SOCIOBIOLOGY, GOD, AND UNDERSTANDING

by Charles J. Lumsden

Abstract. This article presents the rationale of a new approach to the debate between sociobiology and religion. In it, I outline a sociobiology that may generate alternative and competing hypotheses about the existence of gods as beings (theisms) and the nature of their participation in the universe. I examine the central theoretical issues of this sociobiology and discuss the strengths and weaknesses of a sociobiological approach to theological issues, including problems pertinent to nontheistic theologies. A concluding case is made for an enriched and revitalized agenda in the dialogue between sociobiology and religion. While consistent with current research on gene-culture coevolution, the article's treatment expands on earlier work to begin incorporating theoretical terms that carry a more direct theological impact.

Keywords: God; mathematical theology; natural theology; science and religion; sociobiology; theism.

> Religion constitutes the greatest challenge to human sociobiology and its most exciting opportunity to progress as a truly original theoretical discipline.
>
> Edward O. Wilson (1978, 175)

> A proper examination [of the world, God, or our relation to them] involves a dialectic and dialogue [between science and religion], for it is to the world described by science that our questions inevitably refer, and it is in the world so described that we seek meaning—for that world-view has been forged by a science which is the most reliable intellectual tool man

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> has devised for understanding the structure and nature of the cosmos into which he is born.
>
> Arthur Peacocke (1984, 76)

Sociobiology, in its present form, is not a theory of or about gods or God and the spiritual consequences thereof, and this surely accounts in large part for why we sociobiologists have progressed but little way along the road Professor Wilson illuminated. For unless a scientific theory is also a theory of gods and the relation of god to universe, or can generate such a theory, or can produce propositions that are also the propositions of such a theory, one can have little hope for its ultimate theological interest. Whether the emphasis is on prediction or retrodiction, sociobiological method has traditionally dealt with behaviors, thoughts, and feelings as events and processes whose significance is restricted to the material world, the conventional arena of the natural sciences. Within this arena it is meaningful to speak of different kinds of significance—for instance, the ecological, genetic, or political significance of an organism's actions—but not of spiritual significance. Thus far, human sociobiology has failed to define procedures for assigning spiritual or religious significance to any occurrence. A sociobiological grammar of sin, redemption, and God or gods still awaits discovery. This article explores the prospect of such a sociobiology.

What is theology? It encompasses many topics (see, for example, Sutphin 1987); but at least in part it is the scholarly attempt to provide religious experience with an understanding or interpretation of faith, one that makes sense of religious experience in light of spiritual needs. In the search for faith and understanding, the notion of god (or God) is often a touchstone for what lies within the relation sought between self and universe. John Cobb (1965) has made the point that such theology, taken as the systematic interpretation of faith, can include more than beliefs organized around the idea of God in the restricted sense of Christian theology. I will use the term *theology* in the more general sense referred to by Cobb, since the implications of sociobiology involve the structures and objects of human faith as manifested in their cross-cultural diversity. However, since science-religion debates are for the most part held with Christian theologians, I will emphasize concepts essential to these scholars; in particular that of God and the relationship of God to person.

If theology strives for clear understandings of faith, religion puts faith into action through behaviors that express the sacred beliefs and institutions that establish settings for worship and celebration. Sociobiologists and social scientists study the diverse ways a religion functions in the life of the individual and the society (Dobzhansky

1966; Rappaport 1971, 1979; Campbell 1975; Wilson 1975, 1978; Alexander 1979; Burhoe 1981; Reynolds & Tanner 1983; d'Aquili 1985). Indeed, functional analysis of religion in Darwinian terms comprises almost all of the current dialogue between sociobiology and religion. Within the terms of this discourse, sociobiologists can assign theological significance to events by adopting the appropriate (theological) ways of thinking about the world. But the result is not yet sociobiology, and sociobiology as we know it cannot yet begin to supply such ways of thinking.

The point is simple but important. To have a theory of *beliefs about X*, where *X* is for example some god (not necessarily a personified being), is not the same as having a theory *of X per se*. In the current literature human sociobiology is very much a theory of the former type. To the extent we can do anything sociobiological with god-like entities of a sort *X*, it is the making of explanations or predictions about specific religious beliefs about *X* being present in a population (Wilson 1978; Lumsden & Wilson 1981, 1983; Lumsden & Gushurst 1985). The context of this reasoning is a set of functional assumptions related to the consequences of the beliefs but unrelated to the actual presence or absence of *X*. To make the whole affair "scientific," the implicit assumption is usually that *X* is absent. Thus within sociobiology we do not yet know how to capture the meaning of such propositions as: "God exists"; "God is love"; "A divine spirit is omnipotent"; "People receive the blessing of grace"; nor do we even know how to express the individual terms from which these claims are composed.

One might suggest that this condition of sociobiological theory is advantageous. The proper definition of "sociobiology and religion" sees "religion" as institutions, groups, thoughts, and feelings. Sociobiology helps clarify the means by which religion affects social function and individual development. The rest is a matter for theological reflection. Under such a split, however, it is difficult to envisage sociobiology ever having much significant to say in the great debates it has joined. If it is theologically mute, the prospects for effective dialogue are few. I wish to suggest that any separation of "sociobiology and religion" from "sociobiology and theology" is not necessary and must be set aside. In particular, we may seek a sociobiology capable of better contact with theological concepts and meanings, and participating in an enriched dialogue with theology and religious scholarship.

The key is not to replace science with theology, or vice versa, but to remake theoretical human sociobiology into a more theologically interesting enterprise. If for example a god (or God) exists, the conceptual structure of sociobiology has it wrapped in a cloak of epistemological invisibility. However, there appears to be no logical impediment to

removing this cloak by writing an evolutionary science that begins to characterize god and god-universe relations and deals with observable consequences of this "divine" presence. It might then be possible to do sociobiology while posing statements with theological relevance.

Theism Versus Nontheism

Models for an expanded dialogue between sociobiology and religion already exist. Examples are to be found in process theology, selectionist theology, and secular theology. I shall have more to say of these below, where I suggest that recent sociobiology, with its emphasis on the human mind and culture as part of biological history, can help bring these theologies to fruition in their relationships to scientific understanding. Also at issue in this relationship is a sociobiology that will help recover the scientific credibility of what Nels Ferré (1952, 262) has termed the "great, immemorial Christian perspective" and place this perspective back within the science and religion debates in a revitalized form. Ferré is speaking of theism and of theism's central role in the historical development of the Christian faith. Theism, roughly, is the view of God as personal Spirit, not only Being, but a personal being, loving, conscious, perhaps necessary and eternal, beyond all created being but potentially (and potently) interacting with the creation (see Placher 1983; Owen 1984). When I use the term *nontheism* I will mean concepts of God shunning the notion of personal Spirit. *Atheism* will mean the view that there is no God of any sort.

The view of gods as personal beings, albeit divine on some scale, is of course not unique to Christendom. The tendency of human reflection to personify the natural world and to read the supernatural into the affairs of everyday life is so widespread as to suggest a species-specific trait (Wilson 1978). Ethnographic surveys make it plain that in non-industrialized cultures gods are often conceived as forces of nature given personified form (Parrinder 1984; Spiro 1987). Thus, the impact of the weather and environmental disturbances on individual lives is given meaning by attributing to them an intentional structure more or less equivalent to that of a living person. Such religious practices can occur in cultures of considerable complexity, as the exuberant genealogy of the Greek gods and goddesses attests. They occur as well in simpler orders closer to the roots of human evolution.

To make explicit reference to the gods envisaged by such cultures requires a modest but significant generalization of sociobiology. The natural processes (floods, storms) of which such gods are the supranatural interpretation of course already belong to science. Their imputed supernatural character, taken as part of the folk-religious personifications of Nature, goes beyond the properties of the beings thus far known to evolutionary biology—but not necessarily *far*

beyond, in the sense that the personae of these gods are frequently a familiar, very human, mix of virtues and foibles. Moreover, the powers of these gods to work changes in the structure of the material world are generally smooth extrapolations of relative omnipotence, omniscience, and so on from human capacities for knowing and acting (Brams 1983). Yet, despite their proximity to the nature of ordinary living beings (or perhaps precisely because of this) these gods, as objects of religious devotion, are sufficient to sustain complex traditions of ritual, worship, and sacred lore within their cultures. A systematic consideration of a sociobiology that can make meaningful assertions about the gods of such social orders qua gods, and thus clarify their intentions for humankind, their interrelations one to another, and their connections to nature and human action, may provide a useful first step toward a science of increased theological import. It also may contain ideas ultimately of relevance both to science and to a God as complex as that of Christian theism.

Since the Enlightenment, theism has increasingly lost favor in certain quarters, particularly among the avant garde of Protestant theology. More and more, scientific advances have made it seem unlikely that God is a patriarch floating about somewhere above our world. Science gives us Nature's laws, and engineering the wherewithall to put them to work. Who needs God? Philosophers and theologians have also called into question the very legitimacy of beliefs that place a potentially free human person in an objectifying relationship with an all-knowing, all-powerful personal Other. In a century that abhors totalitarianism among mortals, could a Supreme Being—a Being able to foresee, control, and punish our every move—be a tolerable foundation for Christian theology (Tillich 1952)? What religion needs, according to this influential argument, is theology more compatible with personal independence and freedom of will. Nontheistic conceptions of God have therefore appeared within contemporary Christian thought and have been vigorously championed (Sutphin 1987).

For the purposes of my discussion, these nontheistic conceptions can be sorted into three categories. I shall call them the *prosaic*, the *immanence*, and the *transcendent* theologies. Theistic perspectives, we will see, can also be organized within this scheme. Although crude, my scheme of three categories helps clarify sociobiology's relevance to ideas about God and other elements of religious thought. My rationale is that a sociobiology with theological import must contain, or at least refer to, notions in one or more of the three categories. At present, sociobiological theory lacks these notions or anything remotely like them.

I should stress that the terms prosaic, immanence, and transcendent are used descriptively. No normative (or pejorative) connotations

accompany their use. In calling a theology *transcendent* I will not be implying superiority of any kind to, say, one characterized as *prosaic*. On the normative side, the relative merits of the alternative theologies have been discussed extensively (for overviews see Bromiley 1978; Placher 1983; Sutphin 1987), and heated debate is certain to continue. I will not dwell on the contentions or their history, since both are peripheral to my goals. I have elected instead to describe each category of nontheistic theologies in terms of key properties and specific examples. I find that the categories range from extensive to nil in their connections to ideas about evolution and human nature, that is, to the core subject matter of sociobiological theory (Wilson 1975, 1978). The discussion then turns to important shortcomings common to all the nontheistic perspectives and how theism redresses them. I hope thereby to provide both a context for the theistic focus of the latter part of my discussion and to prepare the way for sociobiological studies of nontheistic perspectives more extensive than possible here.

Sociobiology and the Nontheisms

The prosaic, immanence, and transcendent theologies fit more or less comfortably into a scientific age. Where transcendent theologies treat God as strictly apart from the world we know through science, immanence theologies see God's presence and dynamism in evolution and clues to his nature in science's findings. Prosaic theologies swallow science whole, arranging its ideas into definitions of divine being and a life of faith.

By a prosaic theology I mean a systematic interpretation of faith that writes such concepts as *God*, *soul*, and *grace* in terms of material events or processes. *Pantheism*, or Nature as God, is the extreme case of a prosaic theology. I introduce the term prosaic alongside pantheism because the former term is highly descriptive of the intellectual task such theologies set for science, namely to know nature with increasing depth and completeness. This knowledge covers observational data and mathematical laws underlying what is accessible to scientific observation. Moreover, a theology can in general be considered prosaic by virtue of expressing some, but not all, of its principal concepts of faith in material terms. Thus in principle the class of prosaic theologies includes pantheisms as a subset but, for taxonomic convenience, goes beyond them.

Prosaic theology begins with the referents of scientific theory as we know it and develops a spiritual interpretation appropriate to matters of ultimate concern. The everyday findings of science take on substantial importance in prosaic theology since they are, from the viewpoint of spiritual questions, denotative of the very objects of faith. Con-

versely, science contributes strongly to these theologies merely by the continued actions of its established methods and institutions. The actions of scientific investigation lead to new data, hypothesized mechanisms for natural process and societal function, and underlying general principles and governing laws. For a prosaic theology each such discovery is a fresh object of spiritual significance.

Since the term pantheism seems to have inherited connotations almost as derogatory as theism has among some (for instance, Tillich 1952), one hesitates to apply it to anyone more contemporary than the Romantic nature poets. This is regrettable because to the materialist, pantheism and the prosaic theologies are the sole means of resurrecting systematic interpretations of faith in a secular age. If the material universe is all there is, such is the arena in which we must find our spiritual fulfillment. Fortunately, contemporary theologians have not been dissuaded, and their work contains important examples of prosaic formulations based on scientific ideas. Secular theology, in proclaiming the possibility of Christian faith without the concept of God and advancing notions about an essential identity of the divine and the human (Robinson 1963; Mascall 1965; Altizer 1966), is standing on prosaic ground. Liberation theology will never be confused with pantheism. But it is plainly prosaic in its political/biosocial definitions of critical concepts—for example sin as a social historical reality sustaining injustice (Gutiérrez 1973) and salvation as the total well-being of self in community with others (Sutphin 1987).

The "selectionist theology" of Ralph Wendell Burhoe (1973, 1979, 1981) is perhaps the most striking case in point. Carefully developed from Darwinian evolutionary biology and a depiction of the relation between cultural and biological evolution, selectionist theology sets out materialist readings for the ideas central to Christian faith (God = natural selection; soul = an enduring flow pattern "generated by the interaction of the energy and boundary conditions set by habitat (or cosmotype), genotype, and culturetype" [Burhoe 1981, 140]; grace = the relevance and purpose of human beings in the scheme of things). By joining science with a spiritual agenda one comes to a theology that explains God and universe in terms of our human relationship to biological and cultural evolution. The scientific study of this relationship is the central program of human sociobiology (Lumsden & Wilson, 1981, 1983).

Their vital connections with science do not reduce the prosaic theologies to empirical investigation. They are normative, interpretive enterprises built on science's reading of Nature (Burhoe 1981). Moreover, the existence of the prosaic theologies demonstrates—however spartan such prosaic conceptions may appear in retrospect—

that science is rich theologically, even in its present form. It does not necessarily lead to atheism, nor is it limited just to hinting at the immanent signs of a God our species can never know except by revelation.

For the sociobiologist, two points are in order. First, the prosaic theologies will advance in step with our understanding of human nature and its relation to the world. Sociobiology is one among multiple disciplines that focus on human nature. Its potential contributions to the study of humankind are, however, of particular interest. In the first place, sociobiology's taxonomic and comparative approach provides a context in which the findings of the other human sciences can be synthesized (Wilson 1975). Moreover, contemporary research in human sociobiology proposes a specific mechanism to explain both the origins of human nature and its unique properties. This is the causal circuit of interactions that runs from our genome to innate rules of brain development and culturally mediated learning, through individual decision-making to social action and social form. There, within the arena of social life, the circuit of interactions is closed by the effects our behaviors have on individual survival and reproductive success, which determine the abundances of gene variants in the population. Some of these variants affect mind, brain, and behavior (Lumsden & Wilson 1981).

Current evidence suggests that this gene-culture circuit of interactions underlies much, if not most, of what makes us human, including our propensities for culture learning, deliberated decision-making, creativity, and moral thought (for reviews see Lumsden & Gushurst 1985; Findlay & Lumsden 1988). As sociobiology's grip on the connections among genes, mind, and culture becomes firmer, the science-religion dialogue will acquire an improved method to predict and explain the key attributes of human nature. These explanations follow from the more general understanding of the gene-culture linkage, applied in the context of human ecology. Sociobiologies of this form, increasing the depth and precision with which they reveal human nature and its connections to the world, are therefore intensifying along lines of immediate relevance to the prosaic theologies, which seek the vocabulary of faith in the material truth about human origins and existence.

The second point for sociobiologists to consider is that, for a prosaic theology, scientific ideas are potentially theological concepts. The success or failure of prosaic theologies will follow as a test of conventional science in a secular age: can scientific knowledge touch deep spiritual questions as well as those about matter and mechanism? To build a systematic interpretation of Christian faith, or the principal elements

of *any* faith, from the science of human evolution—that is, from materialist human sociobiology—is a remarkable achievement. So far the results of this important attempt, realized most fully in Burhoe's work, portray such an indifferent God (natural selection) and secular soul (human nature's core "flow pattern") that it is unlikely to meet the needs of spiritual seeking. But this could change with further advances in the scientific understanding of our human nature and the way it crosslinks our biological and social history through the circuit of gene-culture interaction (Lumsden & Wilson 1981; Findlay & Lumsden 1988). The crosslinking produced by the circuit has the capacity to amplify goal-directed human action, so that in effect intentional structure is made part of the selectional mechanism itself, and reflected in evolutionary changes in the species pools of cultural and genetic information. (For a detailed discussion of gene-culture amplification see Lumsden & Wilson 1981.) Thus, the God of history, even a fully prosaic one, equated to an underlying principle of evolution, need not necessarily be devoid of attributes that might respond more meaningfully to human hopes and aspirations.

Immanence theologies also preserve the legacy of scientific understanding. They portray the universe in terms highly compatible with modern science, in a manner that sees God immanent within the events and structure of this world. God touches Nature and Nature touches God. Both may evolve, but the two are not equivalent. Through reason we may come to understand God partially, although the full truth about him is beyond empirical science. Indeed, reason is essential but, in the Thomistic spirit, must be allied with truth as revealed through faith. To the secular world of science is added another reality, reflected in but never fully revealed by a study of Nature. Process and natural theologies (Whitehead 1926, 1929; Hartshorne 1964, 1967; Cobb 1965; Peacocke 1986; Polkinghorne 1986) are distinguished representatives of this category of theological reflection.

There is of course room for theism in process and natural theology. The deity may have attributes of personal Being (Cobb 1965; Hartshorne 1967). But in many influential formulations, literal personhood receives less emphasis than do descriptions extrapolating from notions of scientific law (for instance, Whitehead's [1929, 522] God as the abstraction of a primordial "actuality," the non-conscious and unconditioned "actuality of conceptual feeling at the base of things") or from convenient anthropomorphism that makes comprehensible the objectively unknowable (Polkinghorne 1986, 38). However, in all the variations known to me, the immanence theologies are highly significant to a theologically relevant sociobiology. Despite their emphasis on God as beyond Nature, the immanence theologies rest on their demonstrable

compatibility with scientific knowledge. Scientific reasoning is seen as necessary to advancing our understanding of God. The ultimate object of this reasoning—God—is characterized (though never fully revealed) by appealing to scientific concepts, particularly those of process, mechanism, and evolution. The God of immanence theology is not a deistic divinity suspended above the world, forever impassive. The immanent God is a god of history, acting and acted upon.

Sociobiology has considerable import for the immanence theologies, just as it does, I argued above, for the prosaic theologies. The immanence theologies spring from joint readings of the Bible as sacred text and Nature as metaphorical text. We know God through an experience of both texts. Sociobiology, relative to this enterprise, aspires to deal with the full range of human existence as revealed in Nature's text, coordinating and synthesizing the natural, behavioral and social sciences (Wilson 1975; Lumsden & Wilson 1983; Lumsden 1986). Theological discussion may then, and does, turn to sociobiology for an understanding of human beings in the context of biological and social history (Burhoe 1981; Peacocke 1984, 1986; Thomsen 1986). But in seeking an evolutive God, it can also draw from sociobiology on the steady progression of ideas about what evolution *is* and what *kind* of evolution made us human. During the past decade, ideas about the evolution of groups, of species succession, and of gene-culture interaction have become part of the sociobiological debate. The impact of these ideas on the dialogue between science and religion has just begun to be realized by scientists and theologians (Campbell 1975; Wilson 1975, 1978; Hefner 1984; Peacocke 1986; Saver 1985). For the prosaic theologian, the objects of sociobiological enquiry are objects of theological enquiry. For the immanence theologian, sociobiology does not define the objects of reflection as clearly, but the partnership of mutual enquiry is equally important.

The transcendent theologies are a different matter. Their God is a God of ultimate concern. Discourse about the natural world or its contingent conditions of life does not disclose the nature of the transcendent God. Principles of reasoning, as used in philosophy and science, are admitted because they keep theological arguments clear. But they do not bridge the gap between the material world and the ground of ultimate Being as it is known through revelation. The scientist's business is with the material world, the theologian's with the transcendent. The sociobiologist can by definition say nothing that would contradict (or describe) the ultimate, just as the theologian cannot impinge upon the realities of scientific description.

The God of Christian deism stood apart from the world, unmoved and unmoving (Placher 1983; Nellas 1987). In this century the princi-

pal heir to the transcendent view is contemporary existential theology, particularly as realized in the writings of Paul Tillich and his followers (Tillich 1951, 1952, 1957, 1963; Kegley & Bretall 1952; Wheat 1970; Grounds 1976). These existentialist theologians are of great importance to the dialogue between sociobiology and religion. At a stroke they depict a clear division of labor for the two disciplines and define an unbridgeable gap, reminiscent of the is/ought gap in the science-ethics debate. Science simply cannot cross to join theological reflection. Existential theology stipulates this while mustering the analytic methods of scientific thought and dialectic reasoning. With these methods it seeks a rigorous approach to God, bypassing science and moving through revelation, logic, and the concept of ultimate concern. The God of this influential approach to Protestant doctrine (Kegley & Bretall 1952; Sutphin 1987) is not a personal Being, but pure, transcendent Being itself (Tillich 1951, 1952). This approach to God has raised questions about whether Tillich's brusquely anti-theistic proposals can be reconciled with the God of Biblical faith and viewed as a Christian theology at all, rather than something radically different (Ferré 1952; Wheat 1970). It has also underscored the finality with which transcendent theology muzzles science and reduces a science-religion dialogue to commentaries about social function. It does so by forbidding any so-called *conditioning of the unconditional*—by denying the relevance of discourse about the world to questions about the ultimate nature of God. Quite clearly, it is to transcendent theologies that the knowledge of evolution and humankind provided by sociobiology has the least to contribute beyond its conventional role. However, transcendent theology's abstract God, wedded so tightly to a view of the person as alienated, despairing, guilt-ridden mortal, is distant from everyday notions about the love of a personal God and the basis of human nature in hope and goodness. It therefore remains to be seen whether the nontheistic transcendent theologies can acquire the wide public following their authors intend.

Whether a theology is seen as prosaic, transcendent, or otherwise is the result of history, depending as much on the nature of science as upon religious reflection. Developments in science, for instance, could shift category membership: a future science that conditioned existing conceptions of the unconditional would make current transcendent theologies prosaic, while discovery of the actual non-observability of some natural process could render a putatively prosaic theology as an immanence theology, and so on. All, however, could continue to flourish in relation to science.

Theism, in contrast, seems particularly jarring to a "scientific" attitude that seeks causal explanations based on general principles.

The gods of the prosaic, immanence and transcendent theologies either are such principles, or can generally be described in terms of them. Personification in theological discourse, when it is permitted (and it creeps in frequently), is seen as a valuable metaphorical aid, not a literal depiction. The God of theism, on the other hand, literally is a personal Being—a view that seems comparatively unsophisticated if not naively optimistic to an age of advanced scientific abstractions. The study of religious language indicates, however, that theistic conceptions of God do not necessarily involve logically nonsensical or self-contradictory assertions (Wisdom 1963; Obitts 1976). Thus scholarly interest in theism has persisted alongside the proliferation of nontheistic interpretations of faith in this century, partly because of the continuing power of theistic views to answer spiritual questions ("What is God?," "What is life?," "What comes after death?," "Who was Jesus?") in the concise, potent terms of everyday talk. As beliefs competing for the faith of Christians, the nontheistic alternatives suffer from the conceptual remoteness of their God: theirs is a complex, abstract, depersonalized god whose connection with the living God of the Bible is obscure and generally revealed only after a lengthy exercise in apologetics.

We see, therefore, an intriguing counterpoise in the dialogue between contemporary science and religion. Closely allied with the scientific worldview are the nontheistic theologies. Theism, with its conception of the world and Supreme Being as living God at its head, seems at first glance more distant, and is under attack from both scientific and theological quarters (Tillich 1952; Robinson 1963; Saver 1985; Dawkins 1987). At the same time, theism makes immediate, potent sense of Scripture, of the spiritual aspects of human life, and of the life of Christ—all key elements in a Christian theology. The nontheistic theologies must work harder—often much harder—to endow their more abstract conceptions of God with a similar spiritual immediacy. In the face of vigorous theological pluralism, a natural criterion for a sociobiology with theological relevance is that it address both theisms and nontheisms to the extent this is logically possible in one scientific theory. The question I wish to consider in the remainder of this article is how a dialogue with theism may be opened, given the links between sociobiology and the nontheistic views established above.

The answer requires two principal steps. First, there must be a liberalization of the possible worlds that sociobiology can entertain in its work as a theoretical science. This liberalization must also extend to the evolutionary histories possible in these words. As a step to understanding God, such worlds must at least permit the notion of gods, and make plain what occurs when gods and mortals co-exist. Second, there

must be a liberalization of theism to explore the strengths and weaknesses of many alternative conceptions of God as a being. In response to science, which has left less room in the world for a Supreme Being, and to continued debate over the nature of the divine, contemporary theism generally portrays its God in transcendent terms. The theistic God is described as eternal, omniscient, morally perfect, untouched by the "conditioned" propositions of everyday scientific research (Gilson 1938; Placher 1983; Owen 1984). This realm of the divine by definition is a preserve of theologians. Once again, its nature is a matter for reflection beyond the reach of science.

In the next two sections I am going to discuss theism and possible worlds—"conditioned realms"—that are not beyond the reach of science, provided a sociobiology suitably developed to analyze them. The possible worlds are expressed as deductive theoretical models set up in accord with our current understanding of evolution and the circuit of gene-culture interaction. In this form they predict properties of evolution in the hypothesized worlds, and of the evolved beings inhabiting them, just as current sociobiology gives predictions about human behavior and societal function in our ecosystem. As models of any real world they are of course highly simplified, but this schematized nature allows questions about sociobiology and theism to be posed (and studied) with particular clarity. To the extent that the models capture important aspects of our own world—our own universe—their computed properties amount to predictions about the psychology of sentient beings and societal evolution in the presence of gods. With a suitably developed database from biology and the social sciences, these predictions could be compared to the patterns of behavior and social life we see in the world around us, and thus used to test the approach directly.

The realms to be described are, I believe, relevant to theologians and scientists alike. For the sociobiologist they form an arena in which evolutionary concepts relevant to theism can be developed and studied more directly than in current models. Since all of sociobiology's existing capabilities are retained, no contact is lost with the nontheistic theologies. For the theologian the models provide a setting for critical reflection on possible theisms and encourage the dialogue with science. In addition to organic beings, these possible worlds contain beings with many attributes commonly ascribed to gods. For convenience, I will use the term *gods* to describe them, but once more the usage is strictly descriptive, not normative. The gods described here, since they are dealt with in scientific terms (albeit terms different from the evolutionary biology we now have), are the basis for what one could call a *prosaic theism*. This prosaic theism stands relative to traditional (transcendent)

theism as prosaic nontheistic theology stands relative to its transcendent alternatives such as a Tillichian existential theology. The relationship between evolved organisms and gods is part of what sociobiology attempts to describe in presenting these hypothesized worlds. So is the nature of the gods themselves. The gods (or god—there need not be more than one) also happen to fulfill many of the criteria that contemporary theism associates with the Christian God. They do so within the context of a working scientific model. (Indeed, it may be that they could fulfill all of the criteria needed to make sense of, say, the parables attributed to Jesus or his characterization of an individual's relation to God. Whether they actually do so is a matter for further investigation.)

Theism and the Sociobiology of Worldmaking

Is it indeed possible to establish closer connections between sociobiology and theism than would appear evident at first sight? The answer seems to be yes. A treatment of this point is important because much of the current literature (reviews in Saver 1985; Ruse & Wilson 1986; Ruse 1986) portrays scientific sociobiology as being monolithic and based on atheistic materialism. Little or no attention is paid to the theological potential described in the preceding section. Instead we meet the familiar view that the cosmos, in which evolution proceeds, runs itself by laws we can know through physics and biology. Questions such as why these laws have their specific form, or how they came to be, or how the human lives suspended within them have meaning, have no scientific content aside from circular allusions to "because we're here." Gods low or high are not admitted into the normal course of events or into their beginnings, and a favorite practice in science of this kind is to debunk the sacred texts of principal religions. From the viewpoint of adaptationist reasoning, religion is then construed as one of several innovations concocted by a smart primate in order to make life bearable in a violent, godless universe. Theology follows as a semantic game played in a hall of mirrors (Lumsden & Wilson 1983), with the study of religion passing as the scholarship of theological fables and delusions passed from generation to generation.

There are undoubtedly a number of hypothetical worldviews that cross the scientific-theological divide in a more open fashion than this. If we wish to treat scientifically the premise that there is a god(s) of some kind, the construction of a less monolithic sociobiological theory that incorporates theological worldviews as testable hypotheses should be considered an important goal. Although a comprehensive working model for such a theory is beyond the scope of this article, I would like to develop a preliminary sketch of a scientific framework for theistic phenomena. The relevance of sociobiological thought for the nontheistic viewpoints has been summarized in the preceding sections.

A theistic framework of the type sought should treat the interaction between ordinary people (constituents of the universe) and god (God) in a manner susceptible to scientific study. God will be viewed as a being, but a being that can be understood empirically by those constructing the theory. The god is thus a prosaic God, and the theism fully prosaic in its theological sources. Theologians who understand God in transcendent terms will be justifiably concerned about the adequacy of the prosaic approach to theism. We have seen, however, that the empiricism of prosaic nontheistic viewpoints is very useful in clarifying the theological import of a science. The intent of this exercise is similar: not to recommend a prosaic theism as necessarily superior to conceivable alternatives, but to model a relationship between creator and creature that, in context, can reveal a good deal about our own notions of God, and about the ability of science to illuminate them.

The model is one of macroevolution and its consequences. Both biological and cultural change are involved. Relative to the agenda of a prosaic theism, the significance of this sort of macroevolution is that it can produce gods who, as part of the total pattern of evolution, in turn make new universes and their governing laws, creating new evolutionary patterns of creator and creature. Each theoretical prediction about macroevolution is of course made by picking up the evolutionary process at some point in the time dimension of the hypothesized world, and carrying it forward into that world's future by applying the proposed mechanism of evolutionary change. In this important sense the theoretical study of evolution is always future-oriented. But since the pickup point may, relative to our own timeframe, be in the distant past, in predicting such evolutionary trends we are also building possible histories for our own beginnings.

Many of the important questions about an evolutionary process concern the likelihood of certain events (such as the origin of a new species or type of civilization) and the rate, directions, and precise patterns implicit in historical change. If expressed quantitatively, answers to such questions can be compared directly to the available data, or indicate the type of new data required to assess the model. An approach that integrates the language of mathematics with verbal analysis therefore helps to clarify the basic assumptions of such a model. It also allows us to work toward specific quantitative results by which the model may be tested or at least compared to alternative approaches. This has certainly been the case in the development of both evolutionary genetics and the sociobiology of gene-culture systems. The model will therefore incorporate a small amount of mathematical notation in order to facilitate the development and to demonstrate as clearly as possible its connections with existing sociobiological theory.

In defining the kinds of society achieved by highly intelligent, technological organisms, considerable interest has focused on the management of energy and information. Two such analyses were developed by N. S. Kardashev and Carl Sagan (summarized in Tables 1 and 2 respectively; see Shklovskii & Sagan 1968; Sagan 1985a). Kardashev's civilizations are arrayed along a scale of energy management, from control of an entire planet to an entire galaxy or beyond. Human beings are presently edging onto the Kardashev scale at category I. Sagan's civilizations are categorized according to the amount of information in their databanks. Of the many categories appearing in his recent writings, I have outlined four in Table 2. Human civilization has reached category H. It is reasonable to anticipate that sociobiology will eventually be able to estimate the likelihood of societies occupying the various Kardashev and Sagan categories. Thus, for example, a meaningful (though still very difficult) problem for theoretical sociobiology is to estimate the likelihoods f_{II}, f_{III}, f_{IV}, f_V that, having landed in Kardashev I, global villages make it to II, III, etc. Some of the mathematical apparatus is available now (see Lumsden & Wilson 1981; Brams 1983; Weidlich & Haag 1983; Findlay & Lumsden 1988), but more groundwork must be laid.

TABLE 1

KARDASHEV CIVILIZATIONS

Type	*Energy harnessed for communication*
I	Communication output driven by power of a whole Earth-size planet (approx. 10^{15} watts).
II	Communication output driven by the power of an average star (approx. 10^{26} watts).
III	Communication output driven by the power of an average galaxy (approx. 10^{36} watts).

The systems of Kardashev and Sagan suggest a third mode of classification, one pertinent to theism—especially theism cast in prosaic form. The system is shown in the third table, where possible civlizations are classified by the extent of their control over the *structure of physical law*. Civilizations with some degree of control on this scale present a very different aspect from contemporary human society, which works entirely within the confines of physical laws we cannot change. Our feats of technology and enterprise build on knowledge of those laws (such as those of fluid flow, thermodynamics, quantum theory, and gravitation), but do not reshape the laws themselves. Civilizations in the other categories, however, do precisely this. Their science has pene-

trated the process operative (just) prior to their Big Bangs and clarified the mechanisms ordering physical law in the universe occupied by the society—indeed, in any possible universe.

TABLE 2

SAGAN CIVILIZATIONS

Type	*Amount of information (in bits) culturally transmitted between generations by learning and archival storage*	*Example*
A	about 10^6	Simplest moral cultures ("Twenty questions" level)
E	about 10^9	Periclean Athens
H	about 10^{14}	Contemporary earth
Q	about 10^{23}	Galactic civilizations of 10^6 worlds, each with 10^3 times the information content of contemporary earth

TABLE 3

WORLDMAKER CIVILIZATIONS

Type	*Spatial scale over which the structure of physical law can be manipulated*
α	No such ability
β	Atomic nucleus
γ	Typical solar system
δ	Typical spiral galaxy
ν	Typical galactic cluster
ω	Typical universe

For the purposes of the example I am developing, it is irrelevant whether there currently exist societies in the higher categories of Table III. The sociobiologist will want to calculate the proportion of sentient, culture-bearing species that eventually *does* evolve to the stages α, β, γ, . . . of Table III. This is an exciting task for the future. What matters now is that no logical constraint apparently excludes such problems from sociobiological consideration. They are a direct extension to long timescales of questions about trends in technological development. At present, estimating such likelihoods of societal transformation is sheer guesswork and the results would vary enormously with personal bias: among astronomers, for instance, guesses as to the number of even moderately intelligent species (that is, at stage α) in our universe range

from zero to billions (Rood & Trefil 1981; Sagan 1985b). The development of a predictive macroevolutionary sociobiology will permit more objective estimates related to the basic principles of biological and social evolution.

This is important, I think, because societies of type $\beta, \ldots, \omega$ have some degree of theistic significance. (Not much beyond prosaic theology, perhaps, but this constitutes progress however modest for sociobiology and religion.) The significance increases the closer one gets to ω. My reasoning here is as follows: beings in $\beta, \ldots, \omega$ have technologies that give them control over the structure of physical law within specific regions of space-time. Inside these regions they can create new arenas for physical events—in a phrase, new universes. Their possible intentions for building universes, and their range of subsequent participation in them, are also moot points at present, but they take the form of choices that are related, at a mathematical level, to the decision-theory problems treated in psychology and sociobiology (Simon 1979; Lumsden & Wilson 1981; Lumsden 1986). The more immediate issue of theological interest is the nature of such beings and the relationship between them and life that evolves within the universes they make, particularly when the life manifests substantial awareness of self and some degree of personhood. A society or individual in $\beta, \ldots, \omega$ is the creator of the universe. The creator is also likely to show sufficient relative prowess thoroughly to legitimize labels like omniscience, omnipotence, and other characteristics commonly attributed to gods. The essential point is applicable to contact between any societies widely separated in technological sophistication (see, for example, Shklovskii & Sagan 1968): a sufficiently "advanced" group will, for all intents and purposes, be indistinguishable from gods, particularly (from the viewpoint of our discussion here) the supernatural familiars who inhabit the pantheons of polytheistic societies. Could they for all intents and purposes also be indistinguishable from God?

To develop this question more fully, it is instructive to set ourselves and our own universe in the context of the postulated relationship. In other words, given the question, "If a universe is created by a society or being in $\beta, \ldots, \omega$, what is the nature of that being as manifested in the act of creation and in its continuing relation to the created worlds?", several hypotheses come immediately to hand and prepare the way for further dialogue between sociobiology and religion on the issue of theism:

[H1] No macroevolution proceeds beyond stage α. Theism is correct, and the universe was created by God, but it is the perfect, immortal, all-powerful, ultimately unconditioned God of the transcendent theisms. This hypothesis covers both the case of a transcendent God

that has no further contact with the universe after its creation and one who participates fully in its moment-by-moment development.
[H2] No macroevolution proceeds beyond stage α. Theism is wrong, and the origin of the universe may be accounted for in purely atheistic terms. There are no gods.
[H3] Macroevolution proceeds beyond α. The universe was created by a society (or individual) in $\beta, \ldots, \omega$ but only its laws and initial conditions were set. The God is a deistic being, with no ongoing participation or intervention after the origin.
[H4] Macroevolution proceeds beyond α. The universe was created by a society (or individual) in $\beta, \ldots, \omega$ and there is ongoing participation.

Let us denote by f_β the proportion of α civilizations to reach category β (see Table 3), and similarly for $f_\gamma, \ldots, f_\omega$. The positive scientific contribution from sociobiology relevant to hypotheses such as [H1] and [H2] would be the theorem "$f_\beta = f_\gamma = \ldots = f_\omega = 0$ $\forall \mathbf{U}$" establishing the preclusion of prosaic gods in any Darwinian universe **U** and definitively eliminating hypotheses [H3] and [H4]. No such preclusion principle has yet been established. On strictly intuitive grounds, which may be subject to considerable revision as quantitative models are formulated and analyzed, we can expect $f_\beta >>> f_\gamma >>> \ldots >>> f_\omega$ generally and in many possible universes $f_\beta = f_\gamma = \ldots = f_\omega = 0$ typically. It remains to be discovered whether our universe is one of the latter sort. Violation of a preclusion principle $f_\beta = f_\gamma = \ldots = f_\omega = 0$ establishes the possibility that prosaic gods exist and raises important questions about their nature and their relation to the created universe.

Signs of a prosaic god's existence may be present in the universes described by either [H3] or [H4], although the participatory relation [H4] would clearly make possible the literal truth of the god's immanence in natural process and in occasional extraordinary events such as miracles and divine revelation (Gilson 1938; Nellas 1987). Assessing the likelihood of [H4], either by establishing the appropriate preclusion theorem or by estimating the probability that such a theorem is true, would test the likelihood of the associated miraculous theologies. Nonparticipatory signs of the god's presence are modeled in a natural manner as strategies by which immanence takes the form of patternings or "trademarks" imprinted on the mathematical structure of physical law or on the order hidden within mathematical constants like π (Sagan 1985b). Thus, an external, objective moral order might in principle be encoded by a god deep within cosmological equations or the logical texture of microphysics and become accessible to societies that have developed the appropriate forms of astrophysical, theological, and sociobiological scholarship. Very little is known about the extent to which realistic laws of nature can carry ciphers for moral

codes or other "trademarks." While it is relatively easy to construct model universes whose dynamics embody such codes (see Figure 1), constructing physical or organic evolutionary laws that do this within a real universe may be quite another matter. It deserves further consideration.

FIGURE 1

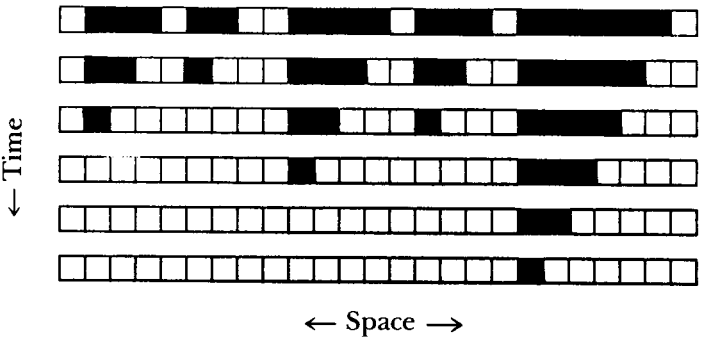

FIG. 1.—A one-dimensional "toy universe" in which the dynamical laws encrypt a moral code. The universe contains N spatial cells that may hold "matter" (black) or "energy" (white). Pairwise associations of cells are stable configurations except when matter is present on the "left," in which case it spontaneously converts to energy. The toy universe is shown at six successive points in time, from a beginning in which matter islands float in an energy sea, to an end state in which energy fills almost the entire universe. The universe's system of dynamical laws, governing the transformations of the pairwise associations, are [M+M→M, E+E→E, M_L+E_R→E, E_L+M_R→M]. These transformation laws are also a substitution cipher for a deontological moral algebra due to Lefebvre (1982, 10). The subscripts "L" and "R" refer to the location of matter M or energy E in leftward (L) or rightward (R) cells.

Human sociobiological theory, developed in the directions highlighted above, will be able to contribute to increasing our understanding of hypotheses such as [H1]–[H4], sharpening our estimates of their likely truth. This is so because it will draw on the continuously enriching physical, biological, and social sciences. To see how, let us briefly consider some evolutionary quantities: let R* denote the mean rate of star formation in a galaxy, f_p the number of stars with planetary systems, n_0 the mean number of planets in each system favorable to life, f_L the fraction that do develop life, f_I the fraction of such planets with intelligent life arising during the star's lifetime, f_C the fraction of such intelligent species that subsequently develop advanced technical civilizations, and L the mean lifetime for such civilizations. Then the fundamental Drake equation (Sagan 1985a)

$$N = R^* f_p n_0 f_L f_I f_C L \qquad (1)$$

is the expected number of these civilizations. Prediction of quantities such as f_L, f_I, f_C and L are, however, the proper subjects of theories of biosocial evolution, especially sociobiology, since the timescales involved are likely to be so long that they involve both cultural and genetic changes. Given the embryonic state of mathematical models in biology and the social sciences, no firm estimates are possible as yet, and as a consequence claims about N in an average spiral galaxy of 10^{10} stars run from a gloomy zero to a bullish 10^6. But with further developments these uncertainties will narrow.

Extension of these developments to deal with theologically pertinent hypotheses such as [H1] to [H4] will require a sociobiology that goes beyond the reasoning of the Drake equation. The fundamental equation of a theoretical human sociobiology rich enough to begin treating our hypotheses must combine the dynamics of events in the originating world with their consequences for the created worlds:

$$\begin{array}{l} R'_O f'_p n'_O f'_L f'_I f'_C L' \text{ ——————— } \ldots \\ \qquad\qquad \Updownarrow \quad \Updownarrow \quad \Updownarrow \quad \Updownarrow \\ N = R_O f_p n_O f_L f_I f_C L f_\beta f_\gamma f_\delta f_G \text{ ——————— } \ldots \end{array} \qquad (2)$$

In writing out equation (2) I have postponed the technological transition to worldmaking until the stage that physical laws can be organized within regions corresponding to an entire galaxy and taken f_G as the fraction of δ-societies electing to engage in worldmaking. The primed quantities refer to the evolutionary frequencies within the created universe (small vertical arrow). The solid horizontal lines refer very schematically to further evolutionary change within the two systems and the double vertical arrows to possible interactions between creator and creature. Interactions from δ could include ongoing adjustments or modification to physical law. Feedback from the created world could be α-dependent and include participation in sacral rites and prayer. When these interactions exist, whatever their form, the two evolutionary streams are coupled and their relationship is one of coevolutionary change.

To treat such new problems in a way relevant to theology, sociobiology must assimilate and make meaningful a number of novel ideas, such as *sanctification*, *worldmaking*, and *god* (or *God*). Developments in logic (Hartshorne 1967; Obitts 1976; Goodman 1978; Bradley & Swartz 1979) and mathematical theology (Brams 1983) suggest the feasibility of this step. The conceptual tools needed for a start are available but as yet essentially unused by sociobiologists. The function

of such applications is neither circular nor ill-defined. It is for example to provide quantitative deductive estimates of factors like f_C, f_β and f_G in equation (2). Concrete evolutionary problems, involving genetic, ideational, and social change, are therefore to be specified within the context of an improved logical terminology and a strengthened relationship to issues in theology.

God and the Prosaic Gods

The principal goal of the discussion in the preceding section is to enrich the interaction between human sociobiology and religious discourse. The attempt is to give evolutionary thought a vocabulary of greater theological significance. I am thus arguing for a conception of human sociobiology in which hypotheses such as the four outlined above can contribute to our understanding of god/God, joining new approaches to established procedures for the functional analysis of religious institutions. I hope to have made plausible the point that, as a novel and expanded theoretical enterprise, human sociobiology can aspire to such goals and indeed to an increased interaction with religion across the range of theological discourse, without endangering a loss in rigor, precision, or scientific character, and without jeopardizing the intellectual integrity of theological scholarship itself. Through the observation of empirical evidence—both of social behavior in a given universe and of a given god's "trademarks"—human sociobiology offers its own preliminary theological interpretation of god/God, one that may encourage further thought in the rich debate between religion and sociobiology.

Since that debate has been rooted historically in Western science pitted against Western (and thus Christian) theology, the question nags: is such a god God? Certainly not in the sense of transcendent theism. Although the god of our hypotheses stands outside the time dimension of the universes it creates and is in this sense eternal, it was itself produced by evolution in its own world. Since it can shape physical law, it can essentially create all possible worlds. The omnipotence and omniscience of such a god seems credible. There is no barrier of knowing between it and us, no unconditioned ultimate that forbids apprehension by the mortal mind. Only technological difficulty. So it is not transcendent, a truth gotten only through revelation. Although attributions of omnipotence seem justified, those of moral perfection are more problematic. It is simply unknown whether moral evolution is likely to be positively, negatively, or in general arbitrarily correlated with the capacity to survive technological transition out of societal stage α. Some degree of positivity might be expected, but this may be sheer optimism, and the persistence of partial moral imperfection might

resolve questions about the grip evil has on the worlds we know. Moreover, our knowledge, whether through reason or revelation, faces the epistemological limits pointed out above for inter-societal contact generally: along the series α, β, γ, . . . , prosaic gods become increasingly Godlike as their historical development proceeds and their macroevolutionary forebears recede into the infinite past. The challenge to faith is then not one of reality, but of realization. For given any list of attributes a god should have, there is in the series a prosaic god indistinguishable from God by our experience of it. The theologian must then answer whether the actual difference is a meaningful one in terms of spiritual fulfillment.

With respect to the central concerns of Christian faith, there is no reason to doubt that an act of universe creation by a prosaic god could be an act of love. There is also no reason to doubt that its command of physical law would fall short of the capacity for individual resurrection (Polkinghorne 1986), or that in bestowing existence on the universe in a loving act of creation it also bestows unmerited (and generally unrequited) love—grace—upon human existence, or that it could elect to give human history a son (or daughter) whose death and resurrection would be indicative of the long-term hope each spirit is thought to seek. Prosaic theisms, theisms unified with science, seem compatible with such things. There are important differences, however, between the god of our model and a transcendent God that exists beyond science, and it is necessary to understand these further. It is intriguing that in reviewing these properties of God, typically discussed in transcendent theism, Findlay (1955), defending atheism as the only reasonable ontology, pointed out the importance such properties play primarily in justifying a relationship with God based on worship as opposed to love. For a conditioned being to want worship, with all its connotations of subservient prostration, seems a monstrous expectation. (Just how unconditioned transcendence absolves a being from the same charge is not clear.) So as the dialogue between sociobiology and religion continues, it is important to disentangle properties of God that may attach themselves to the concept of the divine because they favor the interests of religion as a social institution (the very context of worship, with the individual and God mediated by an esoteric elite) from the properties essential in understanding spiritual ties of God to person and history.

If I have some sense of Christ's life (and I am a sociobiologist, not a New Testament scholar), the central theme—contained in his actions and his parables—concerned not worship but love among people and between people and God: the mutual significance of one another's dreams, the utter significance of personal unity with the Christian God. Paul's extended discussion (1 Cor. 13:1-8) of *agape* made plain the

moral significance of a loving life based on a love of God, and vice versa. On this point, a theology of a prosaic God would then be clear. The Christian truth carries implications for all personal beings. Through the course of our lives we learn to love. But the blessings of one's love need not be bestowed on one recipient or a tiny elect: its potential affects all spirits within the world. The god/God of prosaic theology might, one hopes, never warrant our worship. But under the circumstances of its existence it most certainly warrants our love.

The same might be said of any God that looms behind the science-religion dialogue as we have known it thus far. Indeed, it would seem reasonable to entertain as correct Professor Wilson's expectations that contact with religion will engender new forms for human sociobiology, and to anticipate the rapprochement with the utmost interest and seriousness.

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