CREATION AND EVOLUTION: ANOTHER ROUND IN AN ANCIENT STRUGGLE

by Lenn E. Goodman and Madeleine J. Goodman

Abstract. Creation and evolution were historic allies against eternalism. However, Darwinism seemed to undercut cosmological theism and human dignity, and modern reconcilers of evolution and theology have not convinced opponents that they can preserve these concerns. Creationists find divine handiwork in natural order and freedom in human uniqueness. For them, even entropy and continuity of kinds are emblematic of the unity of nature and the needfulness of salvation. Anti-evolutionists' impatience and frustration are not well answered by dogmatic or mythicized science. Neither is creation well served by reduction to merely empiric facts. Because creationism and evolutionism rest on the unabstractable categories of contingency and necessity, neither will disappear.

Deeper and more lasting than the battles in which humanity has been divided over the control of territory or resources are the battles in which we have been divided over conceptual paradigms. Such battles can be just as bloody as those seeking no metaphysical apology, and in some ways they are even more tragic. For conceptual battles pit strangers against one another often without even the leaders having a clear understanding of the issues for whose sake arms, pens or the cudgel of law is taken up.

Creation and Evolution: An Historic Alliance

The coalition of ethnic interests on behalf of which the sixth-century Byzantine emperor Justinian wielded a metaphysical sceptre has long ago crumbled into political insignificance, as has the seemingly inescapable bureaucracy he forged to enforce the paradigm that held

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[*Zygon*, vol. 18, no. 1 (March 1983).]
 0044-5614/83/1801-0002$04.10

together his power. When Justinian shut down the Academy of Plato in its tenth century of operation and banished the Athenian philosophers of that school, forbidding them to teach philosophy at Athens, he did so in the name of the idea of creation. The neo-Platonic philosophers, the last serious intellectual defenders of pagan religion in the ancient world, had staked the future of their movement on their ability to demonstrate the absurdity of creation. For they analyzed creation as the generation of something out of nothing, a notion which Aristotle himself had once offhandedly remarked seemed self-evidently absurd.[1] Politically the neo-Platonists lost their gamble. Indeed, if it had not been possible for more broadly thinking monotheistic philosophers to forge a unity of the ideas of creation and emanation, incorporating elements of pagan philosophy in monotheism whereas the pagans found it impossible to accomodate crucial elements of monotheism to their view, the philosophical achievement of the neo-Platonists would have been as largely forgotten as was the philosophical achievement of the early Stoic school.

To journalists, controversialists, and even some historians it may seem strange that more than half a century after the Scopes trial had seemingly laid to rest the issue of creation versus evolution in the classroom the issue should come to life once again. However, to students of the history of ideas, the whole affair may have a *déjà vu* aspect to it, since creation has been in court before, sometimes as defendent, sometimes as plaintiff.

Enlightened opinion, which differentiates itself from the body of commonly received traditions, myths, and half-truths, usually has been against creation. When Parmenides argued that being cannot be thought to come to be, because there would be no rational way of accounting for the reality of nothingness, from which such origination might take place, no way of conceiving the means of such an origin or of rationalizing its timing or mode,[2] Aristotle forgave him the sophism of his pun on "nothingness" which made unreality unreal; Aristotle even incorporated a comparable assumption at the keystone of his own First Philosophy. The reason was that Parmenides had struck a valiant blow against all merely mythic thinking by addressing the question of the nature of reality in all its nakedness and not confounding that inquiry with any quest for origins.[3] By contrast Xeniades, who had argued that, because all that is φ comes from what is not φ, all that is must come from what is not, was convicted of a vulgar sophism, confusing the existential with the copulative senses of the verb "to be."[4] The possibility of a universal origin for all things was thereby categorically ignored; in subsequent generations, dazzled by the authority projecting from the intellectual brilliance of Aristotle, creation was often rather superciliously dismissed.[5]

One of the ironies of the history of the long debate over the idea of creation is the radical shifting of ground by the detractors of the idea. For two thousand years, under the impress of the powerful intellectual individuality of Aristotle, most of the philosophical, scientific, and religious opposition to the idea of creation was in the name of the eternity of nature. By this was meant not merely the everlastingness of the matter in the universe but also the perpetuity of its arrangement as we now find it. The eternal subsistence of the heavenly bodies and earth in their present arrangements and the eternal existence of the animal species now extant were not scriptural dogmas of the monotheistic religions but apparent axioms of Aristotelian science. The Aristotelians reasoned that unless the heavens had always revolved about the earth as they do and unless animal species always had bred true through eternal revolutions of generation and decay, there would be a breach in the seamless fabric of time, space, causality, matter, without which nature would be unthinkable and unreality would be real.[6]

This kind of rationalism, until well into the seventeenth century, was the enemy of the idea of contingency in nature. If everything was to be understood, as science at least programmatically seemed to demand, then everything must be necessary and explanation would be the exposure of the grounds of that necessity. If nature's universal pattern was necessity, then that pattern must be eternal, and there would be no room in science or philosophy for talk of absolute origins.

It was neither Galileo initially nor Nicolaus Copernicus, Tycho Brahe, or Johannes Kepler who made the first irreparable cracks in Aristotle's spheres. Rather it was John Philoponus, a Christian in Justinian's empire, who argued against the "scientific" notion that the spheres must be the eternal rotors of that eternal motion we call the natural process, because he observed that some stars seem to shine with different colors than others. Arguing by analogy with terrestrial fires, which glow in different colors when different substances are thrown into them, Philoponus reasoned that some process must be going on within the stars. If so, that process must have an origin and an end point and stars must be subject, contrary to Aristotle's view of the simplicity and everlastingness of celestial motion, to a running down, a loss of energy. It was not true, as Aristotle and his followers maintained, that there is no opposite to rotatory motion, because there is the possibility of rotation in the opposite direction. It was not true that the matter of the heavens was simple and therefore indestructible, because it was obvious that the matter of the stars was different from the presumed matter of their transparent settings in the celestial spheres. On these and many other grounds Philoponus

argued that the heavens are destructible. And if they are destructible, subject to the same laws of generation and decay which govern the balance of nature. Since they are contingent and not necessary in their existence, they require an origin and an Originator or Creator.[7] Despite his learning in the philosophy and natural system of Aristotle and the deep intensity of his philosophic, scientific, and religious commitment to the idea of the world's eternity, Simplicius, one of the last members of the Athenian Academy and Philoponus's polemical opponent, found himself hard pressed to answer the arguments generated by the penetrating common sense of the rival whose viewpoint he despised.[8]

Argument was not allowed to decide the day, but in the centuries after Justinian's closing of the Academy, when the dispute bubbled on within the monotheists' camps, argument remained indecisive, even among those philosophers who had resolved to abide by the verdict that argument would render.[9] Then Immanuel Kant, following the lead of some of the most penetrating philosopher-theologians of the Middle Ages, declared the issue to be insoluble by reason.[10] The alternative paradigms of creation and eternity and the arguments in their behalf were projections of and constructions upon alternative modes of viewing phenomena—as contingent or as necessary—and neither of the modes is dispensible to human understanding. The Kantian disposition of the case and its foundation in the logic of discovery remain unknown and unheeded by most of those contemporary disputants who continue to debate the allied issue of creation versus evolution on the popular level. Also, it is little if at all understood among those who argue the case today that evolution itself was for centuries allied with creation against the eternalist view of the most rationalistic natural scientists and philosophers, that the ideas of creation and evolution spring from the *same* categorial scheme. Nor has there been sufficient understanding among many of the disputants in the current debate of the range and power of the issues indissolubly linked with the questions of creation and evolution in the minds of their disputational adversaries.

The contention of this paper is that there will be no adequate understanding of the present renewal of the controversy over the teaching of evolution and creation in the schools until there has been an adequate reckoning with the significance of these two ideas in the minds of their proponents and detractors. There is a need on the part of anti-evolutionists to enhance their understanding of the claims and grounds of evolution as a theory—for example, to dissociate the idea of evolution from that of mere blind, aggressive struggle in the exploitation of resources, and from that of the justification of such struggle as a human value or way of life. But also there is perhaps an

even greater need among creationists as well as evolutionists for a more adequate understanding of the disparaged but remarkably resilient idea of creation, which once was ranged against the idea of the world's eternity and seems now to be ranged against the idea of evolution. The core of this idea of creation, paradigmatically projected in the opening lines of Genesis, is the idea of the contingency of nature—an idea as central to the empiricism of science as necessity is to its rationalism.[11] Contingency of nature also is an idea whose religious significance for monotheism consists chiefly in that it serves as the mirror in which is reflected the absoluteness and transcendence of the Divine.[12]

Creation Versus Eternity During the Middle Ages and Renaissance

To Abû Ḥâmid Al-Ghazâlî (1058-1111), who came to be known honorifically as the Proof of Islam, in large part for his spirited redeployment of the arguments of Philoponus and others against the eternity of the world, it seemed clear that rationalistic opposition to the idea of creation could not make good on its promises of a theistic emanationist philosophy. There could be no concrete meaning assigned in eternalist philosophy to the idea of God as author of the universe. An eternal universe must exist under all conditions, so God's emanative act would make no real difference. The neo-Platonic philosophers were atheists in spite of themselves.[13]

The Jewish philosopher-theologian Moses Maimonides was not as astringent in his analysis of the anti-creationist program. He avoided naming the exponents of the world's eternity as atheists,[14] but he did challenge the coherency of the eternalists' doctrine on much the same basis that Ghazâlî had. What was the meaning of arguing for the reality of God as the necessary determiner of the world's contingency if the world had no contingency as to its existence or the mode of its existence? How could eternalist philosophers employ the notion that God's wisdom was the necessary cause of *all* particularity if they regarded particularity itself as eternal and therefore necessary, and if they could not make reference to an undetermined state over which God's determining power might range and to which that power had made a difference?[15] Maimonides even invoked an evolutionist analogy against the Peripatetics' belief that the eternity of the world was a demonstrable, indeed a demonstrated truth. All the arguments against creation, he urged, were merely persuasive not demonstrative in force, as Aristotle (who had taught humanity the differences between demonstrative and dialectical arguments) must have known. These arguments drew their plausibility from the projection of our

experience of the settled order of nature. For example, time as we know and analyze it always has a prior moment, and possibility always has matter as its substrate. But there is no necessity of logic (contrary to the suppositions of most medieval Peripatetics) which requires such "necessities" always to have been the case. A man of perfect intelligence (like Ibn Tufayl's self-taught philosopher Ḥayy Ibn Yaqẓân), who knew nothing of human reproduction, might easily "deduce" the impossibility of human birth from his knowledge that human beings breathe air and produce bodily wastes. There is no inferring from nature's present settled state to its possible conditions at the time of its origination.[16]

Maimonides refrains from Ghazâlî's carefully ordered delineation of the points on which opponents are miscreants and those on which they are merely heretics.[17] However, he does present an even more detailed tabulation than does his great Muslim predecessor of the theological consequences and concomitants of the rival views on creation versus eternity. For each major doctrine of creation or eternity he considers a corresponding viewpoint regarding natural causality, divine providence, revelation, divine and human freedom, miracles, teleology, scripture, the problem of evil—in short, every major issue of natural theology and its alternatives.[18] Where Ghazâlî had shown the linkage of the philosophy of nature to the philosophy of God, deriving doctrines of time, space, motion, causality, and volition from the polarity of creation and eternity,[19] Maimonides mapped each option in natural theology onto the corresponding view as to the nature of the divine creative act.

Typical of this mapping enterprise is Maimonides' typology of five views as to divine providence or the governance of nature.[20] These views, representative of major schools in his day, parallel and develop the corresponding views of earlier epochs; and, with appropriate changes to reflect more recently garnered data and more recently elaborated models and analogies, they continue to have their advocates in contemporary disputes about the scientific significance of the idea of creation and the theological significance of the idea of evolution. (*i.*) The materialistic doctrine of chance and necessity, which Maimonides ascribes to Epicurus, is incompatible, he states, with the operation of general laws of nature, such as are required if science is to be possible at all. This means that any overall causal regularity which is rationally apprehensible in the process of nature is taken by Maimonides as sufficient proof of divine governance. The proposition casts a revealing light on Maimonides' conception of the lowest common denominator among diverse usages of the idea of God.[21]

Fundamentalist Muslims of the Ashʿarite school believed, by contrast, (*ii.*) that God marks the fall of the sparrow—or rather, to use

Maimonides' example, that God superintends the fall of this particular leaf. The Mu'tazilite rivals of the Ash'arites believed (*iii.*) that human agency and moral responsibility were quasi exceptions to the universal operation of divine predestination. The Aristotelian view, as expounded by Alexander of Aphrodisias, was (*iv.*) that God governs through the essence of things, whose changeless natures are reflected in their immutable relationships, expressed in changeless natural laws. The eternal choral dance of the ungenerated and indestructible heavens and the cycles of generation and destruction here on earth thus express the timelessness of divine Intelligence, and time is indeed, as in Plato's poetic phrase, the moving image of eternity. Eternal intelligence takes no cognizance of mere particulars. As one eternalist wag remarked, Does a man concern himself with the affairs of the cats in his household?

The poetry of Genesis,[22] which Maimonides balanced against Aristotle's prose version of the poetry of Plato, led, in Maimonides' view, to an alternative (*v.*) no less in keeping with the axioms of science than Alexander's response to the challenging Stoic notion of providence. In fact, in some ways Maimonides' reading of the evidence was more faithful to the underlying rationalism of Aristotle than was the view of Alexander himself. The eternals in the Peripatetic universe were God or Intelligence, Soul, the heavenly bodies, and the species of things. So God, Alexander reasoned, might know universals and govern particulars as species. In the version of his view elaborated by the neo-Platonic synthesists of the views of Aristotle and Plato, the heavenly bodies, being eternal, were an exception to the general rule that God knows only universals. They were under direct divine governance, because they were the world's "principal parts," embodiments for the divine intelligences, by which governance itself was effected, universal forms imparted.[23]

Maimonides, like Philoponus, brought the heavenly bodies within the realm of nature by making them created and composite. The regularities of their motion were not eternal necessities but were, like other regularities of nature, natural expressions of the settled order God had imposed by the act and choice of creation. As for the species of things, Maimonides pointed out, it was Aristotle himself who taught us that there are no universals *per se* but only the particulars they represent. If God governs through the natures He imparts to things, then it is not unreasonable to suppose that providence acts through the specific natures of all things, and that human beings are visited by providence *as individuals* insofar as intelligence is imparted to their human nature—just as, say, they are visited by providence as animals insofar as they are alive. Thus, in a nonanthropocentric and causally ordered universe, Maimonides finds place for a divinely im-

parted human role and sense of worth, not in contravention to the laws of nature or the decrees of providence, but as one aspect of their fulfillment.[24]

Galileo was consciously continuing the rationalistic rebuttal to Peripatetic rationalism when he brought empiricism and indeed creationism to the defense of Copernican heliocentrism. He chose the name Simplicio for the simple-minded foil of his *Dialogue* as an explicit reference to the historical Simplicius of the sixth century, who was the aprioristic defender of eternalism and opponent of Philoponus and who had made his celebrated commentaries on the cosmological works of Aristotle into a religious and rationalistic attack on the idea of creation and defense of the exemption of the heavens from the natural processes which today we correlate with entropy and inertia.[25]

Galileo argued heatedly, with extensive reference to mathematics, experience, and the thought experiments by which he linked the two, that the celestial bodies could not have taken up their present circular motions (in what Maimonides had called the settled order of nature) unless they had accelerated to their present orbits via linear paths, of the sort which Aristotle's metaphysics of motion required to have a beginning and an endpoint.[26] Thus an evolutionistic view, which was fathered on Plato by Galileo but argued on the basis of the phenomena we denominate by the terms inertia and acceleration and anchored conceptually in the Biblical idea of creation and which involved the contingency (as opposed to Aristotelian necessity) of the natural order, was presupposed and indeed regarded as established in the cosmology by which Galileo successfully brought the celestial movements within the orbit of natural science.[27] Moreover, Galileo's suggestion that any life on the moon would necessarily be quite different from life on earth presupposes adaptation to the environment and opens the possibility of adaptation via natural selection as the means by which living species might naturalistically acquire their adaptive traits.[28] The hint was not lost on René Descartes, who employed an evolutionary model of cosmology as the hypothetical means of divine creation in his *Principles of Philosophy*.[29] Similarly Galileo's extended disquisitions on sunspots or the craters of the moon invoke the compositeness, hence mutability of the celestial bodies, and so echo Philoponus's doctrine of the createdness of all nature.[30]

Creationism was not intrinsically inimical to the ideal of science, since science seeks to know not only why things are and must be as they are, but also and by the same token how they come to be just as they are. In that sense the idea of creation, some idea of creation, is the lineal antecedent and complement of the idea of evolution.[31] Thus it be-

comes easy to see how the two might be considered rivals by some and functional equivalents by others.

What Seemed Problematic in Darwinian Evolution

The issues underlying philosophical debate about evolution throughout the twelve decades since Charles Darwin and Alfred Russel Wallace first put forward the massive evidence by which evolution would be transformed from a perennial, speculative hypothesis to a thoroughly documented biological theory have been the same few recurrent issues. They are in fact the Kantian trinity: God, freedom, and immortality under various names and devices, linked together by an apparent common fate at the hands of evolutionism, as they were for Kant by their apparent common fate in the wake of post-Cartesian and Newtonian mechanism.

In his *Dialogues Concerning Natural Religion* David Hume had undercut the argument from design by exposing the compelling image of a watchmaker God as a pale and not too apt analogy even before William Paley put the finishing touches on his most detailed and comprehensive version of that argument.[32] *The Origin of Species* seemed to put an end even to more conceptual versions of divine design.[33] For in it Paley's quondam admirer, Darwin, seemed to consummate the Epicurean project of substituting mechanical causes for divine intentions by capturing life itself within the net of mechanism. Among the secular or conceptual surrogates for an anthropomorphic divine plan was the Aristotelian—hence archetypally scientific—idea of the fixity of species. The fixity of pure biological types was not a Biblically developed concept to be sure. But rationalistic science coupled with rationalistic Bible exegesis could make it such, discovering scriptural proof texts in its behalf with the same unerring eye that the fixity of biological types was "observed" in nature.[34] Thus the Hebraism proposing that the Biblical Creator had fashioned every creature "after its kind" (Gen. 1:24) was pressed into service to vouch for special creation at the behest of a pre-Darwinian rationalism which regarded it as seemly that God should respect the fixed and unchanging essences of species, even in the act of their origination.[35]

With the downfall of pure types went the downfall of human dignity, not merely in the superficial sense of cousinage with the apes but also in the larger sense that Kant had given to the idea of human dignity: that the rational agent was free and thereby subject to the moral law. If humanity were linked indissolubly in the nexus of physiology, then freedom seemed to vanish and moral responsibility with it. There would be no moral law but only the prudential maxims of Utilitarians and other relativists.

Immortality dropped out of sight as well, or so it seemed to many, on the Darwinian account, and that for several reasons. First, as myth or Kantian correlate of freedom, immortality seemed to lose its function in the absence of moral responsibility and hence accountability. Second, and perhaps more subtly but all the more pointedly for that, the transcendental dimension seemed to drop out of human moral undertakings with the loss of human dignity. Third, and most obvious of all, there was no room or need for an immortal soul to guide or govern human actions if the human individual was to become another automatic mechanism fabricated by the incessant poundings of chance and necessity upon the primordial molecular building blocks from which a blind nature had fabricated humanity and all other things.

The claims of evolution were factual, and the radical opponents of evolution have consistently founded their critique on what they took for factual grounds.[36] But underlying the offering of these grounds were deep concerns about values, the values associated with the ideas of God, freedom, and immortality. On a vulgar level there have been the cartoonists' caricatures of human apes and the witticisms about the ancestry of evolutionists—all the way back to the celebrated but probably apocryphal reflection by Bishop Samuel Wilberforce as to Thomas Henry Huxley's ultimate parentage, by which the implications of evolutionism have been crystallized imagistically. Darwin himself was moved to generate a countericonography (following the lead of Epicurus and Lamarck) when he wrote: "I would as soon be descended from that heroic little monkey . . . or from that old baboon, who, descending from the mountains carried away in triumph his young comrade from a crowd of astonished dogs—as from a savage who delights to torture his enemies, offers up bloody sacrifices, practices infanticide without remorse, treats his wives like slaves, knows no decency, and is haunted by the grossest superstitions." Darwin clearly understood the charges which evolution had to answer: behind the image of the ape lay the issue in which the ideas of God, freedom, and immortality were linked and encapsulated, the issue of dignity.[37]

Wilberforce was an amateur ornithologist and geologist as well as the Bishop of Oxford, and his scientific avocation was not wholly unconnected with his spiritual vocation. His conscientious resolve to frame his objections to Darwinism solely on scientific grounds was not merely a tactical decision but a point of principle based on respect for truth.[38] But that respect itself was not unconnected with the historic doctrine of true types, which grew ultimately from Aristotle's conception of the implications of the truism that things must be what they are: "we are too loyal pupils of inductive philosophy to start back from any conclusion by reason of its strangeness. Newton's patient philoso-

phy taught him to find in the falling apple the law which governs the silent movements of the stars in their courses; and if Mr. Darwin can with the same correctness of reasoning demonstrate to us our fungular descent, we shall dismiss our pride, and avow with the characteristic humility of philosophy, our unsuspected cousinship with the mushrooms. . . ."[39]

In the absence of a detailed theory of speciation and channelization failure to observe recognizable intermediate types was a significant objection to evolutionism.[40] So was the sterility of hybrids.[41] These points were raised by Wilberforce with much the intent that subsequent objectors had in raising the absence of intermediate types from the fossil record or the difficulty of traversing the chasm between species by minute discrete steps.[42] Today it is possible to attribute the absence of fossil evidence for each minute gradation of the evolutionary progression to the statistical character of the evolutionary process.[43] And the dynamic that would make possible evolution by mutation has been mathematically modelled and empirically confirmed.[44] But Wilberforce's motive in his determination "to scrutinize carefully every step of the argument . . . and demur if at any point of it we are invited to substitute unlimited hypothesis for patient observation"—like the motivation of his successors—lay not in science but in metaphysics. The notion that "the permanence of specific forms was a fact confirmed by all observation" was a religious and metaphysical conviction, heightened not a little by the significance of the corollary that depended on it: "the line between man and the lower animals was distinct."[45] For Wilberforce and his successors it was not the idea of evolution per se that was alarming but what were taken to be its implications, and so taken generally, not only by its detractors but often by its foremost advocates.[46]

Anticipating E. O. Wilson's concept of the evolution of altruism, Darwin postulated an evolutionary origin in social instincts for moral sense and indeed of the moral principle that moral sentiment theorists had derived from moral sense, the Golden Rule. But, unable to discover a satisfying rationale for altruism on the basis of natural selection, Darwin took refuge in complexity, the mechanists' surrogate for mystery, and in the Lamarckian notion that social sentiments of praise and blame were not only internalized but somehow rendered hereditary in the deep—even mythic—evolutionary past. It seemed crucial to assign a genetic locus to morality since "the moral sense perhaps affords the best and highest distinction between man and the lower animals."[47] How could a specific differentia of such centrality fail to be genetic?

When Huxley purged Darwinism of its attachment to Lamarck, genetically based morality was purged as well, as Kant in his recogni-

tion of the interdependence of morality and freedom (and Aristotle before him) might have predicted.[48] For the moral sphere is that in which praise and blame are properly applied: it is the sphere in which individuals exercise responsibility through their own choices. If morality is borne through the genes then there is no individual responsibility—which is to say that the notion of a genetically transmitted morality (or immorality) is a self-contradictory notion. But to Huxley, a prototype of the modern seekers after the determinants of the human condition, the elimination of genetic determinants of ethics required the postulation of social determinants, and Darwin's evolved Golden Rule gave way to the social evolution of moral standards oriented toward group survival—a welcome consequence for Huxley, since it seemed to do away with the unwanted and seemingly inconsistent teleological assumptions of evolutionary prescriptivism.[49]

The Spencerian alternative to Darwin's and Huxley's models of moral evolution projected yet a third moral ideal, that of triumphant emergence from social struggle. Whether one followed Darwin in trying to derive altruistic standards from the egoistic struggles of evolution, or Herbert Spencer in trying to find altruistic evolutionary rationales for egoism in the pattern of social selection, or Huxley in pitting social evolution and group survival against biological evolution (individual but somehow also species survival), the outcome from a moral point of view seemed to be the same. Morality was relativized and in the process robbed of moral content.[50]

The Focus of the Debate in Nineteenth-century America

John W. Dawson (1820-1899), the geologist principal of McGill University; Enoch F. Burr (1818-1907), Congregationalist minister, astronomer, mathematician, and holder of a chair in natural theology and geology at Amherst College; Louis Agassiz (1807-1873), eminent botanist; and Charles Hodge (1797-1878), Princeton theologian and controversialist, were among the principal early adversaries of evolutionism in America. As a vigorous polemicist pledged to accept demonstrated scientific truths, Hodge had perhaps the greatest impact on popular religious thought, relying heavily on Agassiz's conception that fixed natural forms were not only a benchmark of divine handiwork but also a well-established scientific fact.[51] But it was Burr who spelled out clearly the motives behind theistic/scientific opposition to Darwinism: behind evolutionism lay a materialistic theory which was awkward, implausible, ultimately irrational, and thus untenable because it would have to confirm and explain the nebular hypothesis, spontaneous generation, and the transmutation of species—untenable and irrational because it precluded the "simplest" and "surest" hypothesis by

which all phenomena of nature could be explained directly and with elegant simplicity—the "hypothesis" of divine creation.[52] All of these arguments persist today.

Among the opponents of evolution, Hodge's work in particular foreshadows the concerns of his creationist successors down to the present. He anticipates their argument types as put forth in such recent tracts as H. M. Morris's *The Remarkable Birth of Planet Earth*, D. T. Gish's *Evolution: The Fossils Say No!*, J. C. Whitcomb's *The Early Earth*, and John N. Moore and H. S. Slusher's school text, *Biology: A Search for Order in Complexity*.[53] Hodge also anticipates or gives a founding articulation to his successors' presumptions about the theologically, scripturally appropriate contents of science. He shows a keen sensitivity—perhaps oversensitivity—to the options left for religion by acceptance of evolution. This sensitivity, which borders in Richard Overman's words on the "prophetic," is no doubt the source of the passion Hodge, his successors, and their following bring to the question of evolution and their search for "scientific" evidence against it.[54] To the anti-evolutionist movement in America, clearly evolutionism is not less but more than a biological theory or hypothesis. It is the keystone of a rejected and unacceptable world view. Hodge did not confuse the evolutionism of Darwin with that of Spencer. He saw Darwin as "simply a naturalist, a careful and laborious observer." Darwin was not to be held responsible for the universal application of the model entailed in his theory. Nevertheless, the theory itself was unacceptable, unacceptable as biology, because seemingly it voided teleology, left no room that Hodge could see for application of the idea that God had intended nature to eventuate as it has. And all theories of naturalistic evolution had Darwinism at their essence and were all unacceptable for the same reason.

Hodge responded unequivocally and succinctly to the question raised in the title of his 1874 book *What is Darwinism?*—"It is atheism."[55] Darwinism fails not because Darwin or even Ernst Haeckel was a materialist but because materialism is its implication. The stark contrast of the two alternatives Hodge projects for his followers down to our own contemporaries in the Institute for Creation Research seems to be a trademark of anthropomorphic fundamentalist theology. It cannot fail to call to mind the sharp dichotomies of today's generation of campus evangelists: either Jesus was the son of God or he was the greatest fraud in history.

Hodge's fundamentalism rests its case on facts, or what are taken to be facts, and it regards rival views as theories resting on rival readings of the facts. It gambles on its reading of the facts, leaving little room for graceful retreat.[56] In this it exhibits the same noble abandon that Blaise Pascal, Tertullian, or even Paul (Saul of Tarsus) had seen to be

the essence of one aspect of Christian spirit, wagering all on what might turn out to be absurdity, unwisdom, folly, were it not for the seeming datum of spirit and the received dictum of that spirit made incarnate and articulate as the word.

Darwin was not responsible for Haeckel or Spencer, but his theory gave the putatively factual foundation their philosophies required, and for that reason, in Hodge's view, it required to be refuted. Other data, known with certainty from religious experience and report, were in direct conflict with it; so careful reading (not interpretation) of the evidence would necessarily show that it was false.

Haeckel was not strictly a materialist (he preferred to call himself a monist), nor was Spencer a biologist, despite his anticipation of the evolutionary idea. Both men had their religious notions, as did their followers and successors. But these religious notions, founded on immanentism and framed in the language of pantheism and process, were a focus of Hodge's difficulties and of the difficulties of his successors with the successors of Spencer and Haeckel, whether Romantic, Pragmatist, Bergsonian, Whiteheadian, or Teilhardian.

All the early reconcilers of tradition with evolution had a God. Hodge lived to see only a few, whose first hesitant utterances on behalf of immanentism he labelled blasphemies. The essays of later and more sophisticated reconcilers have not been more satisfying to later Fundamentalists. The literal minded Christian wants a God that can be recognized as a person. The conciliatory proposals of Asa Gray and Henry Ward Beecher, in which evolution becomes God's means of creation, were unsatisfactory because they struck down the picture of the Sunday School God and set up an apparently empty photograph of the cosmic swirl of evolution in its place. Later reconcilers have fared no better in the judgment of more recent creationists. Morris writes of the symbolic interpretation of the first eleven chapters of Genesis: "If we are permitted to interpret Genesis in this fashion, what is to prevent our interpreting any other part of Scripture in the same way? Thus the Virgin Birth may, after all, be only an allegory, the Resurrection could be only a myth of supra-history, the Ten Commandments only a liturgy, the Crucifixion only a dream. Every man may interpret Scripture as suits his own convenience and thus every man becomes his own God!"[57]

The "scientific theism" of Francis Abbott (1835-1922), founder of the Free Religious Association, placed God as both the source and outcome of evolution. The intention was not strictly pantheistic, for teleology was retained as the essence of the divine project, by which "all nature and all life is one great theophany."[58] This teleology was the "essence of purely spiritual personality." To a follower of Hodge that would sound like double-talk, and this divine personality would

not be one which he had learned to recognize. The same could be said of the immanent God of John Fiske's romantic liberal recension of Spencer, or of Joseph Le Conte's God, who was defined in evolutionary terms as the sum of "resident forces" by which continuous progressive change is brought about. For A. E. Wilder-Smith, by contrast, divinity will be recognized not in a metaphysical or metaphorical personality but solely in the familiar lineaments of the Biblical Jesus, whose character is recognized by the studious also in that nature which is his act.[59]

Minot Savage (1841-1918), a Unitarian minister and disciple of Fiske, was explicit in his pantheism when he attempted to resurrect as a deity the "fire mist" that Stoic pantheists had hailed as Zeus and fathered upon Heraclitus. His 1876 book *The Religion of Evolution* only confirmed the fears expressed by Hodge two years before that evolution was a religion antithetical to the religion received.[60] The *either/or* of Fundamentalist Christianity was too bipolar to allow room for such babbling intellectual experiments. Hegelian syntheses of the sort Le Conte proposed, which found a partial truth in evolution and a partial truth in (continuous) creation seemed at best the thin edge of the wedge by which a Christian world would be pried apart and left in atomistic fragments by well-intentioned scientists with part time commitments to theology and misguided theologians of an alien gospel bearing amateur credentials in science.

Chauncey Wright (1830-1875), a Harvard positivist and Darwinian, was among the few exponents of biological evolution to recognize clearly that the articulation of evolutionism in the days of the great evolutionary disputations had attached a metaphysic to the underlying biological proposition. But then Wright was a purist who had recognized the metaphysical content underlying the anti-metaphysical system of Auguste Comte. Wright renewed the alliance of Philo and Demea against the religious rationalism of Hume's Cleanthes in the *Dialogues Concerning Natural Religion*, arguing in 1865 that science as such, that is, as an empirical endeavor, could never disclose a purpose in nature and that theologians would merely dilute the purity of religious truth in trying to make science support belief in divine designs.[61]

The compartmentalization Wright proposed, partly in the interest of protecting science from religious dogmatism, might seemingly have been welcome to the religious, since it also shielded "pure" religious truth from any mechanistic onslaught in the name of Haeckel, Spencer, or for that matter Karl Marx, or other materialistic or quasi-materialist thinkers. Yet the anti-evolutionists built no edifice on Wright's positivism—not because they found it sterile in its refusal to allow science and metaphysics to interact but rather because by their

lights they would have deemed Wright conceded too much. Few Darwinians were dispassionate enough to avow the doctrine of scientific neutrality in metaphysics. The Fundamentalists for their part would have had great difficulty in making common cause with an ally whose "defense" of religion was so cold as to be a major stumbling block to the religiosity of William James. For Wright's pure truth of religion appeared to be little more than an equivalent to pure practical reason, the ethical ideal into which Kant was believed to have resolved the rationally apprehensible content of religion. And if evolution could not guarantee the place of ethics, as an ethically unsympathetic reading of Huxley would plainly show or as a Spencerian reading of Darwin seemed to demonstrate, it could not claim to be the champion of religion, whose true intension it pronounced in the same breath to be identical with that of ethics.[62]

As the work of the reconcilers grew more competent and confident, it grew more technical and more comprehensive, more qualified religiously, and scientifically more thoughtful and mature. It did not, in the process, become more reassuring to the traditionalist frame of mind, which sought to preserve not merely the essence but the body of Christian scriptural theology. Fiske and Savage had dispensed with original sin. In place of the external intervention and vicarious atonement of the Christian eschaton, Le Conte, Beecher, and others substituted a secular process of sacralization, by which individuals or societies work out their own salvation.

Of the Protestant or universally Christian post-Kantian trinity—God, immortality, and freedom—what was preserved when the advocates of evolution had done their work? The liberal romantics and metaphysical reconcilers seemed to preserve only the notion or the name of God in their ideas of progress and process, not the personality or the immediacy of soteriological pathos and response which Fundamentalist Christians understood to be the central message of the Gospels and the Early Church. Henry Osborn and others tried to draw a line at the immortal soul as one phenomenon mechanistic evolution could never capture in its net.[63] But how could they guarantee that the Darwinian project of reducing consciousness and values to mechanistic terms would not one day succeed? C. Lloyd Morgan's conception of emergent evolution, in which higher order levels of complexity defy reduction to the terms of the elemental principles from which they spring, seems hardly adequate from a Fundamentalist perspective as a guarantee of personal immortality, punishments, and rewards. And the Spencerian and Huxleyan projects of founding a morality upon biological evolution or its social analogue or complement would fail as well in Fundamentalist eyes, since the moralities proposed by them, by their successors such as John Dewey,

and by their literary and socio-critical avatars such as Thorstein Veblen, Theodore Dreiser, and Jack London, were not only unscriptural but seemingly antithetical to the morality American Fundamentalist Christians believed they found in the Gospels. Even at their most optimistic, socialist humanism, progressive educationism, and scientistic utopianism (a la H. G. Wells) seemed to be predicting and promoting a world and a morality incompatible with Christian values—not promoting morality at the expense of God but perverting morality through the loss of God as its central orienting authority, or, what seemed worse, the loss of resolution in the projected image of the face of God by the transformation of that image from a clearly recognizable picture of the face of an all-gracious Jesus into the amorphic conception of some form of energy or immanent force. Such a transformation will naturally have seemed clear proof to the sensibility James was to call the "sick soul," which must be born again to live at all, that the "religion of healthy mindedness" represented by progressivism of all sorts was a pagan heresy founded in human pride and naturalistic self-conceit.[64]

Summing Up the Anti-evolutionists' Concerns

This is not the place to survey the achievements of Henri Bergson, Alfred North Whitehead, or Pierre Teilhard de Chardin. Their contributions to the reintegration of a world which even Kant—let alone Chauncey Wright—had concluded must be Solomonically divided to be saved at all, go far beyond the scope of our present reflections on the dialectic in the thinking of those who find evolution unacceptable. We can see clearly that each new technical device, each qualification, demystification, or naturalization of a magical or anthropomorphic notion produced by these or other reconcilers will be met with further reaction. For fundamentalism is not a primitive but a reactive mode of thought, seeking to preserve what it feels sure of and having no confidence in any intellectual content beyond the seemingly elemental artifacts of picture and story. Intellectual synthesis from such a perspective must seem inevitably to dissolve into contentless analysis—an onion that peels itself down to no core. It is their reaction to that dynamic, real or perceived, that today's anti-evolutionists express when they sum up their response to evolution by calling it Godless and unscriptural. In the analogy suggested by the experience of Ghazâlî nine centuries ago, intellectual reconciliation not founded on scriptural faith strips itself away without a stopping point until it reaches emptiness.[65]

This emptiness, the ethical nihilism into which ethical relativism resolves itself in the view of fundamentalists and the corresponding

ontic emptiness of a world bereft of God—a familiar and recognizable God who will call upon His creatures by name—is what the adversaries of evolution seem to fear most. What they fear is not a biological theory or hypothesis but a metaphysic for which that hypothesis has been made to stand as surrogate, the metaphysic with which they associate sexual permissivism, senseless violence, drug and alcohol abuse, familial disintegration, totalitarianism, racism, opportunism, loss of community, and many other evils of our times, from which they feel increasingly certain, as the horrors mount, that there is only one avenue of escape.[66]

At the moment, under pressure of their common fears at the objectivity of real horrors and the bankruptcy of even the awesome powers of science in attempting to address these, the seekers after elemental signs have become politically articulate and united to a far greater degree than they were in the days of the Scopes trial. When William Jennings Bryan asked the political question, "Who says we can't bar science that deprives us of all hope of the future life to come?" he could be answered by a chorus whose scientific, philosophic, and religious credentials were unimpeachable that there was no intention in evolution of damaging our hope for immortality—or at least of the essential meanings behind that hope. Today the answering chorus may seem fainter, the sense of moral malaise is surely more widespread, and the advocacy of materialism and its correlates in ethics has become far more strident than was deemed prudent or even thoughtful in Bryan's day.

Evolutionism as a paradigm has become not merely the framework of a philosophy but the watchword of a whole series of ideologies. Morris, a principal leader of today's anti-evolutionist movement, refers to *every* "anti-Christian system of the present day" as the "evil fruit" of Darwinism. Among these systems he includes communism, fascism, materialism, existentialism, Freudianism, behaviorism, the philosophy of John Dewey, and the application of that philosophy in progressive education.[67] The complex of such ideologies, which locate the creative powers of nature within natural objects and the powers of interpreting nature within human reason are identified as a religion by the advocates of special creation. This religion, which they most frequently label secular humanism in their public pronouncements, is in their view pagan at the root and radically powerless to save or to explain, since they regard all grace and understanding as possible only through the miraculous intervention of their Biblical God of revelation and creation.[68]

With a peculiar twist on Plato's notion of science as a likely story, or on Thomas Kuhn's idea of paradigms, modern anti-evolutionists in general tend to regard scientific theories as models, among which the

choice, up to a certain sticking point is fairly arbitrary.[69] They are very sensitive to the lacunae and even incoherencies of naturalistic evolutionary theories as the products of developing and finite, ever inchoate human intelligence. They do not reckon fully with the extended intimacy of the interaction between a theory and its data, which is far more like the extended intimacy of a happy marriage or the relationship of their God with His creation, than it is like the tenuous nexus, say, between an alibi and the verdict of a jury. And they do not fully appreciate that elusive aesthetic dimension of a theory's cogency which Albert Einstein referred to as elegance. They tend, to a man (and all but one of the thinkers whose work we have been able to review have been men), therefore, to assume that what is called for as alternative to evolutionism is another story—not necessarily a likely one—by which all the data which meets their standards can be wired together. The spirit of their enterprise in this respect is pungently summed up in the evangelical bumper sticker: "I'm a fool for Christ, whose fool are you?"

Understanding and Critique of Anti-evolutionism

There is an inclination on the part of philosophically inclined thinkers to wish that the issues in the contemporary creation-evolution dispute were disentangled somewhat, or more than somewhat. The question of *creatio ex nihilo*, we would say, is not the same as that of the origin of the cosmos, or the solar system. And these in turn are not the same as the questions creationists have raised about the age of the earth, the reliability of geologic dating methods, the thesis of uniformitarianism, the contemporaneity of human and dinosaur fossils, the definition of plant and animal species, the possibilities of hybridization and environmental variation, the nature of human intelligence, and the veracity of the Biblical and other ancient stories of a catastrophic flood.[70] For the anti-evolutionists and for many of their polemical opponents, these issues are all one. Indeed the recital of the issues in the works of the Biblicist creationists of the anti-evolutionist movement becomes a kind of litany in which the same arguments and examples, and even the same homiletic and rhetorical devices, are routinely repeated in an almost standardized order with a regularly repeated rhythm, broken only occasionally by a more detailed descent into the evidence, or flight of original speculation. For us the repertoire and its grouping are revealing, since what links these issues is not merely the question of Biblical authority but the larger question of the content of the world view which that authority is thought to vouch for by one significant body of its adherents and by a larger, if less perfectly arrayed, body of its detractors.

Two instances in the creationists' inventory of exegeses are significant to encapsulate the nisus of their approach: one is presented by the treatment of hybridization and the other by the characteristic creationist approach to biological determinism in relation to entropy. With regard to hybridization, Frank L. Marsh, who seems to be the creationist who has studied the biological *status questionis* in this regard most closely, counterbalances his defense of the fixity of "true" species with the recognition of the possibility of *cell* hybridization across species lines. The relative intolerance of the hybrid line for alien cytogenetic material is welcomed, apparently because it strengthens the idea of fixity of species. But the possibility of cell hybridization, say between human and mouse cytogenetic materials, is welcomed as well: "To the creationist, such behavior in tissue cultures helps corroborate empirically the statements of Genesis which portray man and all animals as originating from the same materials, the dust of the earth, at the command of one creator. A unity within living material was a natural result."[71] Both discreteness and continuity are welcome: discreteness for the sake of human dignity and the articulatedness of the divine plan in nature as creationists understand it and continuity for the sake of the unity of races, saving the phenomena of biological variation, and preserving the humility of the creature/dust before the Creator, God.[72] What this means is that evidence both natural and Scriptural, whether in favor of continuity or in favor of discreteness will be taken as confirming distinct elements of the same world picture. We have not the primacy of Scripture over science but the primacy of the world view which pictures God as a providential personality over both Scriptural and scientific exegesis. The world view modulates itself as a tradition, defining the character of God pictorially, and through that picture defining the possible range of exegesis for both science and revelation. The absolute discreteness of species is thought of through tradition as necessary to all human values and so must be defended at all epistemic costs. But that absolute is not an absolute before God. The continuity of species is also a Scriptural theme, expressive of the unity of life and the absolute (not relative) miracle of creation. Generation of life from nonliving matter, against which anti-evolutionists so frequently inveigh as an impossibility, is perfectly acceptable, provided it is understood that the accomplishment of that impossibility is God's miracle, the miracle of creation, by which absolute (not relative) differences were overcome.

Our second instance grows directly from the first. Anti-evolutionist creationists make quite a point of entropy. One might suppose the idea of all ordered systems running down would be demoralizing, in quite a similar ideological vein as that in which anti-evolutionists have argued historicism, behaviorism, dialectical materialism, and other

modes of mechanistic or vitalistic determinism are demoralizing. But fundamentalist creationists embrace entropy wholeheartedly as the cosmological equivalent of original sin and God's curse upon errant nature. Ice ages, geologic catastrophes, deviant biologic forms, are all results of entropy, manifest signs of nature's inability to correct or govern or to improve itself.[73] Thus, just as in Hume's *Dialogues* a flaw was noted in the theist's attempt to count all order and perfection in nature as the mark of divine creative providence and all disorder and imperfection as a sign of nature's weakness and dependency on God, so here there is a kind of inverse double bind: the stability of natural kinds is the signature of divine grace, but their instability is the mark of nature's accursedness and guilt. Entropy is welcome as the natural equivalent of that happy flaw which merited redemption. Once again conflicting evidence has been conflated by inclusion not in a theory but in a story or picture in which there are passages of both light and dark.

The motives behind the revival of literalist creationism in the 1980s seem to arise not in aimless fanaticism or even ignorance, still less in simple scriptural faith (for scriptural faith has no intention prior to the hermeneutic that informs it), but rather in a reaction to the age, to ideas which are feared and practices which can be truly fearsome. Nor are the modern literalists entirely in the wrong in associating these practices with those ideas. No one of course could claim seriously that the ideologies evangelical Christians reject can be held wholly responsible for the wrongs associatively linked with them, as though all non-Christian world views were tantamount to permissivism or a systematic transvaluation of values. Rather, the problem is one of insecurity: the creationists from Hodge onward have found no guarantee in any of the alternatives to their mythology that a sticking point would be reached beyond which no excess would be tolerated and from which no erosion would occur, morally or metaphysically. Their own impotence to provide a similar assurance they take, in the classic Pauline turnabout, as validation of the exclusivity and efficacy of the Truth they believe their faith enshrines. And they seize upon the simple certitude of the stories and visions by which they would live without a trace of recognition of any irony in the contrast between their supercritical epistemology used to dismiss all other comers and their naive acceptance of what they can recognize as their own, and their equally naive insistence that it is the only viable alternative to an ultimate darkness and nihilism.

Literalistic Materialism

The alternatives to mythologies which can answer them directly are more mythologies. And just as literalist creationism is not a distinctive

ancient doctrine but the product of a reaction against materialism and its associated notions, so also materialism itself as a metaphysic has acquired a literalist form, heightened in its dialectic with literalist creationism. Carl Sagan and Jacques Monod, the educator/publicist and the scientist/high priest of scientism, have now been stating openly what the followers of Hodge have long feared—that evolutionism, far from being the mere backbone of a science, is a framework, *the* framework of higher order truths.

While Sagan is the Haeckel of the age, Wilson has become its Spencer, deriving ethics from quasi-Darwinian group dynamics and positing altruistic (or in the case of Richard Dawkins, egoistic) genes, and so reducing ethics to genetics in rather confident oblivion of the nonmoral character of biological givens.[74] Monod has gone further, arguing that scientistic mechanism is the sole and sufficient foundation of a new ethics based (solely, it is proudly claimed) on respect for humans as the bearers of scientific knowledge.[75] And Sagan has imaged forth a world view in which God, typically, is absent. Mechanical causes play the roles once assigned to design, and rational elements such as mind, value, and order are left in an uneasy limbo between subjectivity and objectivity, to be marvelled at for their moment but ultimately to be reduced to mere things and interactions of things.[76]

Creationists find such worlds unsettling. They would not be convinced of the viability of Monod's ethics, for example, as distinguished from the ethics of tradition. (Shall human life be respected only in scientists and rights accorded in proportion to reputed scientific stature?) And they are not convinced of the capability of humanists or others, including would-be rational theologians, of forestalling what are confidently bruited as the implications of evolution. Demea has at least this much in common with Philo, or with Philo's contemporary materialist or phenomenalist successor: he at least (he alone, perhaps) is convinced of the validity of Philo's arguments—that the conclusions follow, and so the premises must be scotched before they have led to those conclusions.

Creation and Evolution in Public Arenas

Today's advocates of evolution often have not the strong commitment shared by many of their nineteenth-century forebears towards maintaining respectful relations with traditional religion and conventional morality. Many agree with evolution's detractors about the implications of evolution. Many on both sides are prepared to seek settlement of their intellectual dispute by political means. So committed are they to the values evolution or its rejection represent within their minds that they tend to forget the intellectual and the moral dangers of

transforming an intellectual confrontation into a political one. Just as a nontheistic mother can wonder if her child "must be" taught that God "programmed the spider" to build a perfect web,[77] so theistic parents have been wondering whether their children must be taught—in school and via television—that mechanistic explanations are fully adequate to the explication of the cosmos. That is the kind of question that makes education and even science itself a political issue or a set of political issues from which, if all conflicting interests are pressed, there is no successful outcome politically for science or religion. For the establishment of scientific or religious dogmas with official sanctions—as Justinian himself might have learned—only breeds schism, heresy, and hermeticism, stiffling to all inquiry.

The Catholic Church did not succeed in stifling Teilhard's thought —although it temporarily silenced the man—any more than it succeeded in stifling Galileo's thought, although it temporarily silenced the man.[78] Fundamentalists will not succeed in stifling the idea of evolution. Yet despite their intellectual intolerance, even Fundamentalists have rights. Today's issue, intellectually, is not whether evolution shall be taught in public schools (the literal minded seem always to confuse education with inculcation) but the manner in which it shall be taught. The teaching of evolution in a public institution, as a well-founded and fascinating theory in biology or a significant option in metaphysics, whose implications are to be reckoned with globally by philosophers, is a constitutionally guaranteed right the authors both exercise regularly.[79] Yet it troubles us as educators to see evolutionism taught to biology students as a mechanistic or Spencerian or any sort of dogma, as much as it would trouble us to see literalist creationism impressed by authority on untutored minds—not the least when either dogma is accompanied by an uncritical exposition of its alleged implications as seen through the eyes of its enthusiasts or its detractors.

In the polarization of controversy moderation, conciliation, and qualification tend to be overlooked. Complex and subtle concepts are oversimplified. The struggle among the mythic surrogates of concepts is often won on a mythic level by those images which exercise the most powerful visceral appeal. In America today, half the respondents to a recent Gallup Poll stated their belief that God created Adam and Eve.[80] As the issues behind the evolution controversy come to be more explicitly stated, this proportion as well as the proportion opposing the idea of creation could well grow. The minority who do not know or who are undecided could diminish and the positions of the radical adversaries at both extremes would become not only more prevalent but more pointed and inflexible. Sensitization to this particular debate via the channels of public relations and mass communi-

cations does not imply heightened sensitivity to the subtlety and complexity of the issues, or greater openness to the variety of the options. In the worst case, creation could be reduced to a mere fact or dogma and evolution could be debased into a myth as its advocates attempt to debunk an idea they perceive as the mythic rival of evolution.

On the flyleaf of Sagan's popular book *The Dragons of Eden* is a reproduction of an M. C. Escher work in which dragonlike reptiles emerge from the matter of the artist's sketchbook pages and march confidently, breathing fire but in a cycle, over a book on nature and back into the content of the sketchbook page. Nearby on the desk is a miniature copy of the *Book of Job*, and two cacti struggle for space in one small pot. Escher is a favorite of the mathematical games school of aesthetics because his interest in symmetries and visual paradoxes confirms their view that creativity is the outcome of structural symmetries in the brain.[81] Here he is made the iconographer of a scientifically more bizarre but ideologically all the more necessary hypothesis by which Sagan seeks to derive not merely Levi-Straussian formal structures but Jungian archetypes from the obligatory evolutionary past: "We are descended from reptiles and mammals both. In the daytime repression of the R-complex and in the nighttime stirring of the dream dragons, we may each of us be replaying the hundred-million-year-old warfare between the reptiles and the mammals."[82] Here we are told (and that quite typically of reductionistic evolutionism) not merely that we are risen from the apes or lizards, but that in a morally significant sense we are not risen at all. We are (in a way that counts perhaps more than any other) mere things or, worse, beings with a nonmoral but still somehow loathesome (because morally judgmental?) nature. Plainly the anti-evolutionists will be out in force to tell us that such was the inference (they will call it an implication) they most feared all along. But intellectually a scientist can do worse things than calling humans by the names they most fear to be called. Science can be allowed to lose its dignity, its distinction from myth, and the scientist can then be borne along by the power of the images conjured up in the defence of science. The paradox is worthy of Escher.

Progressivists and Reactionaries

Despite their scientific understanding that natural selection as an adaptive trend need not be a progressive tendency,[83] proponents of evolution as an ism tend to remain progressivists. Those who are materialists have a program—minimally, shall we say, the Epicurean program of dethroning the gods' hegemony over mores and disrobing the mysteries of nature. They hope to replace mysteries with a

clear understanding of nature's causes and transnatural authority with the clear self-legislation of human desire and will. And will is programmatically identified as reason for the sake of the appearance of continuity between the scientific and reformist projects. This is to say that anti-creationism, qua materialism, constitutes itself a metaphysic (as materialism must do to survive) and an ideal—known both to its advocates and to its detractors as secular humanism—towards which the proponents believe with nearly perfect faith humanity is inexorably or almost inexorably advancing.

The same outlook as to the onward march of progress and the same vision of what progress means, indeed the same rhetoric and imagery about human liberation through the enlightenment of science, has recurred among proponents of this view from Epicurus to Monod. Because they are stirred by their own rhetoric just as Fundamentalists are moved by their own myths, partisans of modernity (who wage intellectual battles on behalf of what they take to be foregone conclusions) have a fundamental incapacity to understand their foes, or rivals. James Moore, writing the history of the post-Darwinian controversies finds it all but incredible that the Scopes trial should have taken place when it did—when the serious intellectual battles, as he sees it, were all but over in England and on the Continent. Only an intellectual lag in America's cultural coming-of-age could explain the timing of the trial, delayed reaction to the German menace of the Great War, and fear of Bolshevism combined with intellectual bankruptcy, demagoguery and knownothingism.[84] No doubt the recurrence of the Scopes trial issues in the Segraves case in 1981 would be still more dumbfounding. Can enlightenment proceed so slowly? Can lags be long enough to produce retrogression, or are there epicycles on the wheels of progress? The answer seems to be that the armies of reaction, organized superstition to give a modern name to Epicurus's *bête noire*, if frightened enough, can muster unbelievable forces of hysteria without a shred of evidence or intellectual support to rely on.

Yet to dismiss today's advocates of creationism and anti-evolutionism as primitives or hysterics is not to join issue with them or to understand the motives and reasons which lead them to comb the verses of the Bible and the out-of-the-way passages of scientific journals in search of evidence and arguments in behalf of what they know to be the position they are called upon to defend. When twentieth-century creationists speak with conviction of the atheism implied by the idea of evolution, it is not because they are unaware that there have been theistic evolutionists. Rather, clearly, it is because they believe that evolutionary theism is unconvincing or would not function for them in the way that the idea of creation functions for them. When they denounce evolutionism in tracts, studies, and popular

pamphlets as immoral, it is not because they have articulated a thesis that human moralities are framed to fit ideologies rather than mores or ideals. Rather, it is because they believe that nihilism is the sole, logical alternative to belief in a creator God. Dean Turner, a recent and philosophically quite well read author, writes:

> One fact is indisputable: there is a *need* for God to exist, for the plain and unarguable reason that there could be no conceivable time when God's non-existence could be better than existence. The idea that an Infinite Mind exists, characterized by infinite understanding, reason, and creative love, is inherently better than the idea of a godless world that is only an absurd accident that inevitably fails to honor our needs. From the viewpoint of atheism, all reason, love and creation is ultimately accidental, temporary, and doomed to destruction. Only a very unfortunate person characterized by a sick sense of values could say that such a predicament would be better than God.[85]

It may be, of course, that creationists have misunderstood the program of secular humanism, but the possibility should not be dismissed that they have understood it all too well as the articulate expression of trends within the present age they find morally and spiritually repugnant.

Paradigms—Mythic and Factual

Northrop Frye had an interesting remark to make about stories, which would not be entirely irrelevant to our present concern with paradigms. It was that certain stories have the power to absorb others, which become their subplots and variations.[86] *There-and-back-again* is one such story. Creation is another. Its power arises from the figuring of the contingency of existence against the backdrop of the permanency of Being. Like all mythically articulated concepts, creation is susceptible to a distinctive mode of misunderstanding, its absorption within the categories of a rival myth—perhaps the myth of facticity.

Eric Voegelin speaks of the mythic projection of the origin of history and its significance as historiogenesis. He comments on Clement of Alexandria's efforts to prove the temporal priority of the Biblical personalities to the Greco-Roman pantheon:

> It is through their integration into historiogenesis that the tales of myth are divested of their original nature and transformed into facts of history. Isis and Demeter, Dionysius and Apollo become historical personages with a definite date in time, with the consequence that Clement can let his inquiry concerning the gods be followed, without a break of method, by the arguments concerning the date of Christ. Whether it be the dynasties of gods of the Turin papyrus or the creation myth of the Bible, or further on the gods of Euhemerus or Hecataeus of Abdera, or finally the Incarnation—all are pored over and bound together by the pseudo-reality of "history." They are petrified into "facts" by a fundamentalism or literalism that had been alien to the free mythopoesis, be it of the Memphite Theology, or the creations of a

Homer, Hesiod, Aeschylus or Plato. The symbols of the myth have their truth as an analogy of being; if this consciousness of analogical truth is now destroyed, one of the principal causes (there were others) must be seen in the "historization" of the myth through historiogenesis. The tone peculiar to the arguments of Clement, half comic, half embarrassing, stems from this grossness of destruction. The problem is still with us today in the debates on Biblicism and demythicization, as well as in the discussions on the "historicity" of Christ.[87]

The impact of this devastating paragraph, which unfortunately would be lost on most literalists, both among believers and among their adversaries, is that the religious significance of the idea of creation, like that of revelation or incarnation, is lost when such moments are reduced to the status of mere dogmatic or problematic empiric incidents in time. If a Christian is a believer in the mystery of the incarnation of the one absolute God as a man, then a Christian cannot be a believer in the mere facticity of incarnation—or creation. A recent, rather thoughtful scientific editorial *apropos* the Shroud of Turin proposes, "the resurrection was not a circus trick. Those who wish to know its meaning would do better to read Edward Schillebeeckx than [the authors of *Verdict on the Shroud*, 1981] Stevenson and Habermas."[88] If the shroud is to have the sort of significance claimed for it by its "defenders" and rejected by its "detractors," it cannot be the sort of significance that would be locatable in a piece of cloth or assayable by carbon-14 tests or similar procedures.

Wisdom at the present juncture, we would suggest, might be found in the advice of Saadya Gaon over a thousand years ago: If one seeks an ultimate Ground of explanation in a transcendent Author of creation, one defeats one's purpose if one seeks in turn to re-reduce that ultimate Principle to the empirical phenomena it was invoked to explain.[89] For a Christian to "defend" the historicity of creation is a project fraught with the potential irony that the would-be believer, in the very act of testifying faith in creation, might be stripping creation of its significance as an epiphany of the transcendent God. Creation (if properly construed) may be a truth, indeed a fact, but it loses its meaning when its defenders transform it into a *mere* fact.

Scientific creationists face more than a legal difficulty about the nexus of religion and politics when they seek to espouse alternatives to evolution which are not explicitly theistic for use as creationist rejoinders in public school curricula. They face as well the falsification of their own position, which is empty without reference to a transcendent Creator, as they and their opponents know very well.[90] The defenders of evolution, whether as fact or as a bastion of a scientistic, nontheistic paradigm, labor under a corresponding weight of misunderstanding when they imagine creation and creationism are no more

than outmoded notions, ideas whose adaptive usefulness is over and whose epoch in the progressive evolution of human culture is past, myths no longer tenable simply because myth is what they are and a time has come when humanity is capable of replacing myths by scientific understanding. On the contrary, the elementality of the idea of creation goes deeper than the myths which seek to express it—runs as deep, in fact, as the primary categories upon which human thought is founded. Therefore it is unlikely to be without expression in any human age or culture.

The idea of creation as fact or as epiphany arises from the application of a primary abstractive fiction—"What if not ψ"—and achieves consummate logical simplicity as well as metaphysical elegance and comprehensiveness when it asks its question not about tobacco, dogs, or painting, ceremonies or prohibitions, but about reality at large. It looks upon the universe not as a *fait accompli* which must be taken for granted or explained as the necessary outcome of necessary causes but under the rival and equally primary category of contingency and possibility—the category which makes possible the conception of change and becoming, even progress, rather than that which presumes and requires stasis and stability.[91] Contingency is not the category of scientific explanation, but it is not excluded by it; indeed it is presupposed by it. For the contingent is what explanation seeks to render necessary. We do not always look on all things as contingent. There is no contingent stage or phase of human thought or civilization to be gotten into or out of. For the correlative of contingency is necessity, just as the correlative of the relative is the absolute.[92] To look upon all things absolutely as contingent involves an incoherency incommensurate with human thought. We see the necessary through the contingent just as we see the contingent in the factitious and seemingly necessary. In this there is no progress, although there may be partiality or partialness of vision, just as there is no progress in the progression from synthetic to analytic thinking—and back again, although there may be partiality or partialness of vision on the part of some minds or all.

Evolutionism itself rests on contingent thinking, for it views the world of living species (and the cosmos as a whole) not as the inevitable and therefore eternal outcome of inexorable and therefore eternal laws but as the temporal product of natural forces whose empiric pattern is one of increasing complexity, whose future, therefore, is unlike its past. Creationism is the carrying of this developmental idea to its logical ultimate, the envisioning of a past that was radically unlike its future (and of a future that will be radically unlike its past). Yet anti-evolutionary creationists have embedded a key assumption of eternalism among their premises, the supposition of the fixity of nat-

ural kinds. Thus we have a perfect chiasma: the irony of an historical reversal, with evolutionists defending the idea of nature's radical transformation in the name of the immutable laws of nature and creationists denying the mutability of natural types for the sake of a world view which upholds the reality of a radical transformation of nature in the past (and its inevitability once again in the future).

It is because both creationism and evolutionism focus on change, gradual or radical but real, that creation and evolution were so often allied (against eternalism) in the past. Today, when creation and evolution seem to be at loggerheads, miscues are easy. Creationists can imagine the very idea of evolution poses some real danger because it seems to appeal to innate forces to which divine attributes are assigned. There seems to be an insecurity of faith or nerve here, as when the ancient monotheists feared pagan spirits, forgetting their own church's teaching that only the Asbolute could be divine. Correspondingly, evolutionists of ideological stamp can imagine that creationism as an idea must be the revival of some atavistic superstition that would rob science of its clarity and humanity of its freedoms. They forget the creationistic underpinnings of the very concept of evolution, just as the anti-evolutionists tend to forget the eternalistic basis of the idea of the fixity of species. And both groups have invested of themselves ideologically in their world views, associating tightly bound clusters of values to their own positions and projecting the derisive complements and opposites of those values, distorted mirror images of all that they hold sacred, upon the views of their opponents.

A myth is a story which bears meaning, not only through its words and sentences but through its narrative. The events of that narrative need not each contain facticity in order for the meaning borne in the narrative to contain truth(s). Creation is an idea borne in many myths that has absorbed its rivals repeatedly in its long history. For comprehensiveness and not a mere aura of elementality is the mark of power in a myth. Emanation was perfected by the neo-Platonists, quite consciously as an alternative to creation because the learned neo-Platonic philosophers did not choose to redescend into the anthropomorphic cosmogonies from which Aristotle had rescued them with great difficulty only a few centuries earlier. In those cosmogonies only the divine Plato seemed able—salamander like—to flourish happily. Emanation was a paradigm idea, one of the most powerful in humanity's history, but it could not absorb creation. Rather it was absorbed by it and became a variant on the monotheistic theme; it could not survive creation but was survived by it, not because hysteria breeds power—there is nothing hysterical in a Philo, a Philoponus, a Maimonides, an Augustine, or a Whitehead, Bergson or Teilhard—

but because it enshrines and projects an aspect of reality and experience, encapsulates a set of ideas and values that have not been gotten at in any other better way.

Paradigms, we would suggest, are not mere superstructures but are foundations of the structures in which human beings live. The idea of evolution has an ancient and noble lineage as a paradigm or element in several paradigms, running back to the teleology of Aristotle (which is indispensable to it—since adaptation is the key to evolutionary thought, the adaptation of form to function and of organism to environment,) the natural selection of Empedocles, and of course the humanism and naturalism of Democritus and Epicurus.[93] Its relations with militant secularism, pragmatism, value relativism, and the like may turn out to have been quite adventitious, much to the surprise of some of its most ardent exponents and detractors. That evolution might be harbored through some dark period of the human future by virtue of its sacredness to conciliators of the stamp of Bergson, Whitehead or Teilhard is no truly great irony. To consider this possibility need not smack of triumphalism, when we consider that Platonic metaphysics, Stoic ethics, and Peripatetic logic were long harbored by the corresponding synthesists of the past—the pre-Socratics, by Eusebius. Nor need it seem surprising that the creationist paradigm does not die as do so many of the ideas it may bear within it, that creationism does not stand or fall with particular bits of scientific evidence. If paradigms are foundation stones for houses fit for human habitation, the wisest of humanity have always chosen and will always choose houses containing more than a single window looking out on the neighborhood in which they have been built.

NOTES

1. Aristotle *De Sophisticis Elenchis* 5. 167b14-15 "for from what is not nothing could possibly come to be" with *Physics* 8.1. Cf. *Topics* 2.2. 109b23, 4.6. 128b7-9, 6.2. 139b20; *Soph. El.* 5. 166b37; *De Generatione et Corruptione* 1.3. 317b3, *De Anima* 3.7. 431a3-4. But see note 16 below. For the unabashed definition of creation as the generation of "something out of nothing" (*aysa min laysa*), see for example, *On Definitions* by the ninth-century Arab philosopher al-Kindî. For the closing of the Academy, see Agathias *History of the Reign of Justinian* 2.30-31, C. J. de Vogel, *Greek Philosophy* (Leiden: Brill, 1964), 3:590-91.

2. Parmenides frg. 8 in Simplicius' *Commentary on Aristotle's Physics*, 145, in *The Presocratic Philosophers*, ed. and trans. G. S. Kirk and J. E. Raven (Cambridge: Cambridge University Press, 1962), p. 273, text no. 347, line 6.

3. See Aristotle *Metaphysics* 1.5, esp. 986b15; cf. 1.2-3, esp. 983b6.

4. See Aristotle *Physics* 1.8; cf. 1.4. 187a29, 1.7, esp. 190b, 8. 191b10. For Xeniades' elenchus see Sextus Empiricus *Against the Logicians* 1.53 (=Diels frg. 81). In the *Topics* Aristotle makes a point of distinguishing the theses and paradoxes of eminent philosophers from mere sophisms (1.11. 104b18).

5. See for example Ibn Rushd (Averroes) *Tahâfut al-Tahâfut*, ed. M. Bouyges (Beirut: Catholic Press, 1930), trans., S. Van Den Bergh as *The Incoherence of the Incoherence*. Typically: "This argument is in the highest degree dialectical and does not reach the

pitch of demonstrative proof. For its premises are common notions, and common notions approach the equivocal..." (Bouyges, p. 5)—addressed to the claim that possibility does not require matter as a substrate.

6. The rejection of the idea of creation in Greek (and Greek inspired) philosophical thinking fused what we would discriminate as religious and scientific/metaphysical objections at the presumed unseemliness of an interruption in the cosmic order. The linking of theological with "logical" arguments for the eternity of the world is a prominent feature of Aristotle's *Physics* and *De Caelo*, and the interaction of these themes has become even more prominent in the eighteen arguments of Proclus for the eternity of the world. See T. Taylor, trans., *The Fragments that Remain of the Lost Writings of Proclus* (London: Black, Young and Young, 1825), p. 38, and for the first argument, lost in Greek, Philoponus apud Simplicius' *Commentary on Aristotle's Physics* A.-R. Badawi, ed., *Neo-Platonici apud Arabes, Islamica* 19 (1955) and Shahrastânî, *Kitâb al-Milal wa 'l-Nihal*, ed. Cureton (London: Society for the Publication of Oriental Texts, 1842), p. 338. For the necessity of cyclicity see Aristotle *De Generatione et Corruptione* 2.11, but cf. *History of Animals* 5.1; cf. Ibn Rushd *Tahâfut al-Tahâfut*, pp. 41-52, 88, trans. Van Den Bergh, 23-30, 51.

7. For Philoponus see S. Sambursky, *The Physical World of Late Antiquity* (London: Routledge Kegan Paul, 1962), pp. 170-75; I. P. Sheldon-Williams in *The Cambridge History of Later Greek and Early Medieval Philosophy*, ed. A. H. Armstrong (Cambridge: Cambridge University Press, 1967); R. Walzer, *Greek into Arabic* (Oxford: Cassirer, 1962), pp. 190-96; W. Bohm, ed., *Johannes Philoponus Grammatikos von Alexandrien* (Munich: F. Schöningh, 1967); and Philoponus' *De Aeternitate Mundi contra Proclum*, ed. H. Rabe (Leipzig: Teubner, 1899). Cf. Plato, *Statesman* 270d.

8. See Simplicius' commentaries on Aristotle's *Physics* and *De Caelo* and the materials and discussions in Sambursky, *The Physical World of Late Antiquity*.

9. See, for example, Ghazâlî, *Munqidh al-Ḍalâl*, ed. F. Jabre (Beirut: UNESCO, 1959), pp. 12-34; in *The Faith and Practice of Al-Ghazâlî*, trans. W. Montgomery Watt (London: Allen and Unwin, 1963), pp. 22-54; idem, *Tahâfut al-Falâsifa* (The Incoherence of the Philosophers) ed. M. Boyuges, 2nd ed. (Beirut: Catholic Press, 1962), passim, since the method is that of argument, and there is a commitment to accept the outcome of argument; Maimonides *Guide to the Perplexed* (hereafter: *Guide*) Pt. 2, ch. 8, glossing *Pesahim* 94b, and Maimonides' famous assertion that the affirmation of creation and denial of eternity are not based solely on the authority of scripture, since scripture itself can be glossed if its apparent meaning does not accord with the otherwise known scope of possibility, *Guide* Pt. 2, ch. 25. This type of glossing was not the *ad hoc* invention of Maimonides but the well-established practice of Talmudic exegesis long before it was rendered an exegetical canon by Maimonides' tenth-century predecessor Saadya Gaon al-Fayyûmî.

10. Immanuel Kant, *Critique of Pure Reason*, First Antinomy, trans. N. Kemp Smith (London: Macmillan, 1963; German eds. of Riga, 1781/1787), A426/B454-A433/B461. In the Middle Ages Ibn Ṭufayl (d. 1187), for example, represented the arguments between creation and eternity to be insoluble by reason and to express functionally equivalent ideas. See his *Ḥayy Ibn Yaqẓân*, trans. L. E. Goodman (New York: Twayne, 1972), pp. 130-34. Maimonides argued that eternalism could not be proved conclusively and that creation could not be proved necessary, although there might be grounds for preferring the latter to the former. See *Guide* Pt. 2, chs. 16-18; Pt. 1, chs. 74-76, and the discussion in L. E. Goodman, *RAMBAM, Readings in the Philosophy of Moses Maimonides* (New York: Viking, 1976), pp. 124-204. Aquinas, of course, argued that it is an article of faith, incapable of demonstration, that the world began: *Summa Theologica* III, Question 46, Article 2, despite—or because of—his acceptance of Maimonides's contention that the issue is one of probable and preferable views, Question 46, Article 1, Reply. Cf. n. 16 below.

11. See L. E. Goodman, "Did Ghazâlî Deny Causality?" *Studia Islamica* 47 (1978): 83-118.

12. See L. E. Goodman, *Monotheism: A Philosophic Inquiry into the Foundations of Theology and Ethics* (Totowa, N.J.: Allenheld and Osmun, 1981), pp. 67-69.

13. See Ghazâlî, *Tahâfut al-Falâsifa*, Discussions 1-4, 10 and conclusion, p. 254.

14. Thus Maimonides draws theistic conclusions from Peripatetic premises in his discussion of the Aristotelian view rather than regarding the medieval followers of Aristotelian neo-Platonism as mere would-be theists. See *Guide* Pt. 2, Introduction, ch. 1. Yet he seems to regard eternalism as too "metaphysical," insufficiently concrete.

15. See *Guide* Pt. 2, ch. 19; cf. L. E. Goodman, "Maimonides and Leibniz," accompanied by a translation of Leibniz' reading notes on *The Guide to the Perplexed*, in *Journal of Jewish Studies* 31 (1980): 214-36.

16. See *Guide* Pt. 2, chs. 15, 17, 18, see also Pt. 3, ch. 32, etc. It is significant for Maimonides that Aristotle dealt with the world's eternity in the *Topics*, where probabilities, plausibilities and dialectical arguments are considered. He seems to have in mind here the passage in the *Topics* which he echoes in *Guide* Pt. 1, ch. 31: "some problems... it is useful to know merely with a view to knowledge, e.g., whether the universe is eternal.... Problems also include questions in regard to which reasonings conflict... others also in regard to which we have no argument because they are so vast, and we find it difficult to give our reasons, e.g., the question of whether the universe is eternal or no: for into questions of that kind too it is possible to inquire." *Topics* 1.11. 104b7-17. For Ibn Tufayl, see note 10 above. Mendel Sachs derives a striking version of emergent evolution from the passage cited at *Guide* Pt. 2, ch. 17, in his "Maimonides, Spinoza and the Field Concept in Physics," *Journal of the History of Ideas* 37 (1976): 128-129.

17. See Ghazâlî, *Incoherence of the Philosophers*, p. 254, where the (neo-Platonic Aristotelian) philosophers of Islam are declared infidels on three counts and heretical on seventeen more, a charge which led to Averroes' formulation of a legal as well as a philosophical defense of philosophy, the *Faṣl al-Maqâl*, ed. G. Hourani (Leiden: Brill, 1959), and trans. by him as *The Decisive Treatise* in *Averroes on the Harmony of Religion and Philosophy* (London: Luzac, 1967).

18. See *Guide* Pt. 2, chs. 6, 13, 32; Pt. 3, chs. 16, 17, 20, 23, 25.

19. See Ghazâlî, *Incoherence of the Philosophers*, Discussions 1, 17 and L. E. Goodman (n. 11 above).

20. *Guide* Pt. 3, ch. 17.

21. Maimonides regarded the denial of providence, which he attributed to Epicurus and "the unbelievers of Israel" as demonstrably false: "The first doctrine is that there is no providence at all over anything. All that happens in heaven or elsewhere occurs either by chance or in accordance with the characters of things.... Aristotle demonstrated the impossibility of this theory and proved that it cannot be the case that all things are brought into being by chance." *Guide* Pt. 3, ch. 17. The proof to which Maimonides refers is Aristotle's argument at *Physics* 2.5 to the effect that the processes of nature follow the same pattern, either always or for the most part, and that what is always or for the most part uniform cannot be the effect of chance. Maimonides cites this proof at *Guide* Pt. 2, ch. 20 with a view to demonstrating his own thesis that there is an overriding, unitary governance of nature. For if nature were governed solely by "the characters of things" there would be no explanation of the overall uniformity of nature, to which we refer as natural law. Maimonides assumes that the overall governing principle of nature is the divinity; but, as he points out, there is room for a wide variety of accounts of the character of divine governance. For further discussion of these issues, see L. E. Goodman, *RAMBAM* (n. 10 above), pp. 296-324.

22. The account of creation in Genesis must be taken as poetry even by those who would take it "literally" since it involves artistic selection of materials—the inclusion and, very significantly, exclusion of detail. For a literary appreciation of the impact of this Biblical technique and its role in fostering both exegetical elaborations and a sense of historicity see Erich Auerbach, *Mimesis: The Representation of Reality in Western Literature* (Princeton, N.J.: Princeton University Press, 1953—written 1942-45), pp. 7-23. For the impact of the particular "omissions" perhaps most striking in the Genesis narrative of creation—the description, ancestry, motives, "background" of *Elohim*—see C. F. von Weiszäcker, *The Relevance of Science*, Gifford Lectures of 1959-60 (New York: Harper and Row, 1964).

23. See Alexander of Aphrodisias, *De Fato ad Imperatores*, ed. and trans. A. Fitzgerald as *On Destiny* (London: Scholartis, 1931), and the discussion of Alexan-

der's views in P. Merlan, *The Cambridge History* (n. 7 above), pp. 117-23. Cf. Maimonides, *Guide* Pt. 3, ch. 16.

24. *Guide* Pt. 2, chs. 22, 17, 18, 2-7; Pt. 3, chs. 13, 19-21, 25, 26, 31 and the discussions *ad loc.* in L. E. Goodman, *RAMBAM* (n. 10 above), pp. 177-204, 330-50, 363, 386-403.

25. Galileo Galilei, *Dialogue Concerning the Two Chief World Systems—Ptolemaic and Copernican*, trans. S. Drake, 2nd ed., rev. (Berkeley: University of California Press, 1967), p. 7.

26. Galileo, *Dialogue*, pp. 19-32. Galileo fathers on Plato (in view of the creation story of the *Timaeus*) the view that the bodies which form the solar system were borne to their present locations by linear motions and then set in the circular motions since maintained, in much the manner that construction materials are brought to a site and then located within the structure being built (p. 20). He argues that bodies have no natural place or predilection for any particular spot and therefore will move from a state of rest only as a result of the application of force; further, that in moving from an initial state of rest to a given speed, any body will pass "through all gradations of speed." The planets, on this model, were accelerated linearly in the genesis of the solar system, which Galileo describes as God's creation: taking the planet Jupiter as an example, "We may say with Plato that at the beginning He gave it a straight and accelerated motion; and later, when it had arrived at that degree of velocity, converted its straight motion into circular motion, whose speed thereafter was naturally uniform" (p. 21). It was not impossible, of course, for God to create circularly moving bodies, but in fact nature does operate on Galileo's gradualistic lines: an accelerating body is proved to accelerate through all the infinite "degrees of slowness" before it acquires any given speed (pp. 21-28); and a uniform circular motion, such as that of the planets, would be impossible without a prior linear acceleration (p. 28). Galileo confirms this inference by reference to the observed locations and velocities of the planets (p. 29). The outcome is that the observed uniformity in the circular motions of the planetary bodies confirms not the eternity of the heavens, as had been imagined by Aristotle, but the Platonic hypothesis of *formatio mundi*, since these uniform motions may (or by Galileo's account *must*) be traced back to an initial state of rest, from which the planets were accelerated linearly, through all the infinite gradations of slowness. That is, Galileo rests his heliocentric system of the planetary motions on what he takes to be the demonstration of the natural necessity of a starting point of all planetary motion, i.e., on a concept of creation conceived, as he makes clear, in terms of the Platonic idea of *formatio mundi*—arrangement of the cosmos' pre-existing parts. Of course it is not surprising that Galileo should have employed the Platonic model as against Aristotle, for the Galilean view of the heavens as undergoing creation/evolution was very much in keeping with the (Platonically interpreted) Judaeo-Christian naturalism about the celestial realm, which regarded the entire cosmos as generated and destructible. Aristotelian uniformitarianism, by contrast, was founded on the view that the heavens were eternal (ungenerated, indestructible, immutable except for local, rotatory motion) because they and the cosmos as a whole were perfect and divine. See *De Caelo* 1.9 and S. Sambursky *The Physical World of Late Antiquity* (n. 7 above), pp. 154-66.

27. Galileo, *Dialogue*, pp. 37-100.

28. Galileo, *Dialogue*, p. 99. The idea that diverse physical forms are adaptations to diverse environmental conditions is ancient and arises from Aristotelian and pre-Aristotelian analysis of form as serving function. The concept was developed in the Stoic theory of *pronoia* as a synthetically naturalistic/theistic doctrine and, for example, in the *Qur'ân* and the Muslim speculative thinkers. See for example L. E. Goodman, trans., *The Case of the Animals versus Man Before the King of the Jinn*, of the Ikhwân al-Safâ (Boston: Twayne, 1978), pp. 56-60 and notes 25, 29, 30 *ad loc*; cf. F. Rosenthal, trans., *The Muqaddimah* of Ibn Khaldûn (New York: Pantheon, 1958), 1:170-73. But Galileo carries such traditional notions much further when he states that the conditions of the moon render it necessary that any forms of life found there would be very different from those found on earth: "I consider the moon very different from the earth. Though I fancy to myself that its regions are not idle and dead, still I do not assert that life and motion exist there, and much less that plants, animals, or other things similar to ours are generated there. Even if they were, they would be extremely diverse, and far

beyond all our imaginings" (*Dialogue*, pp. 99-100). To propose that radically divergent environmental conditions require a radical divergence in life forms, if any may be found, is to assert the crucial premise of all evolutionary theory. And to do so in the context of an explicitly developmental cosmology is particularly suggestive; especially when it is borne in mind that Galileo expresses uncertainty that any life forms are found on the moon. His suggestion of evolutionary adaptation seems to be transposed to the case on earth.

29. Kenny writes, "Descartes' account of the solar system is disguisedly heliocentric and discreetly evolutionary." *Descartes* (New York: Random House, 1968), p. 12. See René Descartes, *Principles of Philosophy* esp. 3:16, 17, 24, 26, 32, 47, 111, 112, 114, 115; 4:1, 189, 199, etc., trans. Elizabeth Haldane and G. R. T. Ross (Cambridge: Cambridge University Press, 1967; 1st Latin ed., 1644; 1st trans. ed., 1911), pp. 272-74, 277, 280, 289-93.

30. Galileo, *Dialogue*, pp. 47-56, 72, 97-99.

31. Cf. A. N. Whitehead, *Science and the Modern World*, Lowell Lectures of 1925 (New York: Mentor, 1960), pp. 15-22.

32. William Paley's classic statement of the design argument was not published until 1802 in his *Natural Theology, or Evidences of the Existence and Attributes of the Deity collected from the Appearances of Nature* (Houston, Tex.: St. Thomas, 1972), but the argument had been developing for centuries before. Its key notions are discernible in several of the pre-Socratic philosophers and, of course, in myth and scripture. Explicit versions and variations of the argument are prominent features in the philosophies of Plato, the Stoics, Philo, Galen, Boethius, Thomas, and many of the scientific thinkers of the Renaissance and Enlightenment. Spinoza, Hume, and Kant were among the sternest critics, and Aristotle's and Spinoza's immanentism can be regarded as an inversion or alternative to the theory of an (externally derived) intelligent design in nature, rather than a faithful recapitulation of it. See Frederick Ferré, "Design Argument," in *Dictionary of the History of Ideas*, ed. Philip Wiener (New York: Scribners, 1973), 1:670-77. Hume's *Dialogues Concerning Natural Religion* were published posthumously in 1779; see the edition of Norman Kemp Smith (Indianapolis: Bobbs Merrill, reprinted 1947).

33. Charles Darwin, *On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life*, 1859; variorum text of the six editions, ed. Morse Peckham (Philadelphia: University of Pennsylvania Press, 1959).

34. Louis Agassiz' Hegelian, almost Plotinian, belief that species were the ideal variants of conceptually discernible life designs (not environmental adaptations) was rooted, he believed, not merely in secularized theology but in observation. See his *Essay on Classification*, ed. E. Lurie (Cambridge, Mass.: Harvard University Press, 1962; orig. ed., 1857). Bishop Samuel Wilberforce, similarly, founded his critique of evolution in what was made to sound like a rather strict empiricism—as though fixity were observed and natural selection were a purely speculative hypothesis (see nn. 36, 38, 39, and 41 below.) The epistemic double standard (by which species fixity is treated as an observation event and natural selection as a conjectural model, tendentiously in both cases) becomes a fairly regular feature of anti-evolutionary polemic and is even mirrored in the dogmatism of some of the overanxious polemicists on the opposite side of the aisle, who come to speak of evolution (globally?) as (an empirically observed?) fact and creation (in all intensions?) as a fairy story.

35. This trend of thought continues among contemporary creationists. Frank L. Marsh, for example, concedes the possibility of "microevolution," i.e., environmental adaptation of isolated populations generating widespread subspecific variation, but urges that the Biblical species which "brought forth after their kind" were, as they remain, not cross fertile, at least not *salva uniformitate*: "Creationists who believe that *Genesis* portrays the created kinds as reproductively isolated from one another reject the suggestion that kinds may have been able to hybridize in antediluvian times. They take this position because they believe that an original kind which brought forth only 'after its own kind' could not hybridize with another kind. If such were to occur, then neither partner would be bringing forth after its kind. The assumed hybrid would be like neither of the parental types." *Variation and Fixity in Nature* (Mountain View, Calif.: Pacific Press Association, 1976), p. 28. Marsh, like other creationists admits that there is

"much that is heavily speculative" with regard to the problem of antediluvian cross fertility, but he insists on the purity of ultimate types in a fashion suggestive of a debate between modern essentialists and followers of Wittgenstein's family resemblance mode of organizing experience. The issue is clearly stated by three spokesmen of the Creation Science Research Center: "The complex nature of the genetic mechanism and the strong persistence of all basic taxonomical categories argue strongly for their original special creation. If all organisms have actually descended by evolution from common ancestors, it seems inexplicable that there should be any distinct categories of organisms at all. One would certainly expect that nature would instead exhibit a continual series of organisms, with each grading into the other so imperceptibly that any kind of classification system would be impossible." William Boardman, R. F. Koontz, and H. M. Morris, *Science and Creation* (San Diego, Calif.: Creation-Science Research Center, 1973), p. 68. The difficulty, however, is that to many biologists the genetic material seems to present just such a continuum as the creationists' spokesmen reject. But Marsh and others treat the evidence for a continuum as strengthening the case for special creation by demanding a broader concept of the biological species. If cabbages can be crossed with radishes, Marsh argues, this shows not that one kind can be brought forth from another but that we were mistaken in regarding cabbages and radishes as members of distinct kinds (Marsh, p. 35).

36. *Jackson's Oxford Journal,* Saturday, 7 July 1860, p. 2, col. 6, as quoted by J. R. Lucas, "Wilberforce and Huxley: A Legendary Encounter," *The Historical Journal* 22 (1979): 319; cf. Charles Hodge, *What Is Darwinism?* (New York: Scribner, Armstrong & Co., 1874), p. 132. Among the contemporaries, for example, see the two collections of articles from the *Creation Research Quarterly*, edited by Walter E. Lammerts, *Why Not Creation?* (Nutley, N.J.: Presbyterian and Reformed Publishing Co., 1970) and *Scientific Studies in Special Creation* (Grand Rapids, Mich.: Baker Book House, 1971).

37. For an articulate summary of the value concerns centered on the problem of evolution as seen by a contemporary creationist see A. E. Wilder-Smith, *Man's Origin, Man's Destiny* (Minneapolis, Minn.: Bethany Fellowship, 1975), pp. 160-269. Cf. R. J. Rushdoony, *The Mythology of Science* (Nutley, N.J.: Craig Press, 1967), p. 32. See also Boardman, Koontz, and Morris, *Science and Creation*, p. 47. Darwin's counter-iconography is found in Charles Darwin, *The Descent of Man and Selection in Relation to Sex* (2nd ed. rev.; London: John Murray, 1891), ch. 21.

38. Samuel Wilberforce, review of Charles Darwin's *Origin of Species* in *Quarterly Review* 108 (July 1860): 256, reprinted in Wilberforce, *Essays*, p. 92 and in Reginald Brimley Johnson, ed., *Famous Reviews* (London: 1914; reprint ed., Freeport, N.Y.: Books for Libraries Press, 1967), p. 279.

39. *Quarterly Review*, p. 231, reprinted in Wilberforce, *Essays*, pp. 58-59 and in Johnson, ed., *Famous Reviews*, p. 270.

40. See Ernst Mayr, *Animal Species and Evolution* (Cambridge, Mass.: Harvard University Press, 1966); Bernard Rensch, *Evolution Above the Species Level* (New York: Wiley, 1966).

41. See *The Athenaeum*, 30 June, 7, 14 July 1860 and the discussion in J. R. Lucas, "Wilberforce and Huxley," pp. 319-20, 325.

42. Duane T. Gish, *Evolution: The Fossils Say No!* (San Diego, Calif.: Institute for Creation Research, 1973). For contemporary restatements of the problems of speciation and hybridization see Marsh, *Variation and Fixity in Nature* and Boardman, Koontz, and Morris, *Science and Creation*, pp. 49-94.

43. Cf. J. A. Zahm, *Evolution and Dogma* (Chicago: McBride, 1896). Teilhard de Chardin's concept of the tenuousity of nascent forms affords a basis for the explication of the fragmentary character of the fossil record in the principle he calls (rather heavily) the "law" of the "automatic suppression of evolutionary peduncles." See *The Phenomenon of Man* (London: Collins, 1966; 1st French ed., 1955), pp. 90, 120. Early forms are few and varied—exploratory and experimental, as it were. Only established forms are numerous and clearly defined. And experimental forms are frangible, perishable. Anti-evolutionary polemicists may regard this reasoning as somewhat *ad hoc*, subjecting it to criticism rather like that to which some anti-evolutionists were subjected for maintaining that fossils of seemingly millions of years' age were laid down

by God solely to test human creatures' faith. To doubters Teilhard presents not the fossils but the well defined spectacle of the "tree of life," asking rhetorically, whence this grew (pp. 138, 122-40)—a non-Linnaean question which derives its axiomatic rationality as a query of science solely from the idea of creation.

44. Ronald A. Fisher, *The Genetic Theory of Natural Selection* (Oxford: Oxford University Press, 1930) demonstrates mathematically the possibility of trans-specific evolution via discrete mutational steps within a manageable number of filial generations. For example, given an adaptive advantage of 20 percent as measured in augmented fertility, it is possible for a mutant variant determined by a gene with no dominance to increase its proportion in a breeding population from one-quarter of one percent to 95 percent within sixty generations. A dominant or partially dominant gene would be stabilized at a comparable frequency even sooner. See D. S. Falconer, *Introduction to Quantitative Genetics* (New York: Ronald Press, 1970), pp. 26-36, 186-207; cf. L. L. Cavalli-Sforza and W. F. Bodmer, *The Genetics of Human Populations* (San Francisco, Calif.: W. H. Freeman, 1971), pp. 71-88, 316-17. Given sufficient time and a reasonably large population, the emergence of stably fixed coadaptive gene complexes presents none of the mathematical difficulties once imagined to constitute an obstacle to evolutionary theory. Moreover, it should be borne in mind that some fairly small genetic differences can be sufficient to produce a barrier to crossbreeding and thus generate specific differences. The occurrence of observable genetic variation among populations attributable to differences in the adaptive advantage or disadvantage of single phenotypic traits was confirmed by H. B. Kettlewell in "Further Selection Experiments on Industrial Melanism in the Lepidoptera," *Heredity* 10 (1956): 287-301. Anti-evolutionists do not admit, of course, that genetic variation, even when responsive via population dynamics to environmental selection, can yield speciation. See, for example, Bolton Davidheiser, *Evolution and Christian Faith* (Nutley, N.J.: Presbyterian and Reformed Publishing, 1975), pp. 203-5. Robert E. Kofahl, *Handy Dandy Evolution Refuter* (San Diego, Calif.: Creation Science Research Center, 1977), pp. 54-55, argues, "The change observed in Kettlewell's moth produces a different phase, not a new species. It is not evolution." But, given the short time in which such phenomena as industrial melanism have taken effect, there does not seem to be any basis for a probabalistic objection to speciation via natural selection. Even the often repeated claim that there is no laboratory evidence to support the possibility of trans-specific evolution must be qualified by the recognition of the emergence of new strains of antibiotic resistant bacteria within the time frame of laboratory experience. The status of current knowledge on the question of trans-specific evolution is excellently reviewed for the nonspecialist in Peter R. Grant, "Speciation and the Adaptive Radiation of Darwin's Finches," *American Scientist* 69 (1981): 653-63. See also the discussion of the "punctuational model" in Steven M. Stanley, "Darwin Done Over," *The Sciences, Journal of the New York Academy of Sciences* 21 (October 1981): 18-23. And see R. C. Lewontin, *The Genetic Basis of Evolutionary Change* (New York: Columbia University Press, 1974).

45. See n. 39 above. Also J. R. Lucas (n. 36 above), pp. 315-20, argues convincingly that Wilberforce followed his review in the debate. The points about permanence, observation, and the clear line of animal/human demarcation come from the contemporary journalist's report of the debate preserved in *The Athenaeum*, 14 July 1860, p. 65, col. 1.

46. Contemporary anti-evolutionists are particularly emphatic on the discreteness of the human from all other species. They explicitly reject the notion of a gradual emergence of human conscience and consciousness on the grounds that a continuity between humans and the apes would break the lines of continuity between humanity and God. Of the prehistoric strains known from the fossil evidence, Boardman, Koontz, and Morris write: "These ancient men are all true men, not ape-men. . . . Neanderthal Man, also was perfectly normal except that, as now believed, he was affected with rickets. Homo Habilis, though small, seems to have been quite modern in every other respect." *Science and Creation* (n. 35 above), p. 41. Kofahl adds: "There is no evidence for the evolution of human intelligence" and cites Levi-Strauss in support. *Handy Dandy Evolution Refuter*, p. 81. He continues (pp. 83-84): "The essential attributes of human nature are intellect, affections . . . moral capacity and will. . . . There is no reason to

believe that non-living matter thinks, has feelings, has any sense of moral responsibility, or exercises will, or that chemical reactions can make an organism that does. Personal nature must, therefore, have come from a higher personal spiritual Source, not from an impersonal material source. This conclusion from the scientific evidence is just what the Bible teaches. We were created in the image of the infinite-personal Spirit, God the Creator." And Davidheiser concludes: "The evolutionists definitely believe that early man was hardly to be distinguished from some sort of ape and made crude tools which can hardly be distinguished from naturally fractured rocks. According to the Bible the first man was created as such, talked with God, knew right from wrong, named the animals, and sinned. Early men were skillful in metalwork and the handling of musical instruments." *Evolution and Christian Faith*, p. 337. G. F. Howe argues the case in a thoroughgoing manner in "Evolution and the Problem of Man" in Lammerts, ed., *Scientific Studies*, pp. 206-28.

47. Darwin, *Descent of Man*, 1:194.

48. See *Critique of Pure Reason* B431, A798/B826, pp. 383, 631 and *Critique of Practical Reason*, trans. L. W. Beck (Indianapolis, Ind.: Bobbs Merrill, 1956; German ed., 1788), pp. 43-51, 117-20, etc. *Groundwork of the Metaphysic of Morals*, trans. H. J. Paton (New York: Harper, 1956), pp. 99-104; cf. *Lectures on Ethics* (reconstructed by Paul Mentzer from student notes of the 1770s), trans. Louis Infield (Gloucester, Mass.: Peter Smith, 1978), pp. 252-53. Cf. Aristotle *Nicomachaean Ethics* 3.1-5.

49. Thomas H. Huxley, *Evolution and Ethics and Other Essays* (1896; reprint ed., New York: AMS, 1970), pp. 31, 80-86.

50. For contemporary anti-evolutionists the Spencerian approach seems to be salient. That evolution, if a law of nature, would justify the rule of violence and legitimate the domination of the weak by the strong is one of the principal moral objections raised by creationists against evolutionism. This reading, which becomes the basis of a critique of theistic evolutionists such as Teilhard, will not seem quite so strange when it is borne in mind that creationists believe the character and moral standards of the Creator will be legible in the laws governing creation. See Wilder-Smith (n. 37 above), pp. 167-80, 232. See also Davidheiser: "It is generally believed that Darwin did not condone the extrapolation of his natural selection theory into social relationships, but the fact is that he himself taught that human evolution proceeded through warfare and struggle between isolated clans." *Evolution and Christian Faith*, p. 350. Cf. W. J. Tinkle, "Immorality in Natural Selection," in Lammerts, ed., *Scientific Studies* (n. 36 above), p. 232: "If man evolved from the animals, it is easy to feel that he is still an animal at heart with a veneer of civilization. And if this evolution was accomplished by selfish initiative at the expense of other living things, it is easy to justify the same conduct now. In all fairness we must admit, however, that there are proponents of evolution who advocate moral behavior. But the ethical obligations of the scientists of which they write have been realized in spite of the doctrine of natural selection rather than because of it. The antisocial effects of the doctrine may be seen among persons whose moral characters are undeveloped, such as young people or persons who have never become morally mature. Our crime waves, which tend to become worse each year, are examples of the effect of selfish assertion." So taken up are today's anti-evolutionists with the Spencerian/Malthusian model of evolution that few seem to be aware that the pictorial imagery of Tennyson ("nature red in tooth and claw") has widely given way biologically to conceptions of adaptive radiation in which competition for survival, violence, domination and the like are very subordinate or unimportant concepts. Evolutionary success is measured in differential fertility rather than suppression, and the rapid evolutionary movements by which species can be modelled to have emerged will have been results of the differential capabilities of divergent types to exploit new ecological niches and opportunities. It is for that reason that so many ancient types persist—a mark of divine mercy and grace in evolution, to put the matter theologically. Racist and triumphalist readings of evolutionism do persist, however.

51. Quoted in James R. Moore, *The Post-Darwinian Controversies: A Study of the Protestant Struggle to Come to Terms with Darwin in Great Britain and America 1870-1900* (Cambridge: Cambridge University Press, 1979), p. 212.

52. See Moore, *Post-Darwinian Controversies*, p. 198. Cf. Henry M. Morris, *Biblical Cosmology and Modern Science* (Nutley, N.J.: Craig Press, 1975); George F. Howe, ed., *Speak to the Earth: Creation Studies in Geoscience* (Nutley, N.J.: Presbyterian and Reformed Publishing Co., 1975); H. M. Morris, ed., *Scientific Creationism* (San Diego, Calif., Creation-Life Publishers, 1976); Reginald Daly, *Earth's Most Challenging Mysteries* (Nutley, N.J.: Craig Press, 1976).

53. H. M. Morris, *The Remarkable Birth of Planet Earth* (Minneapolis: Bethany House, 1972); Gish, *Evolution: The Fossils Say No!* (n. 42 above), published in a "General Edition" with Biblical documentation and a "Public School Edition (non-religious text)"; John C. Whitcomb, *The Early Earth* (Grand Rapids, Mich.: Baker Book House, 1972); and John N. Moore and H. S. Slusher, *Biology: A Search for Order in Complexity* (Grand Rapids, Mich.: Zondervan, 1974). The Institute for Creation Research in San Diego distributes most of these and numerous other publications including school texts, audiovisual materials, a technical monograph series, teacher's manuals, Biblical and avowedly "apologetic" tracts, and a periodic pamphlet series coordinated with broadcasting and speakers' schedules.

54. Richard H. Overman, *Evolution and the Christian Doctrine of Creation: A Whiteheadian Interpretation* (Philadelphia: Westminster Press, 1967), p. 98.

55. Hodge (n. 36 above), p. 177.

56. Cynthia E. Russett, *Darwin in America: The Intellectual Response 1865-1912* (San Francisco, Calif.: Freeman, 1976), p. 27. Contemporary creationists, by contrast, tend to avoid boxing themselves in. They insist on their characteristically broad definition of the species or "Biblical kind" and leave room for a nonliteral six-day creation and for wide variation within kinds in the antediluvian epoch.

57 Morris, *Biblical Cosmology and Modern Science*, p. 57.

58. See Overman, *Evolution and the Christian Doctrine of Creation*, p. 109.

59. Wilder-Smith (n. 37 above), pp. 169-80.

60. Minot J. Savage, *The Religion of Evolution* (Boston, Mass.: Lockwood Books, 1876).

61. Chauncey Wright, "Natural Theology as a Positive Science," *North American Review* (January 1865), reprinted in C. E. Norton, ed., *Philosophical Discussions* (New York: Holt, 1877), pp. 35-42; cf. Wright's letter to Professor Lesley, 19 January 1865, in James Bradley Thayer, ed., *Letters of Chauncey Wright* (1878; reprint ed., New York: Burt Franklin, 1971), pp. 67-71; cf. his letter of 1 October 1865 to Charles Eliot Norton, quoted in Edward H. Madden, *Chauncey Wright and the Foundations of Pragmatism* (Seattle: University of Washington Press, 1963), p. 149.

62. For Wright's reduction of theism to ethics, his dissolution of the Kantian bond between ethics and immortality, and his avowal of agnosticism and rejection even of the nexus between ethics and theology, see his letter to Abbot, 28 October 1867, "concerning the existence of a God and the immortality of the soul. The verdict of 'not proven' is the kind of judgment I have formed.... Practical grounds are really the basis of belief in the doctrines of theology. The higher moral sentiments have attached themselves so strongly to these traditions that doubts of them seem to the believers like contempt for all that is noble or worthy...." Wright repudiates "dogmatic atheism" as the expression of the "bad motives" of the "meanest and narrowest of men" but exposes Kant's belief that immortality is morally necessary as the reward of the worthy as a paralogism founded in an insufficient valuation of this present life. See E. H. Madden, ed., *The Philosophical Writings of Chauncey Wright* (New York: Liberal Arts Press, 1958), pp. 43-44. Wright's letters give the impression of a series of evasions, his philosophy complementing his personality in the desire to put off religious inquiries for ethical ones and ethical questions for critical ones—a style of movement in its way as "prophetic" as that of Hodge. One recalls Santayana's remark that chastity is a discipline but not a way of life.

63. Henry F. Osborn, *Evolution and Religion in Education* (New York: Charles Scribner's, 1926), esp. pp. 45-67.

64. See Harold W. Clark, *Genesis and Science* (Nashville, Tenn.: Southern Publishing Co., 1967), pp. 115-24. Also, Rushdoony (n. 37 above), p. 41; and Morris, *Biblical Cosmology* (n. 52 above), p. 16. See also Rushdoony's "The Premises of Evolutionary

Thought" in Lammerts, ed., *Scientific Studies* (n. 36 above), pp. 3-6; cf. Davidheiser's attempt to portray Teilhard de Chardin as an idolator, a Communist or fellow traveller, a hypocrite and a heretic (n. 44 above), pp. 111-114. The discussion of Bergson in Jacob B. Agus, *Jewish Identity in an Age of Ideologies* (New York: Ungar, 1978), pp. 232-81, esp. pp. 250-55, is far more tempered and judicious, but the thrust is the same: that Bergson is to Judaism as the faceless gods of the Babylonian seasonal rhythms are to the caring God of providence. Agus, however, is not a Fundamentalist.

65. See Ghazâlî's *Fadâ'ih al-Bâtiniyya*, ed. A.-R. Badawi (Cairo: Dâru l'Qawmiyya, 1964), pp. 11-32.

66. The moral and social evils of evolutionism as viewed from the perspective of the contemporary creationist movement are documented in the references above (esp. nn. 37, 50). Concerning racism, totalitarianism, and opportunism Boardman, Koontz, and Morris write "racism in its virulent forms is mainly a product of evolutionary thinking." They go on to mention Adolf Hitler, Cecil Rhodes, and Benito Mussolini as "ardent evolutionists" and continue, "Karl Marx, Friedrich Engels and practically all other leaders of Communist thought, past and present, have been racists in the tradition of Charles Darwin" (n.37 above), p. 43-44. The approach, and indeed many of the details, are fairly representative; cf. Wilder-Smith (n. 37 above), pp. 187-97; Rushdoony (n. 37 above), p. 53; Davidheiser, "Social Darwinism," in Lammerts, ed., *Scientific Studies* (n. 36 above), pp. 338-43; and Morris, *Scientific Creationism* (n. 52 above), pp. 179-80.

67. H. M. Morris, *Biblical Catastrophism and Geology* (Philadelphia: Presbyterian and Reformed Publishing Co., 1975), pp. 12-13.

68. R. J. Rushdoony, "The Premises of Evolutionary Thought," in Lammerts, ed., *Scientific Studies* (n. 36 above), pp. 1-8, esp. pp. 5-6.

69. Rushdoony (n. 37 above), p. 13; John W. Klotz, "The Philosophy of Science in Relation to Concepts of Creation vs. The Evolutionary Theory," in Lammerts, ed., *Why Not Creation?* (n. 36 above), pp. 11, 14, 20; A. F. Williams, "The Genesis Account of Creation," in Lammerts, ed., *Why Not Creation?* p. 36; Daly (n. 52 above), p. 387; H. M. Morris, "Science versus Scientism in Historical Geology," in Lammerts, ed., *Scientific Studies* (n. 36 above), esp. pp. 119-23. See also G. W. Wheeler, *The Two-Taled Dinosaur* (Nashville, Tenn.: Southern Publishing Association, 1975), pp. 47, 113.

70. See Kelly Segraves, *The Great Dinosaur Mistake* (San Diego, Calif.: Beta Books, 1977); Wheeler, *Two-Taled Dinosaur*, p. 35; cf. H. G. Coffin, "A Paleoecological Misinterpretation," in Lammerts, ed., *Scientific Studies* (n. 36 above), pp. 165-68; Melvin A. Cook, "W. J. Meister's Discovery of Human Footprint with Trilobites in a Cambrian Formation of Western Utah," and W. J. Meister, "Discovery of Trilobite Fossils in Shod Footprint . . . ," both in Lammerts, ed., *Why Not Creation?* (n. 36 above), pp. 185-93.

71. Marsh (n. 35 above), pp. 37-38.

72. See for example, George F. Howe, "Homology, Analogy, and Creative Components in Plants," E. V. Shute, "Remarkable Adaptations," and H. W. Clark, "The Plants Will Teach You," all in Lammerts, ed., *Scientific Studies* (n. 36 above), pp. 243-68, 303-7. Cf. W. E. Lammerts, "Mutations Reveal the Glory of God's Handiwork," in Lammerts, ed., *Why Not Creation?* (n. 36 above), pp. 299-311.

73. See H. M. Morris, "Science Versus Scientism in Historical Geology," "The Power of Energy," and T. G. Barnes, "A Scientific Alternative to Evolution," in Lammerts, ed., *Scientific Studies* (n. 36 above), esp. pp. 107-18, 66-68, and 331-37.

74. See E. O. Wilson, *Sociobiology, the New Synthesis* (Cambridge, Mass.: Harvard University Press, 1975); Richard Dawkins, *The Selfish Gene* (Oxford: Oxford University Press, 1976). For the incoherence of the idea of heritable (im)morality, see Immanuel Kant, *Religion Within the Limits of Reason Alone*, trans. T. M. Greene and H. H. Hudson (New York: Harper & Row, 1960), pp. 16-21, cf. pp. 22-49.

75. Jacques Monod, *Chance and Necessity* (New York: Knopf, 1971).

76. The interest in extraterrestrial intelligence, which Carl Sagan in his own way promotes, is often rather typical of the problems inherent in any revival of pagan approaches to the cosmos in a synthetic intellectual environment such as that provided by modern natural science or its counterpart, universal, metaphysical religion. Like the devotees of island cargo cults, many of the devotees of the search for extraterrestrial

intelligence look to a literal, physical beyond as the source from which superhuman wisdom or transforming grace will come, projecting attitudes of awe, and other values associated with humanity's search for self-transcendence into dimensions whose glittering sacredness is enhanced by the authority of science and the power of technology. But these projections rarely reach the level of veneration, perhaps because the comprehensive naturalism of science and scientism seems to require that even these extraterrestrial focal points of human values ultimately be treated as mere things.

77. Bette Chambers, "Why a Statement Affirming Evolution?" *The Humanist* (January/February 1977): 23.

78. See Julian Huxley's "Introduction" to Teilhard de Chardin's *The Phenomenon of Man* (London: Collins, 1966), pp. 23-26.

79. See M. J. Goodman and L. E. Goodman, *The Sexes in the Human Population* (Los Angeles: Gee Tee Bee, 1981).

80. Gallup Poll reported in *Christianity Today* 24 (April 1980): 50.

81. Douglas R. Hofstadter, *Gödel, Escher, Bach: An Eternal Golden Braid* (New York: Basic Books, 1979).

82. Carl Sagan, *The Dragons of Eden* (New York: Random House, 1977), p. 150.

83. See Huxley (n. 49 above), p. 81.

84. See Moore (n. 51 above), pp. 71-76.

85. Dean Turner, *Commitment to Care: An Integrated Philosophy of Science, Education, and Religion* (Old Greenwich, Conn.: Devin-Adair, 1978), p. 126, cf. pp. 25-26, 66-67, 377 note 1.

86. Northrop Frye, *The Secular Scripture* (Cambridge, Mass.: Harvard University Press, 1976), pp. 6-20. Cf. Reinhold Neibuhr, "The Truth in Myths" in *The Nature of Religious Experience: Essays in Honor of Clyde Macintosh* (New York: Harper and Brothers, 1937).

87. Eric Voegelin, *The Ecumenic Age*, vol. 4 of *Order and History* (Baton Rouge: Louisiana State University Press, 1974), pp. 112-13.

88. Dietrick Thomson, "Turin Shroud: Nature and Supernature," *Science News*, 3 October 1981, p. 2.

89. Saadya Gaon al-Fayyûmi, *Kitâb . . . al-'Âmânât wa-'l-'Itiqâdât* Treatise I, Exordium, trans. S. Rosenblatt (New Haven, Conn.: Yale University Press, 1948), pp. 38-39.

90. We find it significant as we write (Spring 1981) that U.S. District Judge William Overton has struck down the Arkansas "creation science" law—not simply on the grounds that it interfered with free expression on the part of biology teachers and others but on the grounds that the law, by intention and implication, promoted the political establishment of a particular religious view. To separate creation from belief in a deity, Overton argued, "has no evidentiary or rational support." Creation is ultimately and (in a practical sense) inevitably a religious doctrine. Similarly, as we finalize these notes in the Fall of 1982, we find that H. M. Morris has argued that, like creationists, "the evolutionist and humanist" also founds his position in faith in unseen powers, albeit in the powers of "omniscient chance." See *Impact*, a publication of the Institute for Creation Research, 3 (September 1982): 1. The issue plainly is a religious one, although or because it has involved, on both sides, presumptions about the empirical implications of transcendental premises and the transcendental implications of empirical givens.

91. The categories of causality *presume* the necessity of observed outcomes; but simultaneously, explanation paradoxically shares with myth the presumption that things might have turned out other than as they have. For some preliminary reflections on the attempt to segregate pragmatically the alternative modes of thought generated by this paradox, see L. E. Goodman, "Baḥya on the Antinomy of Free Will and Predestination," *Journal of the History of Ideas* 44 (January 1983).

92. The idea that every relativity presupposes an absolute is Plato's, of course. Avicenna made the contrast of such correlatives the bsais of his contingency argument, called the cosmological argument by Kant and rejected by Ghazâlî, on the grounds that it seemed to presuppose the eternity of the world and so left an opening for atheism. See L. E. Goodman, "Ghazâlî's Argument from Creation," *International Journal of Middle East Studies* 2 (1971): 83-85; *Monotheism* (n. 12 above), pp. 63-69. For an anti-

evolutionist's awareness on this point, see J. C. Whitcomb, "The Creation of the Heavens and the Earth," in Lammerts, ed., *Scientific Studies* (n. 36 above), p. 30.

93. For an analysis of some of this lineage in relation to contemporary evolutionary and thermodynamic theory, see Jeffrey S. Wicken, "Chance, Necessity, and Purpose: Toward a Philosophy of Evolution," *Zygon* 16 (December 1981): 303-22.