EXPLORING THE CONCEPT OF SPIRIT AS A MODEL FOR THE GOD-WORLD RELATIONSHIP IN THE AGE OF GENETICS

by Lindon Eaves and Lora Gross

Abstract. The cultural impact of genetics focuses the intellectual and moral challenge of science to theology. Many traditional images of God and the God-world relation are inadequate to represent religious ideas in a world whose self-understanding has been transformed by genetics. Such images also lack the power to help in approaching the ethical challenges of this new era. The way conceptions of the God-world relation can be modified in the light of genetic knowledge is explored by examining how far a new conception of Spirit can function alongside contemporary genetic views of human life in nature. The relationship between genetic theories of human behavior and evolution is related to the revised conception of Spirit.

Keywords: behavior; DNA; evil; evolution; genetics; grace; immanence; natural selection; ontology; Spirit.

Leonardo Boff writes: "Present day experience typically occurs within the context of science and technology. The function of science is to gain knowledge; and the function of knowledge is power. . . . Science (knowledge) and technology (power) typify the present age in contrast to earlier ages" (1984, 52). Genetic ideas are being assimilated into culture, not merely as a source of technological power, but as a cognitive framework to articulate meaning and even despair about the realities of life. "Gene-speak" may soon embellish

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[*Zygon*, vol. 27, no. 3 (September 1992).]
 ISSN 0591-2385

"psycho-babble" as the dominant language people use to express their triumphs and their failures. While the technological aspects of this movement, embodied in the more restricted concerns of bioethics, have rapidly become clear, the challenging and universal theological questions raised by genetics for how humans understand themselves have not been anticipated and remain largely unaddressed. Thus, the religious traditions have confined their engagement with biology largely to the solution of ethical puzzles within a traditional understanding of God and the world, at the expense of the no less fundamental questions biology raises for understanding the reality in which all ethical decisions are embedded, including the concept of God itself. As recently as twenty years ago, Jürgen Moltmann observed that there seemed to be a difference in the cultural impact of Darwinism and modern genetics (1967, 322f.). Darwin's impact was at the speculative level; that is, it challenged cultural norms of human self-understanding but had relatively little direct technological impact on life. On the other hand, in Moltmann's view, modern genetics had sweeping technological implications but was "too complex" to offer the same fundamental challenge as Darwinism. One of the major recent contributors to theological anthropology, Wolfhart Pannenberg, frames his treatment of the essentially *human* characteristics of life in purely cultural rather than biological terms, which he identifies in this context as sociobiology (1985, 160f.). We believe that both these theologians have failed in their understanding of the intimate connection between modern genetics, especially human behavioral genetics, and the very "highest" qualities of human life.

Since there are no adequate theological constructs to provide an integrating framework for practice in this new era, human decisions about the uses of reproductive technology, abortion, and the environment, for example, are often made on a fragmentary, *ad hoc* basis and in a spirit of alienation from the religious traditions which in earlier times established the unity between the diverse facets of life in the premodern world. While most religious communities continue to provide ritual and liturgical support to accompany transitions such as birth, marriage, and death, they have for the most part maintained a stony liturgical and theological silence on the new transitions associated with reproductive technology, such as artificial insemination, in vitro fertilization, genetic engineering, amniocentesis, and abortion. The result is that women have to experience these new realities in isolation. Part of the process of dealing with such novel opportunities is the assimilation of the evolutionary and cosmological foundations of such technology into the religious narrative used to

provide structure and meaning to this new phase in human history.

Although bioethics has responded to the technological challenge, theology, even in those systems most sympathetic to science and scientific method, has not responded effectively to the cultural transformation that is taking place at the more fundamental level of the structures that people use to interpret their experience. There are several indications that, contrary to Moltmann's expectation, genetics is taking on "speculative power" in culture.

First, the "Human Genome Initiative" has assimilated some of the attributes and expectations that were laid upon the "Man on the Moon" project three decades ago (see, e.g., Hall, 1990). The energy (and money!) that thirty years ago were turned outward to the moon and beyond are now being turned in upon ourselves in the attempt to cross one of the significant frontiers to self-understanding—the fundamental molecular basis of our becoming who we are ontogenetically and phylogenetically. The project is a potent example of the cultural impact of biology and the gradual displacement of traditional psychological images by biological ones.

The second strand of evidence that genetics is becoming a speculative opponent of traditional anthropological models is the growing investment of researchers and research funding in genetic paradigms for the understanding of human behavior. Many, if not all, the major programs of the National Institutes of Health support studies designed to uncover the *genetic* basis of human differences. These research programs do not just focus on physical diseases such as heart disease and cancer, but also on psychiatric and social disorders such as schizophrenia, depression, alcohol and drug abuse, and even normal differences in habits, life-styles, and behavior (such as attitudes, personality, cognitive development, social development, smoking, reproduction, and diet). Behavior genetics and its clinical counterpart psychiatric genetics have emerged as a coherent discipline on the frontier between genetics and psychology that is not to be confused with sociobiology. It has its own body of strong empirical findings, its own textbooks (Plomin and DeFries 1990; Hay 1985; Fuller and Thompson 1978; Eaves et al. 1989), its own professional society, journal, and substantial federal research funding.

The third facet of the cultural impact of genetics is the continuing resistance of critics to the notion that human behavior has a genetic component (Kamin 1974; Lewontin et al. 1984). This itself indicates that popular, albeit distorted, genetic constructs are being adopted in accounting for our own behavior and that of others. Finally, genetic puzzles and problems have even become themes in the performing arts. The themes of modern genetics are being assimilated

into culture and, once absorbed into the cultural milieu, they raise fundamental questions about our identity and value as humans.

Genetics as a Model System for the Study of Theological Claims

Theology needs to deal with genetics for two main reasons. First, a century of genetic research has brought a number of fundamental theological and metaphysical issues into sharper relief than at any previous time. Second, the technical and speculative fruits of genetics, through their assimilation into culture, necessitate a reconstruction of religious concepts and metaphors in ways that are historically productive and congruent with our new understandings of the universe. Thus, genetics constitutes a model system for the interaction between science and theology. It presents part of the whole within which we can ask: Does science help clarify, and even resolve, theological puzzles? And, conversely: Can theology construct religious models which represent the most significant claims on human life without violating the essential features of models that emerge from the life sciences? We review these issues briefly, in recognition that this sketch can do little more than to suggest possible avenues of inquiry. Our choice of genetics as a model system does not stem from any simpleminded reductionism; rather it stems from the holistic recognition that (1) theologians are probably mistaken if they presume human culture and history are fully emancipated from, or can be understood without reference to, biology (cf. Pannenberg 1985) and (2) human life presents no exception to the fact that the history of all life is inextricably embedded in, responsive to, and creative of a broader ecological context. We also choose genetics as the model system for theological construction because, to put it bluntly, that is where biology has been most productive scientifically and technologically. Genetics now occupies a nodal position as a source of insight about the workings of life. We recognize that this article in no way explores all the detailed philosophical and theological ramifications of the ideas we enumerate. However, even though these may be problematic, the connections we trace between theological and biological constructs can nevertheless form the basis of a more complete programmatic investigation of the relationship between biology and theology.

Spirit as an Integrating Construct for Theological Discourse in an Age of Genetics

Humans try to optimize the conditions of life for themselves and their

descendants through continued dialogue with their environment. Three elements enter into the conversation between organism and ecosystem: experience acquired during evolution and development; assumptions about the underlying structure of the universe; metaphors which embody those assumptions. Scientific experience reshapes our understanding of the last element, requiring new metaphors to mediate the transformation of society into a new cultural and ecological milieu. As biology characterizes the way humanity is embedded within nature, so theology recovers metaphors that stress the "partnership" between God and humanity in the nurturing of creation, and the involvement of God in the process of decision making as humans address the truly novel situations into which they have been projected by virtue of their biological and cultural evolution. The "created co-creator" model proposed by Philip Hefner (1989), for example, has clear roots in scripture and tradition but takes seriously the evolutionary and cosmological context in which humans now understand themselves. This model seems to deal much more effectively with the fundamental openness of creation and the uncertainty of the human condition than many of the traditional images which undergrid current Judeo-Christian praxis. Lora Gross (1989, 1991) argued for a more developed concept of Spirit to represent the God-world relation from a still broader perspective. Her approach begins by recognizing that the scientific appreciation of the properties and boundaries of nature has expanded since the eighteenth century to embrace those qualities of life and value that were once thought to have been imposed from outside upon a lifeless universe. The subsequent model belongs to the holistic theological and ethical construction in the modern age and may provide structure to religious claims in a culture that has begun to assimilate the intellectual and technological possibilities offered by genetic research. Many of the issues addressed in Gross's treatment are reflected in our current discussion.

The scientific worldview challenges traditional understandings of the God-world relation by extending and redefining our concept of "nature." Life and mind are no longer conceived as existing independently of the physical universe. This recognition of the vital character of matter leads us also to question previous notions of divine and human Spirit. In turn, the door is opened to more mature theological reflection on the insights offered by genetic research concerning the character of human life and specifically the possibility of human ethical behavior. A revised understanding of Spirit that is consistent with a more modern appreciation of the material basis of life can serve both as a model of reality and as an operational idea

for developing concepts of transition from a cultural era in which the human Spirit and divine presence were seen to be separate from nature, to an emerging epoch in which the premise that there is no mind or Spirit without matter is the most viable basis for understanding and interpreting human life and action.

There are some basic presuppositions that underlie a notion of Spirit defined as the God-world relation. Contemporary science has modified earlier models of nature as a finite, deterministic mechanism that is static and dualistic in character. This traditional conception of nature is rivaled by a dynamic, holistic conception that emphasizes the unity of matter, life, and energy and understands nature as a profoundly complex, evolving system of intricately interdependent elements. In the earlier view of nature, matter is seen as fixed in character, inert, compartmentalized, inactive, and unresponsive. Current scientific understandings of nature imply a much more "dynamic" perception of matter, construed more accurately as living, active power, restless, even insurgent, imbued with intrinsic value, possessing depth and intensity, and inclined toward organization. Meister Eckhardt captures something of the modern understanding of matter and nature in his dual metaphor *ebullitio/bullitio* for the "boiling out" of creation and the "boiling" of its divine ground. In his "Commentary on Exodus" he writes: "[The saying] 'I am who I am' indicates . . . a *bullitio* or giving birth to itself—glowing into itself, and melting and boiling in and into itself . . . 'Life' [John 1:4] bespeaks a type of pushing out . . . before it pours itself forth and boils over on the outside" (McGinn, Tobin, and Borgstadt 1986, 46).

Spirit defined as the God-world relation itself, based upon the ideal of the vital character of matter, underlies and supports the presupposition that the highest measurable human functions, such as cognition, affect, and value, depend in part on the fundamental genetic structure of the individual as it exists in relationship to the environment. The process of individual human development *is* the evolution of Spirit in a dialogue between genes and the ecosystem. The implications for human life drawn from the redefinition of nature that emerges from a notion of vitality in matter challenge understandings of Spirit that deny any possibility of divine-human reciprocity and cooperation as well as any intrinsic connectedness of the earth as an organic entity in itself.

Working within a philosophical context, and without the models of modern biology, Bergson was compelled to develop a "vitalistic" notion to account for the more complex contours of life in the universe. However, even though the precise epigenetic processes

linking the DNA with the final outcomes of development are still unclear, the current understanding of biology assimilates the same "vital" characteristics to the basic physical and molecular properties of living material. In this sense, the concept of "vitality in matter" allows us to take seriously the so-called "higher" aspects of the empirical world in all their intricacy and richness, without sacrificing the basic scientific proposition that they have a molecular foundation.

At the very least, within the limitations of a purely biological perspective, the concept of Spirit connotes the immanent self-shaping and self-transcending power of reality, embracing both genetic and cultural continuity and change, unified through evolutionary time and ecological space (see also Pannenberg 1985, 520f.). As we shall see, it draws together fundamental biological constructs (such as the genetic basis of evolutionary change; the connectedness of all life and its continuity with nonlife; genetic mutation, recombination, and interaction) within a theological framework that recognizes that humans can no longer legitimately think of themselves as the center of the universe or of the "divine plan." As such, the concept can function as a positive heuristic around which to integrate mere human history with the broader reality and process within which it is embedded. The concept of Spirit offers a necessary complement to any model that emphasizes human power and responsibility within nature, such as that of the created co-creator. As a corollary to the primary concept of Spirit, we suggest that the metaphor of the journey of the Spirit within nature sets the sociohistorical religious narrative of the Judeo-Christian tradition within the broader evolutionary and cosmological contexts into which human consciousness is inescapably projected by the expanding horizons of the natural sciences.

One of the potential contributions of a more developed notion of Spirit is that it can permit critical speculation and fresh insight into human identity. Specifically, this includes a reinterpretation of the role humans play in the evolutionary development of culture that takes seriously the human experience of and engagement with nature as a locus of human encounter with the divine presence within the world.

The Interaction between Genetic and Theological Models

Genetic research influences the kinds of theological models that are most congruent with reality and the kinds of metaphors that are most productive in historical transformation. A more developed notion of

Spirit can speak theologically in an era influenced by genetics. We examine several areas in which biological and theological propositions appear to be correlated and mutually illuminating.

1. The Common Character of Religious and Scientific Engagement with Reality and Its Evolutionary Ground. The Jesuit theologian Jon Sobrino characterizes spirituality as follows: "Spirituality is simply the Spirit of a subject—an individual or group—in its relationship with the whole of reality. This proposition . . . reminds us that spirituality is not something absolutely autonomous on the part of the subject; it stands in relationship with reality. Secondly . . . this relationship with reality is not a 'regional' (restricted) relationship, or a relationship with other spiritual realities only, but a relationship with the totality of the real" (1988, 13f.). He continues: "Any genuine spirituality will demand in the concrete: (1) honesty about the real, (2) fidelity to the real, and (3) a certain 'correspondence' by which we permit ourselves to be carried along by 'more' of the real" (1988, 13f.).

Such a view of human engagement with the universe provides a common ground that integrates religious language about encountering God with the self-understanding of scientists as they reflect on the pursuit of scientific knowledge. Gerd Theissen (1985) suggests that both processes are adaptive and proposes that both may have their common foundation in the history of evolutionary adaptation to a "central reality." Karl Popper also drew attention to the parallels between the logic of scientific discovery and the process of evolution in nature. He writes: "All *organisms* are constantly, day and night, *engaged in problem solving;* and so are all those evolutionary *sequences of organisms*" (1972, 242).

In hazarding an evolutionary Christology for contemporary culture, Juan Luis Segundo (1988) identifies the "dare" of faith as the cognitive analogy of evolutionary "conjecture." The possible parallels between the way religious metaphors and models function in a life of "faith" and the way in which theories function in science is becoming increasingly apparent (see, e.g., Hefner 1988) and may, in part, contribute to the liberation of theology from its older epistemological foundations. Life in "faith" is not to be construed as a life lived in adherence to certain foundational truths "in spite of" the evidence and in isolation from a broader scientific understanding of reality. Rather "faith" connotes a more open and flexible approach to an unfolding reality guided by certain heuristic notions that are challenged by, and may well be revised in the light of, the facts of history. Such an approach to reality is the characteristically

human, conscious, and even *intentional* dimension of that "journey of the Spirit within nature" manifest more broadly in the "experimental" character of the evolutionary process.

Such an evolutionary perspective applied to humans' engagement with reality allows for a much freer interchange between contemporary religious exploration and the specific tradition in which it is set. In her examination of Christian origins, Elizabeth Schussler Fiorenza (1983) acknowledged that the particularity and cultural relativity of events in early Christian history established them as "prototypal" rather than "archetypal." Similarly, Segundo views them as "primordial" in character, in a manner analogous to that in which the specific sequence of DNA base pairs encodes the specific form of the developing organism or to that in which the specific characteristics of self-replicating molecules are the basis for the evolution of life.

The concept of Spirit provides a framework for the unifying structure of reality that has the character of unfolding through specific temporal manifestations, including their specific ontogenetic, historical, cultural, and phylogenetic expressions. The need for such a unifying construct is dictated, in part, by a common understanding of humans' engagement with reality shared by scientists and the wider reflective community, including the community of faith.

2. The Material Basis of Spirit. In an early paper, Hefner observed that "A new doctrine of man must reassess the Spirit/Nature dualism" and stated: "If evolutionary theory is correct . . . Spirit and material nature must be considered within a single continuum rather than as two separate realms of being" (1967, 138). We now recognize that Hefner's insistence on the continuity of Spirit and matter depends not just on evolutionary theory but on the results of extensive empirical study in behavioral genetics. We would go even further and argue that a theological anthropology of culture that does not recognize the continuing dialogue between genes and culture but treats culture as if it were independent of "life" merely transforms the old dualism of nature and Spirit into a new dualism of genes and culture.

The highest measurable human functions—cognition, affect, and value—all depend in part on the genetic structure of the individual (e.g., Eaves et al. 1989). This does not mean that the organism exists in isolation from the environment, but rather that the ontogenetic process, i.e., the process of individual development, is a dialogue between genes and the ecosystem in which genetic effects are augmented, if anything, by the aggregation of correlated environmental

inputs. Humans select, transform, and incorporate salient features of their environment (Martin et al. 1986; Eaves 1976a, 1976b; Eaves et al. 1989; Cavalli-Sforza and Feldman 1973). The fundamental processes that make this adaptation possible have their origins, however, in the properties of DNA. That is, even the environment has a genetic component. Subsequently, this notion has been exploited in developing more rigorous mathematical treatments of issues as diverse as the effects of genes on the social environment and cultural transmission (Eaves 1976a, 1976b) and the evolution of social behavior (e.g., Hamilton 1966).

Hefner's model of the created co-creator (e.g., 1989) has the great strength of emphasizing human connectedness with and responsibility for nature, and even the fragility of nature in human hands. The more fluid notion of Spirit allows us to articulate the character and value of nature apart from any immediate relevance to humans. The metaphor also characterizes features of reality that are central to our self-understanding in relation to nature. Implicit in the notion of Spirit, in contrast to many of the earlier metaphors of the Judeo-Christian tradition, is a recognition that the cosmos is not adequately conceived as wholly dependent on an outside creator, but that the future, and even the very survival, of creation is a matter for dialogue between humanity and the ecosystem. That is, there is reciprocity, intimacy even, between the human and divine worlds. An important theological implication of this model is a further dissolution of the polarity between the "human" Spirit and the "divine" Spirit that has been assiduously maintained even in the writings of such eminent twentieth-century theologians as Paul Tillich (1963).

Biological models of human development, therefore, recognize the reciprocity and interaction between human life and the ecosystem, between life and the reality that gives it being and form. What is understood scientifically through the study of human development is part of the process captured and explored theologically through the notion of Spirit. We appreciate the theological criticism which would not admit the simple unity or identity of matter and spirit. At the same time, we recognize that while the boundaries of nature and God are dissolved in a way that may seem to be anathema to traditional religious understandings of the God-world relation, this dissolution implies that the universe is no longer to be understood fully as a machine, finished or closed. Specifically challenged are interpretations of divine Spirit as immaterial, unearthly, or wholly transcendent, and notions of the human Spirit as subjectivistic, passive, powerless, and submissive.

The concept of Spirit captures many of the properties of nature

as they emerge from the last three centuries of science. For example, it helps humans take seriously the unity of the physical, life, behavioral, and social sciences. On the one hand, by focusing on the vital and self-transcending character of matter expressed in life and culture, it challenges the restriction of our understanding of matter to the form it has traditionally taken in the physical sciences. On the other hand, it enshrines the dependence even of religion and culture on the laws of physics. It is in this sense that the notion of Spirit tries to do better justice to the facts about matter and life as they are currently understood by science.

3. The Phylogenetic Ground of Humans' Experience of God. Several religious and philosophical models have tried to express the apparently "unconditional" character of certain human intuitions in mystical or metaphysical constructs such as absolute dependence, contemplation, the categorical imperative, or the ground of being. Rudolf Otto (1950) presents the classical statement of the irreducible category of "the sacred." One traditional response to these intuitions has been to identify their source in the existence of a reality "than whom nothing greater can be conceived." Evolutionary and developmental biology together present a more immanent model for intuitive notions that does justice to the experience but offers a different explanation. In a characteristic early essay, Bertrand Russell captures a primitive form of this evolutionary perspective:

> The fact is, of course, that both intuition and intellect have been developed because they are useful. . . . Intellect, in civilized man, has occasionally been developed beyond the point where it is useful to the individual; intuition, on the other hand, seems on the whole to diminish as civilization increases. . . . But to those who see in these facts a recommendation of intuition ought to return to running wild in the woods, dyeing themselves with woad and living on hips and haws. (1949, 15f.)

Since Russell's essay was written we have, through studies of behavioral genetics, a much clearer understanding of the biological basis of human affect and, through sociobiology, an incomplete but much more coherent theoretical framework for exploring the evolutionary ground of behavior. It now seems less absurd to speculate that many noncognitive responses and unconscious motivations *are* noncognitive and unconscious because organisms reconstitute during ontogeny their ancestral adaptive history from the information encoded in the DNA. Thus, DNA embodies memory of past adaptive responses that are, by virtue of their being transmitted genetically rather than by learning, unconscious and affective. Some of these "archetypal" responses may be adaptive, others may now

be maladaptive given the ecological gulf between our tribal past and global present. At least part of the human consciousness of transcendence may stem from the fact that we bear in our genes noncognitive ways of functioning that have been adaptive in the past. Russell may be correct in his caution that even such intuitions have to be subjected to rigorous cognitive scrutiny before they are incorporated into moral exhortation. However, humans are puzzled by their awareness of the divine and feel compelled to give a name and coherence to its basis in reality beyond their immediate experience.

Thus, religion may arise because humans begin life as a "code" which endows us with an adaptive "ontological obsession" (cf. Eliade 1959, 94). The fact that many philosophers of religion develop ontological arguments for the existence of God that are difficult to embrace cognitively but have strong affective appeal (see, e.g., Heschel 1951; Barth 1960; Pannenberg 1990 for modern treatments) may be a reflection of the underlying noncognitive, phylogenetically and ontogenetically based foundations of religious consciousness. In this respect, phylogeny is a modern analogy of the Platonic notion of the preexistence of the soul, satisfying the need to account for prevenient intuition; ontogeny corresponds to the notion of "recollection" invoked to account for the observation that preexistent notions are not present at birth. Mircea Eliade (1963, 119–25) noted similar correspondence between Platonic theories of Ideas and *anamnesis*, the cosmogonic mythology of prephilosophical cultures, and the Jungian "collective unconscious." Of course, we are not proposing that the specific cultural forms of myths and archetypes are exclusively encoded in the DNA. Rather, the processes of encoding and ontogenetic decoding of adaptive responses characteristic of the continuity of the germ line represent a material foundation to the basic elements of Plato's more formal model, in much the same way that later observations of chromosome behavior provided the concrete material vindication of the determinants postulated by Mendel. It is quite plausible that we bear in our DNA the imprint of long-forgotten stimuli that heralded a safer or more productive environment or necessary response to diurnal or seasonal change. Such biological foundations for religious experience and value (e.g., Truett et al., in press) necessitate models of the divine that stress the closest possible intimacy in the God-world relation and add weight to the need for a developed theory of Spirit.

4. The Religious Implications of Metaphors Describing the Mechanism of Evolution. The choice of metaphors in science is not neutral with respect to the rest of culture. The dominant metaphor of Darwinism

is that of selection. Although it is frequently pointed out that the reality of evolution does not imply universally that nature is "red in tooth and claw," it can scarcely be doubted that the metaphor, however productive scientifically, has cultural overtones that are not unlike those implied by traditional conceptions of God as Deus ex machina and Judge. The "God outside reality," who "decides" on the shape of the Universe and History, has much in common with the "nature" that "selects" those variants that will thrive and those that will be lost. There is ample historical evidence that such a model can be demonized in culture by assimilation to the characteristics of Baal and Mars.

Clearly, Darwin intended the *natural* in *natural selection* to supersede the notion of a process that operates from outside nature with the concept of a process immanent within nature. However, that implication has largely been forgotten by a misguided emphasis on *selection* as the dominant aspect of the metaphor. Evolutionary change may have selection as one of its components, but the role of other factors such as catastrophe and genetic drift cannot be excluded. Furthermore, by focusing on the "top-down" impact of the ecosystem on the organism, the metaphor of natural selection fails to capture the equally significant "bottom-up" impact of the organism in shaping the environment.

Like most scientists, Darwin had a legitimate preference for an impersonal metaphor that offered a parsimonious analysis of many essential features of the evolutionary process without reference to a "personal" being. However productive such a metaphor might be scientifically, the implied distance and detachment between humans and their environment is hardly neutral with respect to its consequences for the future of the living world.

As the notion of evolution enters culture and takes on historical power, there is a need to develop language that captures *all* the cognitive claims of evolutionary biology in a form that is culturally "life-giving." The Darwinian theory of evolution by natural selection is a significant facet of the cognitive content of biology, but we need also to emphasize the immanent, self-shaping character of evolutionary change and the impact of organism on environment that has now become potentially catastrophic. The metaphor of Spirit has many attractions for combining the cognitive implications of the process in which humans find themselves with an affective response. It speaks of the immanent character of the evolutionary process in language that is sufficiently fluid to avoid embracing the less-desirable anthropo- and andromorphic connotations of much traditional God-talk, while admitting the necessity of that affective,

caring, even passionate engagement between the organism, especially the human organism, and the ecosystem that cannot adequately be represented by purely impersonal images.

5. The Biological Basis of "Grace." Surprise is inherent in nature. The mechanisms of inheritance have within themselves the probability of presenting new transcendent possibilities for action within history. This view of reality provides a basis for the theological concept of grace as the free, unmerited gift of a new quality of life. This view of "gracious nature" stands in marked contrast to that of the more gloomy critics who suggest that to ascribe a genetic basis to human behavior is "determinist," "reductionist," or even "reactionary." We believe that such a view stems from a timidity in the face of science and a simpleminded dualism that separates genes and environment, placing them in an opposition such as that between good and evil. It also fails to recognize that the task of a specifically *human* biology is not to undermine the fullness of human experience. Rather, biology seeks a new framework for its comprehension that does justice to all the so-called higher aspects of human consciousness in a phylogenetic and ontogenetic framework. Biology rightly calls into question all understandings of humanity that assume that we can ignore our evolutionary and developmental history even at the level of history and culture. It does not call for denigration of the human phenomenon or for the denial of the significance of history, culture, and human action. The unifying concept of Spirit acknowledges that continuity of life is nothing more nor less than the continuity of genes and culture and that the energy required for their organization is immanent within the environmental matrix by which they are sustained.

The new possibilities for understanding human life and action are much more exciting than is implied in naive reductionism. Genetics provides *a basis for grace within the structure of life itself.* In the mechanisms of inheritance and gene action, through the processes of genetic mutation, recombination, nonadditive interactions between genes, and interactions between new genetic constitutions and the ecosystem, we encounter the promise of new lives with the creativity and the courage of a Moses, Judith, Jesus, Buddha, Gandhi, Muhammad, Theresa, Biko, or the martyrs of the Third World (e.g., Sobrino 1990). Such grace is inherent in nature and offers the fragile promise of its completion by redirecting the resources of the ecosystem into more abundant life. The recognition that the mechanisms of life are inherently gracious calls into question the naive identification of biological theories of behavior with crude

determinism. Several times in their history, the material processes of life have produced a person who transcends all conventional definitions of personhood to the point where the term *freedom* is the best we have available. Put crudely, if Jesus, and men and women like him, are "determined," we'll settle for that kind of determinism!

Such a model for the biological basis of human freedom is hard to reconcile with a traditional distinction between "grace" and "nature" because the mechanisms of grace are to be found within nature. The more developed notion of Spirit, introduced above, is consistent with this model because it dissolves as far as necessary the traditional separation of divine and human Spirit by allowing us to articulate the self-transcending character of life inherent in the mechanisms of inheritance.

This view of grace within nature also raises the question of the exclusivity of claims by particular religious traditions. The Christian claim for the uniqueness, ultimacy, and "cosmic significance" of Jesus, for example, must be viewed against the more universal background of the "Christogenic" (equally the "Buddha-genic" and "Muhammad-genic") properties of nature—the capacity of nature to produce paradigms of freedom and sacrifice from within itself. Such a view of the graciousness of reality implies that the necessary material for a contemporary or future realization of "Christness" is dispersed within nature. Jesus may legitimately be considered, therefore, a proleptic fulfillment of a promise inherent in nature. The notion that Jesus represents a bringing forward of the future into the present is a dominant motif of Pannenberg's Christology (1977). Jesus can be considered "the firstborn" who realizes in history qualities with which nature has been imbued from the beginning.

6. The Structural Reality of Evil. We cannot affirm the structural reality of grace without also acknowledging equally the naturally inherent possibility of evil. That is, the same molecules and mechanisms that produce Jesus Christ also produce Adolf Hitler. At a fundamental level evil is always present as a possibility. The question then arises, is this also true eschatologically? Given the real possibility of evil inherent in matter, is there any guarantee that it will not triumph ultimately? Is there any evidence that the mechanisms of evolutionary change are inherently biased towards the elimination of evil? The most truthful answer is that there is no guarantee, but there might be hope. The reality seems to be that humans keep alive the memory of both love and hate. In doing so they appear, on average, to treasure the former, and fear and despise

the latter. Such a preference is adaptive and may provide a foundation, albeit frail, for hope. It does not provide certainty.

The structural reality of grace and evil creates the genuine "openness" of the future. However, the notion of Spirit as the freedom within nature recognizes that the future is not best conceived fatalistically or mechanistically, but that the future is shaped for good or ill by present choices. Faith is less a superstitious absurdity and more a mature necessity before an open future. Human identity in the face of the future cannot be claimed without it. In its biological evolution and cultural development, life reaches the point at which religious choice and commitment, understood traditionally as the act of faith (see, e.g., Hebrews 11 for narrative examples) are central factors in shaping the future. Our description of matter as inherently "Christogenic" hypothesizes a mutual coherence between the structural and genetic realities of evolution and development on the one hand and the theological constructs of grace and hope on the other. The natural vision, based on the appreciation of how life changes and develops, provides the rational context and basic outline of a mature life of religious faith, the fulfillment of which is anticipated in the great incarnational figures of history.

7. The Puzzle of Diversity. Recent published studies concerning the genetic basis of human abilities, personality, and even values (e.g., Martin et al. 1986; Eaves et al. 1989) present a fascinating answer to the question, Why aren't we all the same? At the same time, they present a new puzzle to culture in terms of, How do we respond to the reality of human diversity that is rooted in the stuff of which individuals are made? This puzzle is focused sharply in a verse attributed to Aquinas (1961, 947): "Sumunt boni, sumunt mali: Sorte tamen inaequali, Vitae vel interitus." (Both good and evil share one meal, yet fortune reserves for each a different fate: life or ruin.) Conflict and pain are inherent in the relationship between genetically different individuals who share, nevertheless, a common origin and condition. The unifying genetic basis of all life, and every individual, poses the question of theodicy in potent form: Is there a coherent framework that allows us to deal positively but truthfully with the frailty and fallibility of nature?

One proposal, which in our view is unsatisfactory, may be characterized as the "ethic of perfection allied to a theodicy of waste." The "mutant" is viewed as a side effect of nature in the effort to produce a perfect humanity. Such a model for the creative process engenders the notion that some individuals constitute "genetic waste," and consequently this model may lead to a disregard for

human rights by justifying a spirit of detachment, rather than commitment. Such detachment is sometimes seen in the "scientific" attitude, which sees its role merely as the proclamation of "truth," baldly and dispassionately, with no responsibility for the ensuing pain and alienation, in what Buber has called the "demonic question . . . the question of truth" that leads to the declaration, "From where you have got to, there is no way out" (1966, 13f.). However, the notion of Spirit as the universal divine presence in matter recognizes two facts. First, culture creates the conditions for social interaction between individuals of different genetic constitutions in a manner analogous to the physiological complementation observed at a cellular level between genotypes that are, individually, nonfunctional. That is, culture creates conditions for completion in community that would be otherwise impossible in a mere aggregation of individuals. Such a model for the significance of human diversity is closely akin to Pauline models of the religious community as the "body of Christ" that contemporary theologians (McFague 1987) have extended to encompass the entire ecosystem. In a broader perspective, we see culture, and even the ecosystem, as providing the condition for complementation between genetically different individuals. Such a view of reality offers a coherent biological and cultural ground for the prototypal biblical construct of "the *koinonia* of the Holy Spirit." Though originally restricted to the Christian community within the human domain, the *koinonia* is now extended to transcend the merely human, embracing instead a planetary, even cosmic, dimension.

This view of genetic diversity abrogates any "perfectionist" notion that engenders a theodicy of waste, replacing it with a model in which individuals achieve their identity and value in their relationship to the totality of reality. Within the Christian tradition the issues of unfinished relatedness between diverse individuals has been captured to some extent in discussions of the role of the church in society. The nonnegotiable aspect of diversity, i.e., the fact of faith as gift and the recalcitrance of unbelief, is sometimes treated under the discussion of "election." Although such discussions may appear irrelevant to a non-Christian culture, they nevertheless capture important aspects of the ambiguous relationship between specific groups with their own vision and consciousness and the evolving pluralistic and global culture within which they are embedded.

Ultimately, the *koinonia* model of human diversity places individual spirituality and commitment in the broadest possible context of creation. It points away from the individual "self" as the locus of salvation towards the community of creation. It calls forth a model of the faithful community as the symbol and prophet in creation of

a hope for consummation that is intended to embrace the totality of diversity in a future of which the life of the church (in rare moments) and the resurrection of Christ (within the Christian tradition) may be viewed symbolically as a prototype and foretaste. The nonnegotiable fact of a genetic diversity that creates radical incomprehension of religious language in some men and women speaks directly against any model of consummation that is narrowly conceived in literal terms as "getting everyone to church."

The organization within culture of such eschatological communities poses a puzzle for conventional "selectionist" models of social behavior. Recognition of the power of nature to produce rare "mutants" and "recombinants" does not entirely explain why individuals who willingly accept genetic "death" nevertheless command such admiration from a significant proportion of the population. The "puzzle of Mother Theresa," from a sociobiological perspective, is not, after all, why such a rare "mutant" (or combination of genetic and environmental contingencies) should appear within history, but rather why she should command such devotion (if not emulation). How, under a "selectionist" model, do the gene complexes (or memes, for that matter) which lead to the cultural admiration of such sacrifice become established in the population at such a high frequency when the behavior has little or no adaptive value for anyone who copies it too closely? Put differently, why do so many humans resonate to such examples of sacrifice when the examples themselves are pathological from a Darwinian perspective? It is not clear that current models for the evolution of altruism (see, e.g., Boorman and Levitt 1980) quite address the problem of the organization of a community of "restricted altruists" around a symbol of "unrestricted altruism." The reality that theological language characterizes as "grace" and an expression of the "love of God," i.e., the "gift of Mother Theresa to the world," corresponds to the biological or cultural "fact" of the rare and novel "mutation." The milieu that theological language identifies as the "*koinonia* of the Holy Spirit" establishes the cultural conditions in which the continuing reality of such gracious events could conceivably become a factor in cultural and biological selection. We stress that this view is a highly speculative proposal to deal with a specific puzzle for any theory attempting to relate theological notions to biological or cultural reality.

The second, related strand of a more positive genetically grounded theodicy is the recognition that the conditions of life are such that the process that produces pain, in the sense of genetic disease, is also the process that maintains life in the cosmos. We return to this issue below. Notions of genetic "waste" or "disability" can legitimately

be questioned by models of social complementarity rooted in the fact that genetic diversity is a given. The recent reemphasis in biblical and liberation theology of the historical significance of the poor cannot adequately be captured by a bland recognition of "difference," nor by seeing them simply as a "problem," but by recognizing them as the historical focus of God's action and call (see, e.g., Brueggeman 1987; Gutierrez 1983). The challenge to mainstream Western values from other marginal groups has the same character as we move from a tribal to a global ecosystem. This more radical view clearly calls people to reexamine their relationship to those unlike themselves, including people of different race, values, sexual orientation, or moral virtue, whom society has at best tolerated as "sick" or "different" and often sought to marginalize.

8. "Sin": The Gulf between Evolutionary Past and Global Present. Some of the most recent attempts at theological construction focus on the destructive power of traditional metaphors and present the creative possibilities of new metaphors (e.g., Kaufmann 1985; McFague 1987). The attempt to construct "new" metaphors depends on an optimistic view of humanity such as that found in Richard Dawkins's hope that culture will change the world for the better "in spite of" the human genetic heritage: "We have the power to defy the selfish genes of our birth and, if necessary, the selfish memes of our indoctrination" (1976, 215). The truth may turn out to be different. The Judeo-Christian concept of sin may mean that the traditional metaphors die more slowly than their critics might hope. That is, there may be a biologically based inertia in culture which means that humans continue to organize their world around metaphors which are no longer productive. Traditional talk of "sin," "actual," and "original," may focus our attention on the fact that we still bear the biological marks of our evolutionary history. The understanding of grace and evil within nature necessitates a closer look at traditional concepts of sin and the identity of human beings and human action in the light of an interpretation of Spirit that takes seriously the insights of genetics.

Current theories of sociobiology focus on the role of kinship in the evolution of social behavior (e.g., Maynard-Smith 1964; Dawkins 1976). The fact that most human resources are poured into providing for close relatives, and especially children, together with the popular acclaim for "family values" allied to suspicion and disdain for other kinds of relationships suggest that culture still bears the marks of its ancient biological heritage and that we bring to a new global ecosystem a biological history of parochial self-interest that is, at best,

tribal. If this is true, this perspective gives a new slant to the problem of "original sin" because it truly implies that humans bring into the world, by virtue of their ancestry, biological baggage that is ill-adapted to the present world. Thus, no matter how much goodwill there might be, in Paul's words, "I can will what is right, but I cannot do it" (Romans 7:15ff.).

9. Aging and Dying. Meister Eckhart observed that "life lives out of its own ground and springs from its own source, and so it lives without asking itself why it is living" (see Colledge and McGinn 1981, 59). The question of meaning is brought into sharp focus by the reality of aging and dying. Whatever their original foundation, conventional religious doctrines of immortality appear to be no longer adaptive in a culture in which the material basis of consciousness is becoming more clear. It may be that such doctrines actually immunize humans from serious engagement with the problems of a fragile world and its physical future. The tacit acceptance, in the popular exposition of traditional formulas, of a doctrine of individual immortality may be a basic barrier to a life of integrity and sacrifice. A thoroughly material view of human life calls religions to a radical and honest restatement of their approaches to death and dying (Sobrino 1988; Ruether 1983, 256f.) and the place of the events like the crucifixion in the structure of reality (e.g., Moltmann 1974). Some sociobiologists who have tried to understand the process of aging and dying within an evolutionary perspective (e.g., Kirkwood 1987) make the important distinction between the "continuity of the germ plasm" and the "disposability of the soma." That is, "bodies die but the DNA lives on." While we recognize that surprise is a feature of both nature and history, the conventional religious models that identify the value of the individual in terms of the trajectory of individual consciousness beyond biological death suffer from a literalistic interpretation that precludes that "honesty about the real" of which Sobrino wrote. If there is "meaning" or "value" to the individual beyond his or her "soma," it may not lie in the "coming to a personal, individual, and conscious knowledge of God after death" so much as in the part that the individual has played in laying the groundwork for the future "communion of the Holy Spirit." Monod (1972) has pointed out that there is a "price" paid in terms of increasing entropy for maintaining locally the informational content of life. The *koinonia* of the Spirit establishes the conditions for the transfer of energy from the ecosystem to increase the organization of matter in life and community through the sacrifice of life. That is, the "life-giving" power of death, present in primordial form in

the evolutionary tension between the disposable soma and the continuity of the germ line, takes on historic proportions in the dialectic between cross and resurrection (expressed in Christian terms) and assumes a global dimension through the power of Spirit in culture. Thus it is possible to speak symbolically, even scientifically, of the "entropy of the cross" as the continuing necessity of "new life in the Spirit."

10. The Transformation and Fulfillment of Nature. The dialectic between the contingent events of history and the laws of nature is established for all time in the event of the resurrection of Jesus Christ (Pannenberg 1970). Thus, the actual and potential wholeness and healing of the natural order is presently operative in the whole creation and primordially within the DNA that is the raw material of creativity, and the mainspring of culture.

Human life perceived within the context of the whole natural process to which it is related by evolutionary descent and ecological necessity calls into question the tacit acceptance in traditional theology of human redemption in isolation from the rest of creation. Spirit as the God-world relation postulates the inherent vitality (as distinct from vitalism) in matter and extends to nonhuman life a share in the ultimate salvation that is promised to humans. The God-world relation understood as a continuum that has evolved from the most primitive forms of matter and imbued with universal spiritual presence enables the traditional concept of redemption to be understood more universally as the fulfilling purpose not only of the human species but of the whole created order. Further, Spirit understood in its vital relationship to matter defines the consummation or the destiny of the planet in God's hands in such a way that the perfection of the whole creation, human and nonhuman alike, is included in a vision of final consummation.

With a notion of Spirit modified as a result of a new understanding of nature, understandings of redemption as liberation from both alienation and violation of one's beinghood by another is reserved not only for humans. Rather, within a continuum of reality that is alive and empowered by Spirit, there is not one aspect of the created order that is not taken up and redeemed. Redemption takes on the connotation of healing, wholeness, and transformation that is inclusive of all creaturely relationships, including the relation of humans with each other and with their environment as a single entity for the sake of renewing and perfecting these relationships.

CONCLUSION

The model of Spirit as the God-world relationship informed by the insights of human genetics provides a framework to conceive of human action and behavior as *coparticipation* with the whole created order. The combination of human power with the reality of our connectedness to the rest of nature means that the choices made by the human species now affect not merely our own survival but that of the ecosystem that has nurtured and shaped our identity to this point. It is for theologians, therefore, to appreciate more fully the biological foundations that account for much of who we are and that connect us intimately with the rest of creation. Scientists, whose notorious suspicion of religion often restricts their criticism to what is most superficial, may discover in theological constructs a phenomenological aspect which can no longer be ignored if they are to fulfill their ambition of understanding reality at any but the most trivial level.

We cannot know for certain, given the reality of the "selfish gene," that humans can evolve a spirituality that makes the transition from the prototypal (and culturally and ecologically destructive) image of the "brotherhood of man" to the more universal and life-giving notion of the "beinghood of all nature." (See a recent essay in *Time* [1991, **137**, 82] entitled "Saving Nature, but Only for Man," which symbolizes the power of the "selfish gene" to restrict the domain of altruism.) Spirit as the God-world relation provides a model of reality and an operational idea that can assist humans to envision such a possibility and to realize such a self-definition.

The assimilation of genetic ideas into culture as a way of interpreting significant features of human experience raises fundamental questions about the relationship between biological and theological models of human life in nature. We suggest that theologians should not be timid about exploring the anthropological issues raised by human genetics because the mechanisms of genetics offer a model system for examining the connection between scientific and theological claims about reality. Theologians have been slow to adapt to the rapidly changing scientific view of the world that has alienated much of Western culture from traditional religious concepts and metaphors and led to a fragmentary self-understanding that is largely independent of confessional theology.

Many traditional religious and philosophical perspectives of reality may do more to obstruct than facilitate the development of a theological and ethical vision of human life in nature that is adequate for our times. Concepts of Spirit in the Christian tradition have been relatively primitive when compared to highly elaborated doctrines

such as that of incarnation. Perhaps the new understanding of nature that has emerged in the twentieth century will stimulate a more developed doctrine of Spirit as a way to articulate the religious significance of the delicate ecological and evolutionary matrix in which all of life is embedded and over which humans have such astonishing power.

A renewed emphasis on Spirit facilitates the reaffirmation of nature and the realignment of humans in relationship to nature in directions which transcend those set by the "selfish gene." The renewed emphasis on Spirit provides a conceptual matrix of universal meaning and purpose for an evolving epoch that is struggling to take shape. Whatever its ultimate fate in relation to the so-called tradition, it offers a proposal that can be received in the Lakatosian spirit of heuristic proposals in theology (Hefner 1988) as a way of opening up new horizons of understanding. The strength of the proposal lies in its ability to take seriously the unfolding biological insights about life in general and human life in particular, recognizing the fact that the distinction between *life* and *human life* may not be as radical as many modern theologians have maintained.

A universal notion of Spirit that is intrinsically related to the natural process provides an essential and hitherto neglected understanding of the God-world relation. Such a concept can be an interpretive principle that is capable of discerning and directing the destiny of the world in an age where the self-definition of human beings and the focus of human action has tremendous consequences for the survival of the planet. Theology's interface with the insights drawn from human genetics is key to the development of a new notion of Spirit. Religion's full participation in the dialogue with science is the starting place for a recreation of culture that has as its goal the survival of the present world and the hope for its fulfillment.

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