environment. The devices themselves employ a form of random variation and selection. Examples are echolocation devices in animals, such as the lateral-line organs of fish and comparable devices of porpoises, and bats, as well as the radar and sonar technologies of humans. These engage in a blind search by broadcasting radiation in all directions, and all receive selected input back from the environments, which tells these animals of the location of masses impenetrable to the radiation and therefore probably impenetrable to the whole organism.

Another substitute for physical locomotion is the eye, which Campbell argues is a development of a blind search-selection device that uses, instead of a single-cell scanner, multiple fixed cells to record reflected light.<sup>17</sup> Still other substitutes are the scent trails of animals, which originate in the blind search for food but become olfactory maps of the environment when food is discovered, and conceptual maps developed by humans, based originally on random searches through new territory, the results of which are encoded in human memory and refined with the aid of human cultural artifacts called maps. Even various types of conceptual schemes that "map" different aspects of reality, initially experienced as a result of random mental searches, may be regarded as vicarious locomotion devices of a sort. Such maps would include the personal and evolutionary models of ultimate reality.

In the acquiring of energy or food, vicarious selectors substituting for death are hunger and thirst; these felt experiences constitute a kind of prelinguistic experiential knowledge that warns of potential harm to the body and that initiates a search for food and water. Beyond these, tastes for certain types of food evolve to help give an animal the kind of nourishment it needs. At the human level these may be supplemented by evolved cultural and dietary laws, which build upon and perhaps vicariously substitute for biological regulations that distinguish nourishing from noxious substances.

These vicarious, experiential selectors for nutrition are complemented by the development of behavioral knowledge that substitutes for individual random searches for food. Cooperation and a

division of labor in food gathering and preparation may be one example. Another vicarious device among humans may be divination rituals, which are substitutes for random tribal movement when the location of food is unknown and the normal means for its discovery fail.

For defense animals have developed knowledge consisting of programs against both macropredators and micropredators. Against macropredators the genetically programmed fight-flight instinct constitutes a combination of experiential knowledge that recognizes a threat and behavioral know-how that responds to the perceived threat. In species such as the social insects, in which all individuals are genetically related as close kin and in which there may be sterile castes, cooperative and individually sacrificial defense behavior takes place. In humans this cooperative and at times sacrificial behavior may be motivated conceptually and emotionally by common symbol systems that provide the cultural analogue of the genetic kinship of social insects.<sup>18</sup> Against disease-bearing micropredators, substitutions for death as a selector are devices that convey the experience of pain or fever. Behaviorally, genetically developed immune systems protect the organism, and in humans conceptual and behavioral knowledge have evolved in the form of medical science and technology.

The hypothesis of evolutionary epistemology is that these stored programs of organismic adaptation are best understood as developing on the Darwinian model of variation-selection-retention. However, in many instances these vicarious substitutes themselves seem to be variation-selection-retention devices. Campbell's thesis is that the basic Darwinian model applies throughout many levels of emergent evolution.

#### EVOLUTION OF RELIGIOUS KNOWLEDGE

Cooperation is one of the vicarious strategies used in the acquisition of food and in defense. I want to explore this more fully, because it may be part of the evolutionary basis for the development of religious thought, behavior, and experience as we generally know it.

In bisexual systems cooperation is developed via the "sex drive" and "parental instincts," which are based on genetic programming, and structured into the limbic system of the brain.<sup>19</sup> In many human societies these are supplemented by such cultural requirements as the marriage vow and the commandment to honor one's parents. In this manner human families are both biologically and culturally programmed to achieve a high degree of cooperation in acquiring food and in defense among genetically related kin.

However, this kinship bonding can become a deterrent to the formation of more complex social systems, which may be desirable for

the more efficient acquisition of food and more effective forms of defense. Some writers, such as Ralph Wendell Burhoe, suggest that the creative process (described as random variation-selection-retention) has produced in addition to genetic knowledge moral codes and religious myths. These codes and myths help form a social identity and a degree of cooperation that allows human societies to expand beyond the size of the kin group.<sup>20</sup> Much of the moral code of any society—which formulates knowledge about what is right and wrong—may be hypothesized to have been formed by initially random conceptual and behavioral variations and then selected experientially to meet the criterion of increased bonding of the larger social group. Examples of moral imperatives that seem to do this are the second tablet of the Ten Commandments, the principle of “always tell the truth,” the principle of reciprocity formulated as the so-called Golden and Silver Rules, and under certain conditions the principle of sacrificial love. At the same time, such practices as marriage vows and the recognition of ownership may reduce intragroup conflict, making cooperative endeavors possible. By increasing the bonding between members of a particular society (but not necessarily between members of that society and outsiders) these moral principles may in turn increase capacity for the acquisition of food and for defense.

Can the same be said about belief systems regarding the nature of ultimate reality as metaphysically and valuationally ultimate? If the idea of metaphysical ultimacy includes an answer to the question of ultimate origins of a particular society, then one might argue that some conceptual knowledge about God is partly determined by the criterion of social bonding. One might hypothesize, for example, that the development of the Hebraic concept of Yahweh from a tribal to a national deity came as a result of random thought-trials selected in the context of the larger social-political environment by the ability to mold first a tribal and then a national identity for the Hebrews as the people of the Lord. A similar development may have occurred in the same manner, when after the exile Yahweh became a universal deity—ruling over all the nations and empires for the good of all, including his originally chosen people.

If one takes valuational ultimacy in terms of final ends, one might further hypothesize that a variation-selection process was behind the second century B.C. development in Israel of the Persian idea of resurrection and final judgment—a judgment that separates the righteous and faithful people of God from the wicked and apostate—and the eventual acceptance of this belief in early Christianity.<sup>21</sup> Whether such beliefs in final outcomes are verified in terms of direct, individual human experience (for example, John Hick’s eschatological verification), one can see from an evolutionary view-

point how they might have been selected by a vicarious criterion of social solidarity, which in turn helped assure the survival of a culture and a people with particular genetic lines during a period when their cultural and biological existence were threatened.<sup>22</sup> (I am not saying this is the only criterion for the selection of religious beliefs as valid for a people but only that it may be one of them.) From a theological perspective but in terms of the evolutionary model, employed as a model for ultimate reality, such beliefs are created by ultimate reality for a people in a particular time and place.

If social solidarity is one vicarious selector of religious ideas, we may ask how well the evolutionary model itself meets this test. Our evolutionary perspective offers an impersonal model of the ultimate source of what we believe, do, and experience; furthermore, it offers a model that does not project any definite outcome in terms of final preservation and justification of particular individual phenotypes or particular societies. How well does such a model contribute to the kind of religious-cultural bonding so necessary for the survival of societies as we know them? In part this is a question of whether the Darwinian model of the ultimate can meet the test of existential ultimacy, a question to which I will return in the concluding section of this paper.

#### THE RELIGIOUS SIGNIFICANCE OF REPRODUCTIVE SUCCESS

In the preceding discussion I have been presenting an outline of an evolutionary theory of knowledge in which religious knowledge is continuous with other forms of human and even nonhuman animal knowledge, because religious knowledge results through the actions of high-level vicarious searchers and selectors. At the bottom of this hierarchy is the fundamental test of biological, reproductive success. However, does not this reduce all human knowing about what to think, do, and experience to mere survival and thereby trivialize all human attempts to acquire further knowledge? I do not think it does. What is biologically reproduced are the genes which are composed of chemicals that form strands of deoxyribonucleic acid (DNA), and in this sense what is reproduced is only a set of chemicals. However, the important thing about DNA is not the chemicals themselves but the arrangements or patterns they form; it is the arrangement or pattern that makes genes what they are. Further, one can say that these patterns are programs of knowledge. DNA is a sophisticated knowledge program brought into being by evolution, and the structures and behaviors that make up our phenotypic selves are the external manifestation of this program interacting with the environment. Thus, when we speak of reproductive success or genetic survival, we really are speaking about the survival of knowledge. What has been pro-

duced and inherited according to the variation-selection-retention model of ultimate reality is a rich deposit of knowledge embodied in the genotypes and resulting phenotypes of millions of species on earth.

Furthermore, many of these knowledge programs are for the creation and retention of further knowledge, including the vicarious variation, selection, and retention devices of which I have been speaking. In humans, this genetic knowledge controls the development of the neocortex, coupled to the evolutionarily older parts of the central nervous system.<sup>23</sup> This allows for the invention of cultural symbol systems, including language, with which we can map our world in various ways, with which we can develop—again by trial and error—codes of behavior and religious beliefs. This new cultural knowledge, like genetic knowledge, needs to be transmitted from generation to generation—if for no other reason than it can help to insure the continuity of genetic knowledge. (Of course some cultural knowledge, such as how to make more effective weapons for defense, may destroy both culture and genes; if this happens, however, from an evolutionary perspective it will be judged to be a mistrial in cultural evolution.)

The importance of the continuation of knowledge, both genetic and cultural, is recognized by some cultural codes and practices. The commandment, “be fruitful and multiply, and fill the earth and subdue it,” may be taken as a cultural reinforcer of the biological imperative for DNA reproduction and hence as a supplemental insurer of human survival at one time in human history.<sup>24</sup> The practice of adoption of someone else’s offspring does not pass on one’s genotype (although some look for phenotypic similarities in adopting); however, this vicarious reproductive strategy does pass on some cultural knowledge about what to think, do, and experience from parents to adopted offspring. This cultural knowledge may be important to insuring societal or even species success, that is, the survival of other cultural as well as genetic knowledge. Finally, the importance of the transmission of knowledge is seen in the activities of teachers and ministers. Similar to adopting parents, they are involved in the creation of intellectual progeny, who, hopefully, will continue to transmit a particular society’s heritage as well as create new elements in that heritage.<sup>25</sup>

From an evolutionary perspective I have been implying the continuity of various kinds of knowledge—genetic and cultural, scientific and religious. In order to make a final point about the importance of the reproduction of knowledge so conceived, I would like to set this broad view of knowledge in a still larger context. We can do this when we recognize that knowledge, or stored programs for organismic adaptation, is a particular kind of order. According to our evolutionary hypothesis, the order called knowledge is created by the same



processes of variation-selection-retention that have created order in general, that moves the energy and matter of the universe away from the most probable state of random atomic motion—dictated by the second law of thermodynamics—to stable states far from entropy, states of generally increasing complexity.<sup>26</sup>

If ultimate reality is the process by which the order of the universe is created and maintained, then nonhuman animal and human activity to both preserve stored programs of organismic adaptation and create new programs is a part of the ongoing activity of ultimate reality. When we attempt even a random trial and error search for new and stable sets of ideas, when we attempt to teach new generations sets of ideas that have proven adaptive in the past, when we pass on genetic programs through sexual reproduction—in other words, when we so engage in the processes that create and preserve order—we participate in the work of that which creates and sustains the universe. Survival—the propagation of our genes and culture—is not trivial. One might say instead that it is the work of God.

#### GENERAL AND SPECIAL REVELATION

In traditional Christian theology, which has a theory of knowledge based on a personal model of ultimate reality revealing himself through his word, God's revelation is both general and special. In general revelation God discloses his nature and will through the human experience of nature and history and through rational reflection on that experience. In special revelation, which for Christians is through Jesus as the Christ, knowledge of God and God's will is so clearly disclosed that this becomes the basic criterion for testing all other purported religious knowledge.

So far, in our outline of an epistemology that is based on the model of ultimate reality as the creative process specified by the Darwinian mechanism of random variation-selection-retention, we have presented the evolutionary version of general revelation. However, what does this evolutionary theory of knowledge have to say about special revelation? How can a view of the creation of genetic and cultural knowledge, which suggests that knowledge usually increases by small Darwinian type variations, account for what the more traditional Christian view calls special revelation? How does it account for the sudden, spectacular emergence of a complex set of insights about what we ought to think and do given by a religious genius such as Moses, Jesus, Mohammed, or Buddha?

Much exploration needs to be done on this question from the perspective of biocultural evolution.<sup>27</sup> In this paper I am only going to suggest one possible hypothesis that may account for such sudden, special revelations. In terms of the Darwinian variation-selection-

retention epistemological model, one can suggest that such revelations involve a rapid reordering of existing knowledge. One factor involved in accomplishing this reordering is extreme stress, both in a society at large and within one person or a select group of individuals—the prophets—of that society. This takes place in what anthropologist Anthony Wallace and others call a revitalization movement.<sup>28</sup>

Using Handsome Lake, the Seneca Indian, as an example, both Wallace and Barbara Lex emphasize the role stress can play in altering the functioning of the central nervous system so that a new “revelation” is possible. Under extreme stress Handsome Lake went into a three-day trance, so deep that his friends and relatives judged him to be dead. However, he came out of the trance and elaborated a new moral code that was the basis for the revitalization of the Senecas. Lex and Wallace suggest it is possible for a human body outwardly to appear dead to others while the brain is processing and reorganizing its contents very rapidly, thereby producing a new religious-moral system. This process, however, is still one of random, trial variations until a new stable system of information is achieved. Wallace writes: “The therapeutic resynthesis that occurs during the experience of religious inspiration would seem to be best described as a sorting process. Cognitive residues or assemblages are subjected to an extremely rapid scanning procedure, involving checking through a very large number of permutations, combinations, and identifying ambivalences,” and then resolving the ambivalences so as to reach a new synthesis.<sup>29</sup>

The evolutionary model predicts that under conditions of societal stress and breakdown a number of prophets will emerge, but it also predicts that in the long run not all prophetic restructurings of religious beliefs, actions, and experiences will be selected as viable or adaptive and hence retained. In short, one expects a separation of true from false prophets, the criterion for which would not be the stated origin of the prophecy (variations are blind, i.e., decoupled from selective criteria) but the ability of the prophetic message and the society following the message to continue to reproduce their biological and cultural systems of knowledge. Expressing this idea derived from the evolutionary model of ultimate reality in terms of the traditional Judeo-Christian personalistic model, we might say that even prophets are subject to the ongoing judgment of the “Lord of the universe and history.”

#### THE PROBLEM OF PLURALISM

Earlier in this essay I stressed the importance of the general fact of cultural pluralism and raised the question of how an understanding

of religious knowledge might cope with this situation. We suggested the difficulty that the traditional, personal model of the ultimate has in dealing with new ideas in science and with other living religious traditions, especially if it assumes religious truth revealed through the word of God is eternal truth, valid in all times and places. This problem is even more difficult than first indicated, because one can add the dimension of time to the question of pluralism. When we do this, we become concerned not only with the present diversity of options about what to think, do, and experience religiously, but also we begin to wonder at the general fact that over time new cultures with new religions have come into being while other cultures and their religions have died, in much the same way that new biological species come into existence while others perish. Regardless of the conception of ultimate reality, whether personal or nonpersonal, one is driven to ask, what is ultimate reality doing? The problem may be more acute for the personal model of the ultimate, because one using this model can be asked to explain how it is that God could intend and plan things to be this way—unless one employs a second explanation, as part of an overall religious theory, that the constantly changing world as we know it is not due to God's will but to something else, the work of realities opposed to God or human sin.

The evolutionary model of ultimate reality faces this same problem and interestingly enough offers a portrayal of what is going on that can be incorporated into a personal model.

Because it stresses the continuity of cultural with genetic knowledge, the evolutionary perspective recognizes that both genotypes and culturetypes originally come into being through variation and selection in particular environments. As the environments change the old formulations of the genetic or cultural code may become maladaptive and at least potentially lethal for the species or culture. One example is the taste for sweets. This taste may have functioned originally as a vicarious selector to provide nourishing natural sugars; however, in a culture that produces many artificial sweets and non-nourishing sugar substitutes, this taste becomes unreliable and perhaps even harmful. A second example of how cultural knowledge of what to do may become maladaptive is the value of military patriotism, a derivative from reciprocal altruism of the group and at one time serving to help defend the group. But in an age of weapons so powerful that perhaps no culture could survive a nuclear holocaust, military patriotism may be a maladaptive value. A third example concerns reproduction. Is the genetically based and culturally supported commandment, be fruitful and multiply, and fill the earth and subdue it, still adaptive? At one time, when human populations were limited in size, it probably was a necessary imperative; those who did

not possess this commandment genetically and/or culturally would have been at a disadvantage in reproducing the rest of their genetic and cultural knowledge. However, today, when excessive population growth seems to be taking us beyond the carrying capacity of the earth and thus threatening the balance of our planet's ecosystems, such an imperative may need revision. As Campbell points out, the biological and cultural knowledge concerning what we ought to do (as well as what we ought to think and experience), knowledge that we have inherited, represents "wisdom about past environments"; such knowledge does not seem to be true for all time.<sup>30</sup>

The facts of history, cultural anthropology, and biology force us to recognize that species and cultures, including the various systems of knowledge that serve as their bases, are ever changing. What does this tell us about the nature of ultimate reality and what it seems to be doing in the universe as we experience it?

We can make an inroad into this question by summarizing the work of some European scientists who are dealing with thermodynamics and creation. Ilya Prigogine, Manfred Eigen, and others have been working on the problem of how complexly ordered entities such as living systems can come into being when, according to the second law of thermodynamics, the natural tendency of the universe is to move toward random disorder.<sup>31</sup> To resolve this problem Prigogine and Eigen postulate that creation comes about through the interaction of chance and law. During the ten to twenty billion years of the universe's existence since the big bang, there seems to have been a constant search for hidden stabilities in nature. The search is essentially random, often without results, until a particular combination of positive and negative energy uncovers a hidden stability and a particular atom is formed. The same random search for stable states far from thermodynamic equilibrium continues: atoms form more complex stable arrangements called molecules, molecules form still more complex arrangements that are self-reproducing and hence living, and living organisms discover new patterns of genetic knowledge that allow them to diversify and adapt to, or become stable in, particular kinds of environments. The process of creation thus goes on in the trial-and-error search for the actualization of an ever greater number of potential stable states until we humans appear on the scene.

However, for us and other new species to appear something interesting had to happen. Other already-existing species, in their uniqueness, had to die by transformation of their genetic knowledge. Biologically this transformation can occur by two different mechanisms: in reproduction through mitosis the transformation occurs through copying errors in both DNA and protein chains. These errors are the result of quantum effects and are hence, for all practi-

cal purposes, unpredictable.<sup>32</sup> The second source of biological transformation is bisexual reproduction, in which the mechanism of DNA recombination makes offspring genetically different from their parents. Analogous to some of the mechanisms producing changes in genetic knowledge are cultural mechanisms that likewise alter what we think, do, and experience. In some cases cultural change seems to occur simply through copying errors in the transmittal of already existing knowledge. Scribes who copied ancient texts, for example, are recognized to have made errors that alter the meaning of the text, and teachers passing on a particular piece of information may put that information in a new context or give it a new interpretation that likewise alters the sense of what is being said. If one looks for an analog to bisexual reproduction in cultural evolution, one might cite the making of analogies—the borrowing of ideas from one area of thought and applying them to other areas of thought. In addition there is a method of change in human thought that seems to be different from any method of biological change; this is the dialectical principle of affirming the opposite. Examples of this principle in operation are the denial of the postulate of parallel lines by nineteenth-century non-Euclidian geometries and Albert Einstein's denial of the Galilean theorem of the addition of velocities in regard to light. In both cases once the affirmation of the opposite was made new systems of thought were worked out.<sup>33</sup>

All three types of mechanisms may be at work to initiate changes in religious thought, practice, and experience. Some changes may simply be unintentional copying errors, such as those that led to the variety of New Testament texts in the early church. Some may be a recombination of ideas as when Augustine of Hippo combined the Christian message he inherited with Neoplatonism or when Thomas Aquinas recombined the Platonic Christianity he inherited with Aristotle's philosophy. Finally, some religious developments may be dialectical, a pattern which was idealized by G. W. F. Hegel to be that of universal creation.<sup>34</sup>

In both biological and cultural cases, the mechanisms produce changes that may be detrimental to the existing species or cultural systems: because they alter existing patterns, genotypic and culturetypic changes can destabilize a system and lead to its demise. On the other hand, some of the changes produced by the same mechanisms may give rise to new genetic or cultural knowledge that enhances, modifies, or replaces the prior heritage. Our evolutionary outlook suggests that both these phenomena, death and new birth, are not unusual but are, indeed, consistent with the way the universe works. In short, ultimate reality seems to be dynamically creating ever new systems of order, including ever new systems of knowledge. For

this to occur in a finite universe, however, the creation of new order and knowledge can only come about as some prior order or knowledge is destroyed. Creation from the evolutionary perspective is always to some extent death and transformation.

If we express this general picture of universal creation in metaphorical terms, it is as if the universe were a cosmic symphony. Underlying laws of nature provide its basic rhythms, and in keeping with these laws the universe searches out new melodies and chords. At the beginning the melodies were simple and many still repeat today, but as the symphony continues to create itself the melodies become more varied, the harmonies more complex. Also, as the complex symphony plays on, some of the melodies and harmonies die out; whole movements come into being, then pass away. This must be so, for unless this happens all we would have is noise. 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 the environmentalist John Muir 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."<sup>35</sup>

Thus, from the point of view of an evolutionary model, one expects both biological and cultural pluralism, not only in the present but also through time, as a manifestation of the creative work of existence. Can such an understanding be incorporated into a personal model of ultimate reality? Interestingly enough it can and has been incorporated by A. R. Peacocke, who gives the work of Prigogine and Eigen a theistic, personalistic interpretation. In speaking of the music of creation, Peacocke suggests that God as creator is "like a composer who, beginning with an arrangement of notes in an apparently simple tune, elaborates and expands it into a fugue by a variety of devices of fragmentation and reassociation; of turning it upside down and back to front; by overlapping these and other variations of it in a range of tonalities; by a profusion of patterns of sequences in time, with always the consequent interplay of sound flowing in an orderly way from the chosen initiating ploy. . . . In this kind of way might the Creator be imagined to unfold the potentialities of the universe which he himself has given it."<sup>36</sup>

Peacocke then goes on to cite a traditional religious conception that says much the same, the Hindu God Shiva, the Creator-Destroyer, who is the Lord of the Dance of creation. In commenting on the idea of Shiva as the ultimate reality dancing out the universe, Sir Charles Eliot observes that Shivaism "gives the best picture . . . of the force which rules the universe as it is, which reproduces and destroys, and

in performing one of these acts necessarily performs the other, seeing that both are but aspects of change. . . ."<sup>37</sup> Thus, there are personal models of ultimate reality as well as the nonpersonal evolutionary model that allow for the pluralistic view of culture and of knowledge, including religious knowledge. Of course in adopting a personal view of God as a cosmic composer or as Lord of the Dance, one must give up the traditional Greek idea, which has so permeated Christian thought, that the truth can only be really true if it is eternal or unchanging and that a particular body of religious knowledge must reflect this eternal nature of truth. If this assumption can be relinquished, if even a personal model of ultimate reality can recognize that knowledge created by God at different times and places is part of a larger, dynamic, unfolding process of God's universal, ongoing creation, then the religious thinker can rest easier with a pluralism of religious belief, practice, and experience than many religious thinkers of the past have done, at least in the West.

However, what about the individual who is confronted with this pluralism and who is trying to decide from among various options what he or she ought to think, do, or experience? How does one come to know the "will of God" in a particular time and place? I suggest that one comes to religious knowledge for oneself by doing what the universe itself seems to have been doing since its inception, by trying to preserve the knowledge from the past while at the same time recognizing new environments and cultural situations, and by searching for new stable states. Religion and morality, like science, and indeed like life itself, must to some extent be experimental. While one tries to act and think according to the tested knowledge of the past, one also continues to test that knowledge in new situations and to form and test variations on that knowledge. For example, in ethics, concerning what ought to be done, when past directions for deciding moral questions no longer suffice, one must engage in a conceptual and then behavioral trial and error search for new directives, or modifications of the old directives, that will solve the new moral dilemmas. This is in fact what seems to be happening in medical ethics in response to technological developments that have altered the cultural environment. However, what is not recognized sufficiently by current ethicists, including those with theological training, is that by searching out new formulations of what ought to be done, one is engaged in the work of God. Or in evolutionary terms, one is a part of the ongoing creativity of ultimate reality.

This general advice on how to act in a pluralistic age turns out to be much the same as that offered by Saint Paul to the early Christian church. Paul, who also lived in a culturally pluralistic environment, urged the followers of Christ to live not according to the law but by

the Spirit.<sup>38</sup> The law may be taken to represent the wisdom of the past, but in the new age ushered in by Christ one needs a more dynamic conception of how to live. That new, more dynamic conception was not complete lawlessness but living experimentally in tune with a more fluid spiritual reality.

In this tension between the established past, which to some extent must always die, and the emergence of the not yet fully existent nor fully known future, there is then a general principle, based on the evolutionary picture of ultimate reality, that gives some stability to our search for those yet undiscovered niches or stable patterns of behavior which may represent God's will. If we are not just looking out for ourselves, trying to preserve the truth and the good we already have, but if we are committed to carrying on the work of God, or committed to participation in the evolutionary process as effectively as we can, then we might follow the imperative: as you try to seek new knowledge of what ought to be thought, done, and experienced, at the same time try to assist the reproduction of as much of the old knowledge from your own system and from other genetic and cultural systems as you can—with humility, knowing that you cannot be entirely sure what aspects of the tradition still may be valid. This imperative is a special case of a more general imperative that seems to reflect what is going on in the universe: as you try to create new stable states, try to preserve and not diminish order elsewhere in your society, planet, and universe.<sup>39</sup> These directives from the evolutionary model can also be expressed in the more traditional personal model as “Love the Lord your God with all your heart, and mind, and strength; and your neighbor as yourself.”

#### THE RELIGIOUS VALIDITY OF THE EVOLUTIONARY MODEL

The general evolutionary model of ultimate reality and its corresponding view of the creation of knowledge, including religious knowledge, must be valid for both scientific and religious universes of discourse.<sup>40</sup> In particular, an evolutionary theory of knowledge must be able to offer a reasonable scientific picture of the way inquiry proceeds in seeking explanations of the world, human nature, and society. Its scientific hypothesis is that human inquiry in general, and scientific and religious inquiries in particular, are special cases of cultural evolution, which can be modeled with the same Darwinian mechanisms that are used in modeling biological evolution. I have been describing this model in relation to religious inquiry in the preceding sections of the paper. Campbell and Popper have written at some length on how the Darwinian model—augmented with vicarious variation-selection-retention processes known as intelligent



thought—seems to describe creative, scientific inquiry.<sup>41</sup> In the concluding section of this essay I wish to suggest how the evolutionary model of ultimate reality and its corresponding epistemology may be evaluated for its *religious* adequacy, the issue we raised at the end of the section on “The Evolution of Religious Knowledge.”

If we go back to our original working definition of religion as the system of thoughts, actions, and experiences relating individuals and/or societies to what is ultimate, and if we remember that we offered a further definition of ultimate as metaphysically, valuationally, and existentially ultimate, we have a statement of some basic criteria that can be used to evaluate the adequacy of more specific personal or nonpersonal models of ultimate reality. (From the evolutionary point of view these criteria are themselves vicarious selectors that serve as initial indicators as to whether a particular understanding of ultimate reality might help make sufficient sense of things and unify a group of followers so as to reproduce itself.)

Burhoe and I have written elsewhere on the evolutionary understanding of God offering reasons for its metaphysical and valuational ultimacy.<sup>42</sup> Briefly, if the ultimate is conceived to be the entire evolving universe, one can argue for its metaphysical ultimacy, as indeed, pantheistic religious philosophies have done. This seems to imply valuational ultimacy, because it is the evolving universe itself, through a series of emergent levels, that gives rise to human values; one can claim that the source of all value is the highest value as Henry Nelson Wieman, for example, has done.<sup>43</sup>

Now I wish to focus on the criterion of existential ultimacy and ask to what extent the evolutionary model provides an understanding of ultimate reality that is meaningful for the individual not just rationally but emotionally. This is one of the common concerns held by those who advocate a personal model of ultimate reality, who argue that only a personal understanding of God can be satisfying for a human person in providing such things as a sense of meaning and a moral direction for our lives.

Sometimes religious traditions have used nonpersonal metaphors to signify the relations between persons. One example of this is Jesus's picturing the relationship between himself and his disciples as “I am the vine, you are the branches.”<sup>44</sup> Jesus in his parables also uses nonpersonal images from his pastoral society to portray metaphorically insights about God and God's work among men. His early church followers reciprocate, using the physical image of light to portray Jesus as the light of the world, which complements his admonition in the Sermon on the Mount not to hide their light under a bushel. In a religion whose conception of ultimate reality is essentially personal, relationships can be described in nonpersonal terms.

Can the reverse also be allowed? Can a view of ultimate reality as a nonpersonal process of Darwinian evolution use personal analogies to speak of the relationship between humans and the evolving system of nature? I think so. Whether one uses the personal or evolutionary model of ultimate reality, one can—perhaps one must—describe one's relationship to ultimate reality in terms of the personal relationship between offspring and parent. On the one hand, we have been genetically and culturally created, not just by our earthly parents, and not just by our ancestors and past cultural leaders, but in the final analysis we have been created by that process that creates everything else in the universe, regardless of how we conceptualize it. On the other hand, as offspring, we carry on the work of our parents in further genetic and cultural creation, although, unlike our earthly fathers and mothers, our divine parent does not die but continues to create with and through us.

The relationship between offspring and parents applied to nonpersonal ultimate reality is clearly illustrated by the Japanese Confucian philosopher, Ekken Kaibara (1630-1714):

All men may be said to owe their birth to their parents, but a further inquiry into their origins reveals that men come into being because of nature's law of life. Thus all men in the world are children born of heaven and earth, and heaven and earth are the great parents of us all. The *Book of History* says, 'Heaven and earth are the father and mother of all things.' Our own parents are truly our parents; but heaven and earth are the parents of everyone in the world. Moreover, though we are brought up after birth through the care of our own parents and are sustained on the gracious bounty of the ruler, still if we go to the root of the matter, we find that we sustain ourselves using the things produced by nature for food, dress, housing, and implements. Thus, not only do all men at the outset come into being because of nature's law of life, but from birth till the end of life they are kept in existence by the support of heaven and earth. Man surpasses all other created things in his indebtedness to the limitless bounty of nature. It will be seen therefore that man's duty is not only to do his best to serve his parents, which is a matter of course, but also to serve nature throughout his life in order to repay his immense debt. That is one thing all men should keep in mind constantly.<sup>45</sup>

The same possibility of a personal relationship with a nonpersonal reality is contained in the thought of Martin Buber, in his famous work, *I and Thou*.<sup>46</sup> In contrast to the I-it mode of existence, in which there is a fundamental separateness between someone and another person, another thing, or God, Buber contends that the I-Thou or relational mode of existence involves the total giving of each party to the other, the entering into relation in the fulness of one's being.

If our own being is understood to be the result of a long evolutionary process that conditions our genetic and cultural knowledge, which are central to ourselves in that they shape our physiologies and our thinking, behaving, and experiencing, and if we understand ourselves as carrying on that very process of creation that shaped us by

searching for new knowledge and other forms of order, then we can picture ourselves as so wrapped up with the universe and the process that continues to create it, we might say we stand in an *I-Thou* relationship with ultimate reality. This realization should be emotionally motivating, because our own individual existences have a place in the overall scheme of things. Furthermore, we are involved in a process that will continue after our particular phenotypes (or bodies) die. Yet the process of creation continues differently to some small extent because we lived. We indeed contribute to the work of God, even if God is conceived as a process that is nonpersonal and hence not aware of where things are going.

Insofar as personal images of the relationship between us and ultimate reality can be used, the evolutionary understanding of the ultimate seems to meet the criterion implied by the idea of existential ultimacy. However, this test also might be met through a nonpersonal metaphor expressing our relationship to the ultimate as our being "at home" in the universe. This metaphor was used by the philosopher Stephen Toulmin when he spoke about how a newly emerging cosmology makes possible a remarriage between science and natural theology.<sup>47</sup> Toulmin suggested that the new cosmology, based in part on ecological thinking, allows us to understand how we are at home in the universe. Is this idea just an intellectual recognition, or does it also have the emotional power that religious concepts are expected to have in order to satisfy the criterion of existential ultimacy?

I think the idea of being at home in the universe is both intellectually and emotionally satisfying, especially when it is related to the evolutionary model of ultimate reality as I have described it. There is a difference between a house and a home. One lives in a house, but the house remains separate. A home, however, is something of which I am a part and which is a part of me. When I see myself as a confluence of biological and cultural systems of knowledge created through a random variation-selection-retention process, and when I see myself in the same manner mirroring the process and contributing to the evolving universe, then the universe is not just a house, it is a home. This affects me, not just intellectually but also emotionally; it motivates me to want to do my best to continue creatively the genetic, cultural, and environmental heritage in which I live and move and have my being. In short, it seems possible to be related personally to that mysterious origin of all things called ultimate reality, even when that reality is conceptualized with a nonpersonal, evolutionary model.

#### NOTES

1. Even though I have formulated these epistemological questions in a normative manner, I am not dealing directly with the question of the "naturalistic fallacy." Actually what I am doing is something more radical than moving from "is" to "ought": I am

suggesting that even descriptive concerns, including scientific questions, require a normative formulation whenever there are genuine alternatives to be considered. This is parallel to the writing of some who suggest there are value questions to be considered even in scientific inquiry. See Bruce B. Wavell, "The Rationality of Values," *Zygon* 15 (March 1980): 43-56. In the normative formulations I have offered, however, the equivalent of the problem of moving from "is" to "ought" still exists as the problem of how one moves from what we ought to believe and experience to what we ought to do. In other words, after we have decided issues of "true belief" and "real experience" we still have the problem of how these are to be related to future courses of action. This is because, once the decisions are made as to what we ought to believe and experience, we take the combined results of these decisions as at least tentatively descriptive of the way things are. It is a further step (however one which is not addressed in this particular paper) as to how one moves from the way things are to what ought to be done from among the possibilities that in the future may change the way things are.

2. In philosophy "knowledge" is usually understood to be "true belief" and hence is only conceptual. However, in religion people often speak of experiential knowledge, and common usage seems to support the notion of behavioral knowledge along the lines I have indicated. See further my definition of "knowledge" below in the section titled "Knowledge in an Evolutionary Perspective."

3. Paul Tillich, *Systematic Theology* (Chicago: University of Chicago Press, 1951), 1:211-15.

4. Cf. Henry Nelson Wieman who suggests that the creativity underlying all felt quality and knowable order is "ultimate in two senses: It is metaphysically ultimate because it is logically prior to all other knowledge and experience; it is religiously ultimate and valuationally (axiologically) ultimate because it brings forth the greatest human good which man can ever experience. . . ." *Man's Ultimate Commitment* (Carbondale: Southern Illinois University Press, Arcturus Books, 1958), p. 92. Metaphysical and valuational ultimacy are also implied in Frederick Ferré's definition of "religion . . . as the conscious desiring of whatever (if anything) is considered to be both inclusive in its bearing on one's life and primary in its importance," or "religion is one's way of valuing most comprehensively and intensively." *Basic Modern Philosophy of Religion* (New York: Charles Scribner's Sons, 1967), p. 69.

5. Luke 17:21, RSV.

6. Cf. Harold K. Schilling's discussion of mystery in science and religion in *The New Consciousness in Science and Religion* (Philadelphia: United Church Press, 1973), and Carl Raschke, "From God to Infinity, or How Science Raided Religion's Patent on Mystery," *Zygon* 17 (September 1982): 227-42.

7. One criticism of the use of the word "ultimate" in a definition of "religion" is that ultimacy implies something singular. If this is so, the very existence of polytheistic religions shows the limits of the definition if "ultimate" implies one final, single reality as the ground of existence, the highest good, and the focus of personal concern. However, the word might still cover polytheistic religions if their various deities can be conceived to make up a single system, for example in a divine family or court. In any case, our definition of religion seems to apply well to the major developed religions of the world, which express a monotheistic or monistic conception of the reality that underlies all existence, and to contemporary naturalism, which views the total universe as the final reality.

8. There is a growing body of literature on Alfred North Whitehead and the use of his thinking in religious thought. Important works by Whitehead on the nature of God are *Science and the Modern World* (1925, New York: New American Library, Mentor Books, 1964); *Religion in the Making* (1926, New York: World Publishing Company, Meridian Books, 1965); and *Process and Reality* (1929, New York: Harper & Row, Harper Torchbooks, 1960). Some good introductions analyzing Whitehead's thought and showing how it may be developed theologically include William A. Christian, *An Interpretation of Whitehead's Metaphysics* (New Haven, Conn.: Yale University Press, 1967); Donald W. Sherburne, *A Key to Whitehead's "Process and Reality"* (New York: Macmillan, 1966); Elizabeth M. Kraus, *The Metaphysics of Experience: A Companion to Whitehead's "Process and Reality"* (New York: Fordham University Press, 1979); and John B. Cobb, Jr., *A Christian Natural Theology* (Philadelphia: Westminster Press, 1965). For

the ongoing discussion of process philosophy and theology see the journal *Process Studies* (Claremont, Calif.: Process Studies, 1971- ).

9. Cf. Karl Barth, *The Doctrine of the World of God; Church Dogmatics*, vol. 1, pt. 1, trans. G. T. Thomson (Edinburgh: T. & T. Clark, 1936), pp. 124-35; and Emil Brunner, *The Christian Doctrine of God*, trans. Olive Wyon (Philadelphia: Westminster Press, 1950), pp. 22-34. What follows is not strictly a Barthian formulation, because Barth limits religious knowledge to special revelation.

10. See Saint Paul in Rom. 1:18-23; also Friedrich Schleiermacher, *On Religion: Speeches to its Cultured Despisers* (New York: Harper & Brothers, Harper Torchbooks, 1958), pp. 210-65.

11. Karl E. Peters, "The Image of God as a Model for Humanization," *Zygon* 9 (June 1974): 98-125; J. Bronowski, "New Concepts in the Evolution of Complexity: Stratified Stability and Unbounded Plans," *Zygon* 5 (March 1970): 18-35; and Ralph Wendell Burhoe, "Natural Selection and God," *Zygon* 7 (March 1972): 30-63, reprinted in Ralph Wendell Burhoe, *Toward a Scientific Theology* (Belfast: Christian Journals Limited, 1981), pp. 77-111.

12. Of course, at the different levels of cosmic evolution there are different mechanisms for variation, selection, and retention of order or information. All that is being asserted here is a common variation-selection-retention pattern. Various mechanisms will be specified as we develop our Darwinian model.

13. Donald T. Campbell, "Blind Variation and Selective Retention in Creative Thought as in Other Knowledge Processes," *Psychological Review* 67 (1960): 380, n. 2.

14. George C. Williams, *Adaptation and Natural Selection* (Princeton, N.J.: Princeton University Press, 1966), pp. 58-61.

15. Donald T. Campbell, "Evolutionary Epistemology," *The Philosophy of Karl Popper*, The Library of Living Philosophers, ed. P. A. Schilpp (LaSalle, Illinois: Open Court, 1974), 1:423.

16. One of Donald T. Campbell's most systematic statements about vicarious selectors is in "Descriptive Epistemology: Psychological, Sociological, and Evolutionary" (William James Lectures delivered at Harvard University, Spring 1977).

17. Campbell, "Evolutionary Epistemology," 1:424.

18. Ralph Wendell Burhoe, "The Source of Civilization in the Natural Selection of Coadapted Information in Genes and Culture," *Zygon* 11 (September 1976): 263-303, reprinted in Ralph Wendell Burhoe, *Toward a Scientific Theology*, pp. 151-99; idem, "Religion's Role in Human Evolution: The Missing Link between Ape-man's Selfish Genes and Civilized Altruism," *Zygon* 14 (June 1979): 135-62, reprinted in *Toward a Scientific Theology*, pp. 201-33.

19. Paul D. MacLean, "Evolution of the Psychenecephalon," *Zygon* 17 (June 1982): 201-4.

20. Burhoe, "Religion's Role in Human Evolution," pp. 153-58.

21. The development of the idea of resurrection and final judgment in late Judaism is expressed in Dan. 12: 1-3.

22. In response to the positivist criticism that religious language is meaningless because its claims are in principle unverifiable by observation, John Hick has suggested that the verification, although not the falsification, of such beliefs as an individual experiencing existence after death or a kingdom of God ruled by Christ could take place after death: if such beliefs are true a person will have a confirming experience after death; however, if the belief in an individual experiencing existence after death is not true, we will not know it. See John Hick, *Faith and Knowledge* (Ithaca, N.Y.: Cornell University Press, 1957), pp. 150-63; idem, "Theology and Verification," *Theology Today* 17 (April 1960): 12-31, reprinted in *The Existence of God*, ed. John Hick (New York: Macmillan, 1964), pp. 252-74.

23. MacLean, pp. 204-9. For a summary of the connections between the neocortex and the limbic system in perception and long-term memory, see John C. Eccles, *The Human Mystery* (Berlin: Springer-Verlag, 1979), pp. 176-77, 194-203.

24. Gen. 1:28. In the finally edited form of the Bible, this is the first commandment God gives to humans.

25. See Robert B. Glassman, "An Evolutionary Hypothesis about Teaching and Proselytizing Behaviors," *Zygon* 15 (June 1980): 133-54.

26. See A. R. Peacocke's summary of the work of Ilya Prigogine and M. Eigen in *Creation and the World of Science* (Oxford: Clarendon Press, 1979), pp. 97-104, reprinted in "Chance and the Life-Game," *Zygon* 14 (December 1979): 310-15. It is true of course that the mechanisms involved in variation-selection-retention at the atomic and molecular level of creation are different from those that create living organisms, just as the mechanisms of biological evolution are different from those of cultural creation. However, the important metaphysical point is that the basic patterns of creation (the variation-selection-retention pattern) is universal. If it is universal, then it is metaphysically ultimate. See Peters, "The Image of God" (n. 11 above), pp. 104-23.

27. One line of inquiry should examine the recent scientific proposals on punctuated evolution, which if correct would modify the more common Darwinian gradualism. For a detailed discussion of punctualism and its implications for religious thought see Steven M. Stanley, *The New Evolutionary Timetable: Fossils, Genes, and the Origin of Species* (New York: Basic Books, 1981). If punctuated evolution were biologically true, it might serve as an analogue to the phenomenon of sudden, new, religious movements in culture.

28. Other factors include the repetitive stimulus of certain rituals, the sensory deprivation of some forms of meditation, and drugs. See Anthony Wallace, *Religion: An Anthropological View* (New York: Random House, 1966), pp. 239-42, and Eugene G. d'Aquili and Charles Laughlin, Jr., "The Biopsychological Determinants of Religious Ritual Behavior," *Zygon* 10 (March 1975): 32-58. For a discussion of revitalization movements see Wallace, pp. 157-65, and Solomon H. Katz, "The Dehumanization and Rehumanization of Science and Society," *Zygon* 9 (June 1974): 126-38.

29. Anthony Wallace, "Mazeway Resynthesis: A Biocultural Theory of Religious Inspiration," *Transactions of the New York Academy of Sciences* 18 (1956): 636-37. Barbara Lex gives another analysis of the same process in "Neurological Bases of Revitalization Movements," *Zygon* 13 (December 1978): 276-312.

30. Donald T. Campbell, "On the Conflicts between Biological and Social Evolution and between Psychology and Moral Tradition," *Zygon* 11 (September 1976): 202, reprinted from *American Psychologist* 30 (1975): 1103-26.

31. Peacocke (n. 26 above).

32. See Bronowski (n. 11 above), p. 22-24.

33. For a more detailed statement of the roles analogy and of affirming the opposite in cultural creation, see Karl E. Peters, "The Concept of God and the Method of Science: An Exploration of the Possibility of Scientific Theology," (Ph.D. diss., Columbia University, 1971), pp. 67-68, 91-92, 176-78, and idem, "Image of God" pp. 109-12.

34. G. W. F. Hegel, *Phenomenology of Spirit*, trans. A. V. Miller (Oxford: Oxford University Press, 1977).

35. Kent Danner, ed., *The American Wilderness in the Words of John Muir* (Waukesha, Wis.: Country Beautiful Corp., 1973), p. 58.

36. Peacocke (n. 26 above), pp. 316-17.

37. Sir Charles Elliot, *Hinduism and Buddhism* (London: Edward Arnold, 1921), 2:144, quoted in John B. Noss, *Man's Religions*, 6th ed. (New York: Macmillan, 1980), p. 199.

38. Rom. 7:1-8:17.

39. Cf. R. B. Lindsay's "thermodynamic imperative" in "The Larger Cybernetics," *Zygon* 6 (June 1971): 132-34.

40. The idea of separate universes of discourse is articulated nicely by Bruce B. Wavell in this *Zygon* issue. While Wavell cogently describes the methodological problem faced by those who seek to unite in some way science and religion, my suggestion here is that such a unification may be possible if one can develop understandings that meet the criteria of both scientific and religious discourse.

41. See for example Campbell, "Blind Variation and Selective Retention" (n. 13 above), "Evolutionary Epistemology" (n. 15 above), "Descriptive Epistemology" (n. 16 above), Donald T. Campbell, "Unjustified Variation and Selective Retention in Scientific Discovery," *Studies in the Philosophy of Biology*, ed. F. J. Ayala and T. Dobzhansky (New York: Macmillan, 1974), pp. 139-61, and Karl R. Popper, *Objective Knowledge: An Evolutionary Approach* (Oxford: Clarendon Press, 1975).

- 42. Burhoe, "Natural Selection and God" (n. 11 above), and Peters, "The Image of God" (n. 11 above), esp. pp. 104-13.
- 43. Henry N. Wieman, *The Source of Human Good* (Carbondale: Southern Illinois University Press, Arcturus Books, 1964), esp. pp. 54-83.
- 44. John 15:1-10.
- 45. Ekken Kaibara, "Precepts for Children," *Sources of Japanese Tradition*, ed. R. Tsunoda et al. (New York: Columbia University Press, 1958), p. 367.
- 46. Martin Buber, *I and Thou*, trans. Walter Kaufman (New York: Charles Scribner's Sons, 1970).
- 47. Stephen Toulmin, "The Future of Cosmology: Can Science and Natural Theology Get Together Again?—The Fire and the Rose" (Lecture delivered at the Divinity School, University of Chicago, Spring, 1979).

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