SCIENCE AND THE FORTUNES OF NATURAL THEOLOGY: SOME HISTORICAL PERSPECTIVES

by John Hedley Brooke

Abstract. The object is to examine strategies commonly used to heighten a sense of the sacred in nature. It is argued that moves designed to reinforce a concept of Providence have been the very ones to release new opportunities for secular readings. Several case studies reveal this fluidity across a sacred-secular divide. The irony whereby sacred readings of nature would graduate into the secular is also shown to operate in reverse as anti-providentialist strategies invited their own refutation. The analysis is used to support the claim that the sciences have put fewer constraints on religious belief than is generally assumed.

Keywords: argument from design; deism; naturalism; natural theology; Providence; secularization.

It is commonly said that in our modern age we have lost a sense of the sacred in nature, that we experience great difficulty in giving content to the idea of God's involvement in the world. This paper had its origin in an invitation to consider whether historical perspectives might help to illuminate both the desacralization and the difficulty. This ought to be the case, since the difficulty of conceptualizing divine involvement, and of proclaiming it in a cogent manner, are not new problems. Many strategies have been employed in the past, both by scientists and religious apologists, and presumably there is something to be learned from their success or failure.

I say *presumably* because the quest for historical understanding and the attempt to learn lessons from history can be two quite different goals. Indeed, one might be forgiven for harboring serious doubts

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about the didactic use of history. Where the history of science has been used as a resource for illustrating the defective strategies of the past, the quality of the historical scholarship has commonly left a lot to be desired. The demand for an empathetic understanding of a historical figure—which the historian tries to meet—may run counter to the demand of a contemporary apologist looking for case-studies through which to score a point or learn a lesson. One example may clarify this point and also serve as an introduction to the main thesis which I wish to explore: In late-seventeenth-century England, Thomas Burnet published a theory of the Earth's history which was explicitly a *Sacred Theory of the Earth*. That was his title. In it he assumed the role of apologist, using a knowledge of history to identify the successes and mistakes of the past. Thus he applauded Augustine for his warning that science and religion should not be too tightly interlocked, that it is dangerous to invoke the authority of Scripture in disputes about the natural world. The danger, in Burnet's paraphrase, was that as scientific understanding advanced, one would "discover that to be evidently false which we had made Scripture to assert" (Burnet [1691] 1965, 16). Its authority would thereby be jeopardized on far more important matters. But, says Burnet with evident condescension, Augustine proceeded to fall into the very trap he had identified, using Scripture in his zeal against the Antipodes. Burnet, so much wiser in the late seventeenth century, is even more aware of the danger and knows how to avoid it.

And yet anybody reading Burnet's *Sacred Theory* today would immediately be struck by the fact that he falls headlong into the trap which Augustine had identified and which he, so self-consciously, located. Instead of keeping the spheres of science and the Bible apart, they are closely intertwined. Thus he attempted a scientific account of how the Genesis flood came about and defined the main epochs of earth history with reference to phases gleaned from his Bible. His picture of a submerged earth, in which Noah's ark alone is discernible, vividly shows how the flood was made constitutive of the Earth's physical history (Burnet [1691] 1965, 85).

The point is this: we, too, may play Burnet's game, looking for traps and how to avoid them. But the more sympathetic question, perhaps, ought to be how it was possible for Augustine to behave in a manner which, to a later generation, looked inconsistent. And similarly for Burnet. Part of the answer to *that* question is that the domains of science and religion were obviously separated by different boundaries in Augustine's day from Burnet's, and from Burnet's to our own. It is easy enough to score a point, or extract a lesson, with hindsight, but at the expense of a sensitive analysis of those shifting boundaries.

What one can discern in such examples is a degree of irony. A closer inspection of the context in which Burnet was writing magnifies it rather than removes it. As chaplain to the King (William) and as a serious candidate for the see of Canterbury, he was on the side of those who wished to use the latest science to enrich their understanding of Providence. His suggestion of a Cartesian mechanism for the Genesis flood was not intended as an argument against God's special Providence. The argument for God's involvement in the world was *enhanced* by the realization that the mechanism for divine punishment had been perfectly synchronized with the progress of human degradation: "It is no detraction from Divine Providence, that the course of Nature is exact and regular, and that even in its greatest changes and revolutions it should still conspire and be prepared to answer the ends and purposes of the Divine Will in reference to the *Moral* World.This seems to me the great Art of Divine Providence, so to adjust the two worlds, Humane and Natural, Material and Intellectual . . . and especially in their great Crises and Periods" (Burnet [1691] 1965, 89).

But—and this is the irony—anyone who read Burnet through the spectacles of deism would rejoice at finding such enthusiasm for mechanistic explanation. And rejoice even more, when they found Burnet expressing doubts about the literal accuracy of the Creation narrative. One who rejoiced in precisely that way was the celebrated deist, Charles Blount, who seized Burnet's sacred physics and simply divested it of the sacred (Force 1985, 34-39). If mechanisms could be found for events once ascribed to God's special Providence, could they not be reduced to the normal course of nature?

Some Self-Defeating Strategies in the Defense of a Christian Providentialism

The ease with which the sacred could graduate into the secular is a central theme of this paper. I want to explore the paradoxical thesis that those strategies which have been employed to boost a sense of divine involvement in the natural world have often been the very ones that have turned out most counterproductive. There *may* be a lesson in that, but that is for others to decide. In an essay on religion and secularization, Peter Burke put in a nutshell an observation commonly made by historians: "The scientists were destructive in spite of themselves"—destructive, that is, of a sense of the sacred in nature (Burke 1979, 303). Destructive in spite of themselves. If this were a sermon, that would be my text.

Let us begin with a familiar example, in which the ironic pattern has long been recognized. Where the strategy is to argue for God's involvement by exploiting gaps in scientific understanding, the god you get is a

god-of-the-gaps, a god progressively nudged out of the world. A classic example would be the advice of American botanist Asa Gray to Charles Darwin—that until such time as he could account for the origin of variation it would be prudent to assume that advantageous variations arose through the guiding hand of Providence (Brooke & Richardson 1974, 89-91). It has become a commonplace to observe that such advice, far from enshrining wisdom, represents bad science and precarious theology. The familiarity of such examples means that there is no need to labour the point. The irony consists in the fact that what might be a very successful short-term strategy invariably seems to fail in the long run. What, one wonders, will be the fate of the argument that divine activity is the explanation for why the universe, in the first moments of its existence, conformed to an anthropic principle? (see Polkinghorne 1986, 80). What will be the fate of arguments designed to show that artificial intelligence will never entirely simulate human intelligence?

For a quite different strategy it is necessary to go back to a period when scholastic philosophy was beginning to give way to what we recognize as modern science—back to that memorable year, 1600, when Giordano Bruno was burned at the stake for, among other things, having referred to Christ as a rogue who got what he deserved, to all monks as asses, and to Roman Catholic doctrines as asinine. Bruno is generally perceived as the most radical of the Copernicans because of his insertion of the Copernican system into an infinite universe containing an infinite plurality of worlds (Lovejoy 1960, 108 and 116; Rossi 1972; Dick 1982, 63-70). There is no doubt that Bruno's vision was very damaging to a sense of cosmic identity in the early seventeenth century. Kepler, for example, was in the delicate position of wishing to support a heliostatic cosmos whilst, at the same time, avoiding the excesses of Bruno. He succeeded by insisting that the earth still had a cosmic identity as that planet which occupied the central orbit, revolving around the most resplendent sun in the universe. We know of his relief when he learned that the satellites which Galileo had observed through his telescope were satellites of Jupiter, not planetary bodies circling another sun. Had they been the latter, they would have given empirical support to Bruno's subversive cosmology (Rosen 1965).

It is difficult to imagine a more subversive system that that of Bruno. Yet—and this is the irony—it was a cosmology defended in terms of a natural theology which was an extension of an already well-established critique of Aristotle. Against Aristotle's dogmatism that only one world (in the sense of cosmos) was possible, scholastic philosophers had already objected that God *could* have created other worlds if that had

been desirable. The deity had not done so, but could have. That way God's omnipotence had been protected (Dick 1982, 33). Bruno simply pressed the argument further. If the natural world is truly to reflect God's infinite power, then it too must be infinite. If it is to reflect infinite creative power, then it must contain an infinite number of solar systems like our own. Bruno put it this way: "There is no infinite power if the infinite is not realizable; I say that there is no infinite power capable of creating unless there is an infinity capable of being created. After all, what can this power be if it is impossible or if it is a power of the impossible" (Westman 1977, 20). As Robert Westman has emphasized: with Bruno "the immensity and perfection of God is such an overwhelming vision that the mere assurance of God's *possible* actions is insufficient to grasp his actual power in creating this universe" (Westman 1977, 20). At the very inception of seventeenth-century science, a zealous attempt to promote the omnipotence of God immediately eventuated in subversive and radical conclusions. And it had all hinged on that fragile transition from what God *might* have done to what, according to Bruno, *had* been done. It is perhaps the most telling example of how easily, and in this case literally, a natural theology can self-destruct.

A third strategy, commonly employed during the seventeenth century, was to insist that the hand of God was to be seen in everything. A strong version of this thesis was associated with what is often called a voluntarist theology of nature (Klaaren 1977; McGuire 1972; Milton 1981). Everything in the physical world was as it was because God had so chosen. There was no binding necessity for the deity to act in any way rather than another. The regularity of "laws" of nature simply reflected the fact that God normally chose to act in the same way. This view, which tended to make the deity immediately responsible for every event in the natural world, was not as hostile to the scientific movement as is sometimes supposed. As long as God did, for the most part, act consistently, the regularities of the natural order could be investigated.

In fact, a voluntarist theology has been seen as beneficial to science in at least three ways.

First, it could facilitate the defense of empiricism since there was no a priori way of discovering how the world had to be. Thus it was one of Marin Mersenne's objections against Aristotle that in his treatment of qualities such as heaviness, he had assumed that the earth occupied a "natural place" in the cosmos. Mersenne's point was that on theological grounds the concept of a "natural place" was inadmissible. The earth was where God had chosen to put it (Lenoble 1943). To find where the earth was, it was necessary to go out, as it were, and look, not to prejudge the issue.

Second, a voluntarist theology arguably encouraged a mechanical philosophy of nature since, if everything was the result of particles of matter in motion, one could ascribe the motion directly to God. For a Roman Catholic like Mersenne, sensitive to the complaint of Protestants that Catholic clergy were pretending to perform miracles in order to convert or hold the masses, a mechanical philosophy linked to a voluntarist theology could be very attractive. It helped to differentiate between natural marvels and true miracles, in that the latter were phenomena that could not be explained in mechanical terms.

And finally, through this mechanical philosophy a voluntarist theology could help to purge the world of spirits, demons, angels, vital principles and all the other cosmic junk which was commonly thought to mediate between the forces of heaven and earth. It helped to rid the world of animism, of Nature with a capital "N," until, in the natural philosophy of Robert Boyle, there were simply corpuscles of matter sustained in motion by God. Boyle did not deny the existence of spirits, but by stressing the essential passivity of matter, he allowed God absolute control. "I know of no man," he once wrote, "who has yet shown how matter can move itself" (Boyle [1663] 1979, 165).

This way of looking at things is so foreign to twentieth-century sensibilities that it is as well to consider the central analogy on which it was based. For Boyle, and for Isaac Newton, God could act immediately in the physical world, just as we act every time we move a limb. Human voluntary behavior provided the demonstration of how spirit could move matter. Because this analogy was of such central importance to Newton, it is quite wrong to reduce his God to a god-of-the-gaps. Newton's God was not into gaps. He was into everything (Brooke & Goodman 1974, 89-94). In an early essay Newton wrote that his object was to show "that God may appear to have created the world solely by the act of will just as we move our bodies by an act of will alone; and, besides, so that I might show that the analogy between the divine faculties and our own is greater than has formerly been perceived by philosophers" (Westfall 1971, 340).

This voluntarist theology was, then, a useful vehicle for promoting mechanical science and for giving maximum weight to God's sovereignty. But a few ironies soon appear.

For one thing, the clockwork analogies that were integral to the new mechanized universe played straight into the hands of deists. For all Boyle's attacks on vulgar conceptions of nature (Boyle [1686] 1979, 176-91), he did on occasions refer to the universe as behaving like a *self-running* engine. No wonder even as sympathetic an observer as John Ray, when he first read Boyle, came to the conclusion that he was a deist (McAdoo 1965, 249). He subsequently acknowledged his mis-

take and apologized. But Ray's misreading nicely brings out the irony: once the clockwork analogies were established, deism was but a hair-spring away.

A second problem arose if the analogy with human behavior were taken too literally. If God moved matter as humans moved their limbs, was the universe not, in a sense, the body of God? In which case one was on the slippery slope to pantheism. Since Newton did refer to space as if it were the sensorium of God, he laid himself open to the objection of Gottfried Leibniz that he was promulgating a defective image of the deity. If God knew all things, Leibniz complained, it was not because He was able to sense them, but because he produced them (Alexander 1956, 12-20; Shapin 1981).

A third element in the ironic pattern is that Newton's voluntarism arguably did create difficulties for his science. Because he sedulously avoided giving matter any inherent powers, he was at sixes and sevens over how best to explicate the action of his gravitational force. He toyed with at least four different accounts of how gravity could operate, including the notion that it was a direct and continuous expression of divine activity (McMullin 1978, 79 and 103; Guerlac 1983). The irony is that for those who were prepared to see gravity as inherent in matter, Newton was the very man who had shown how matter *could* move itself. The deist Anthony Collins invoked the authority of Newton to make precisely that point.

As a final element in this part of the story, we should note the existence of a recurrent problem. If it is presupposed that God is directly responsible for all activity in the natural world, then how can one demonstrate this involvement? If it is an all-or-nothing matter, how can one convince anyone else that they should go for the all rather than for the nothing? The nineteenth century contributor to *Lux Mundi*, Aubrey Moore, has been praised for his openness to Darwinian evolution: "The one absolutely impossible conception of God, in the present day, is that which represents him as an occasional visitor. Science has pushed the deist's God further and further away, and at the moment when it seemed as if He would be thrust out all together, Darwinism appeared, and, under the disguise of a foe, did the work of a friend.... Either God is everywhere present in nature, or He is nowhere" (Moore 1891, 73).

That openness is certainly to be commended, but structuring the argument around an all-or-nothing does nothing rather than all to show how appeals to nature can heighten a sense of divine involvement. The difficulty is one that Newton appears to have felt. He was evidently alert to the fact that the mechanized universe of René Descartes was giving solace to deists, scoffers and other reprobates. This

may account for his search for the more extraordinary features of creation which might show, more vividly, the continuing hand of Providence. It is well known that he found reasons for supposing that the solar system would require a "reformation" from time to time, and that in making provision for such a reformation Providence was to be celebrated. The problem is that with his voluntarist theology, Newton was still on the horns of a dilemma. For there was nothing to stop him speculating on the nature of the mechanism which Providence had provided for the job. A comet passing close to the sun, for example, might lose part of the mass of its tail through gravitational attraction, the sun thereby gaining in mass which compensated for loss through vaporization. Comets, far from being stripped of religious significance by the new science, were agents of Providence in preserving a stable system. But then the catch: the whole procedure comes very close to self-defeat. If comets deliver the goods at just the right time, why not see their role as pre-programmed, in line with a deistic metaphysics? (Kubrin [1967] 1973, 166-67).

There are other ironies associated with the mechanization of the world picture. There is a sense in which Descartes's attempt to promote the dignity of humanity and its immortality had a marked effect in the desacralization of nature by legitimizing a widespread cruelty to animals (Thomas 1984, 34). If they were merely machines, bereft of any feelings, there was little to discourage one from kicking them around: "Please do not bring a dog for Pauline," a certain Mdme. de Grignan begged in 1690; "we want only rational creatures here, and belonging to the sect we belong to we refuse to burden ourselves with these machines" (Spink 1960, 229).

Now for a strategy that was designed to defeat the deist. In the apologetics of the eighteenth-century Anglican, Joseph Butler, an ingenious analogical argument was constructed to expose the alleged inconsistency in the deist position. Deists would accept that nature had a divine author, but not Scripture. There was no need to prove God's existence, because no deist denied it. But it was necessary to prove the authenticity of Revelation. Hence Butler's method: to emphasize the similarity in style between the book of God's words and the book of His works. The same features and the same difficulties were to be found in both. If the deist asked why Christ had come so late in time to effect a remedy for our spiritual ills, Butler replied that the case was no different in the course of nature, where we had been long in discovering the remedies for our physical ills. If the deist asked why knowledge of Christ was so unfairly distributed, Butler replied that the case was no different in the course of nature, where other gifts were unequally bestowed. If the deist was prepared to accept a God of nature, despite

the difficulties, then he should, to be consistent, accept the God of the Bible, where the difficulties were of the same order (Butler [1736] 1961).

Butler's strategy may have been effective against deism, but the irony is once again transparent. For the sceptic who had doubts concerning a beneficent designer, the strategy was as likely to reinforce doubts as to remove them. If both Scripture and nature were fraught with similar problems, the correct procedure might be to resist the inference to a divine Author in *both* cases. The analogical argument simply backfired when aimed at a sceptic like David Hume (Jeffner 1966). Butler's strategy is well known, but I have introduced it here because a similar style of argument appeared in the nineteenth century in the context of astronomical and geological debate. One factor in the desacralization of nature was undoubtedly the psychological one of squaring the transcendental value which religion conferred on people with the enormity of space which seemed to trivialize them. Christian apologists, such as Thomas Chalmers, frequently addressed themselves to this difficulty. And with good reason. Later in the nineteenth century Thomas Hardy would capitalize on the problem when shaking his fist at Providence. In his early novel *Two on a Tower* he allows a young astronomer to deduce from the fact that such a multitude of stars could not have been made for humanity, that *nothing* was.

The analogical argument, reminiscent of Butler, was voiced by Cambridge polymath William Whewell, drawing on recent developments in geology. This new science had shown that humanity was a very late addition in the long march of geological time. And yet, says Whewell, we do not consider ourselves of any less significance because of that. Hence the analogical projection: if our significance is not trivialized by our being a mere speck amidst vast eons of time, why should we be considered trivialized by being a speck in the vast oceans of space? (Brooke 1977, 275-77).

The trouble is that for anyone who did believe that we were dwarfed into insignificance by the towering cliffs of time, Whewell's argument simply reinforced the doubts. Humanity had been robbed of its supremacy both by geology and astronomy. And, of course, there were those who saw it that way—just as Bertrand Russell, in this century, used the fossil record to pour scorn on any notion that we were the result of divine intentions. If humanity was the crown of creation, why had the universe existed so long without it?

Now to a less straightforward irony, arising from another strategy against deism. One of the glories of geology, for the nineteenth-century Cambridge geologist Adam Sedgwick, was that it refuted the atheist and the deist. The atheist could be knocked out in the first

round because what the fossil record showed was that not all the creatures extant now had always existed. Any conception of the eternity of animal forms therefore foundered on the rocks. But the argument demolished the deist as well because he was happiest with a mechanical universe that since creation had run like clockwork without any significant change. But geology showed there had been change—a progressive introduction of new species, progressive in the minimal sense of greater complexity appearing over time (Sedgwick 1834, 28; Brooke 1979). Sedgwick's strategy was to boost a sense of divine involvement by identifying certain trends in the history of creation. It was, of course, this powerful synthesis of Providence with progressive creation with which Darwin had to contend (Rupke 1983; Bowler 1976).

But that simple juxtaposition conceals a remarkable irony that historians of paleontology have had to recognize. To boost a sense of Providence in nature, the progressive creationists like Sedgwick, his opposite number in Oxford William Buckland, and the Scottish evangelical Hugh Miller, pointed to linear trends in the progressive unfolding of the divine Will. But, as Charles Lyell saw, there was a danger that they were playing straight into the hands of evolutionists who might wish to project the transformism of Jean Lamarck onto the fossil record. Lyell, it would seem, was unduly sensitive about having an orangutan for an ancestor and so rejected this sense of direction in the fossil record (Bartholomew 1973). Going out on a limb, he proposed a sort of piecemeal extinction of species and the introduction of others, but with no linear trend that would admit linear transformation. As it happens, Lyell's perception turned out to be well founded. By 1844, the Scotsman Robert Chambers published his anonymous *Vestiges of the Natural History of Creation*, arguing for a type of evolutionary development in which God's role was once again restricted to providing the original blueprint, the basic laws of development (Gillispie 1959, ch. 6; Millhauser 1959).

Where did this leave the progressive creationists? Certainly in need of a new strategy. One had to scotch the Scotsman by showing that the fossil record, while exhibiting an overall increase in complexity, did not after all show a smooth passage upwards as a *law* of evolutionary development implied. Hence Hugh Miller's tactic: to urge progress from the beginning of one epoch to the beginning of the next, but, within each epoch, degradation (Gillispie 1959, 174-76). This conception of degeneration was by no means incongruous with his evangelical theology which, at its most lugubrious, was preoccupied with death and corruption. From Miller's standpoint, Lamarck and Chambers had been annihilated. But the fossil record now looks rather more complex: some overall increase in complexity, but with lines of deviation.

And so to the biggest irony. It was something close to that more intricate model of the fossil record that Darwin reinterpreted with his branching, not linear, evolution. As Lyell later acknowledged, it was the Christian naturalists who had come closest to the model of the fossil record that Darwin's theory required. There is a sense in which the most potent scientific force for secularization in the second half of the nineteenth century had been presented to Darwin on a sacred plate (Bowler 1976; Desmond 1982, 56-83).

After the dissemination of Darwin's theory, the stakes were changed yet again. The retrieval of Providential trends had to take another form. Given the Darwinian emphasis on divergence from common ancestors, linear trends were required again—to show that Providence had been involved somehow. A typical move was that of the Unitarian physiologist, William Carpenter. From a study of the species *Foraminifera*, he identified a series of increasing complexity in which a conical shell showed evidence of being increasingly finely wrought. Carpenter's point was that the representatives of his series were still extant. Natural selection was therefore not a sufficient explanation of the trend, for if it were, one would have expected the earlier, more rudimentary representatives, to have succumbed to their successors (Bowler 1977, 41). So much made to hinge on so little!

So far nothing has been said about the strategy which, until the time of Darwin, was perhaps the most common of all: the appeal to the argument from design. One reason for refraining is that the argument, in its conventional formulation, did not provide a means of discriminating between theism and deism (Brooke 1979). A camel's hump or a woodpecker's beak might show evidence of divine wisdom, but it hardly added to a sense of the sacred in nature, or provided evidence of God's continuing involvement. But an analysis of the history of the design argument would, I think, show something of the same ironic pattern we have been following. The more one tried to boost a sense of Providence by accumulating examples of divine contrivance, the easier it became to go over the top with examples which could appear so ludicrous that they brought the whole enterprise under suspicion. It is not insignificant that both Darwin and Alfred Russel Wallace reacted against just such examples. Darwin took exception to John Macculloch's use of the chameleon and the woodpecker's beak. However impressive the adaptation, the fact was that each fed on the same food. One could therefore overplay the singularity of means adapted to ends. To other more naive examples, Darwin was already responding "what trash!" (Gruber & Barrett 1974, 418). Similarly, Wallace could not restrain himself when he encountered the argument from that soft scar on the coconut which allows the embryonic shoot to emerge. "Is

not this absurd?" he choked: "To impute to the Supreme Being a degree of intelligence only equal to that of the stupidest human beings . . ." (Durant 1979, 38). It was like praising a philosopher who, in building a house, had remembered to provide a door!

Moreover, the usual contrast between Darwin and Paley conceals yet another irony. In one respect Paley anticipated the metaphysical structure of evolutionary theory whilst rejecting the form in which it was currently garbed. In his *Natural Theology*, Paley had considered whether the design argument would be vitiated if God had fixed the original materials and rules of the universe, but had then left the task of drawing forth a creation, in accordance with those rules, to another Being. He decided that though he had no wish to advance such a view it would be perfectly safe to do so: "The subject may be safely represented under this view, because the deity, acting Himself by general laws, will have the same consequences upon our reasoning, as if He had prescribed these laws to another" (Paley [1802] 1963, 19). The irony is this: Darwin made natural selection operate in a manner which usurped the role of that second Being, finding it extremely difficult to avoid personifying it. What Paley had considered safe, in Darwin's hands proved to be explosive. As John Durant has observed: "by pushing God Himself into the background, and entrusting the enforcement of the 'rules of creation' to an intelligent subordinate . . . Paley unwittingly transformed his defence of theism into a model of naturalistic explanation" (Durant 1977, 57).

Finally, a quite different strategy which has probably done more to secularize than sacralize a theology of nature. This is the tactic of redescribing traditional doctrines in the vocabulary of scientific theory, in the hope of capitalizing on the prestige of that vocabulary. An example would be this: instead of acknowledging conflict between Darwin's emphasis on the rise of the human race and the traditional doctrine of the *fall*, liberal theologians in the second half of the nineteenth century found in the theory an attractive way of explicating the notion of *original sin*. It referred simply to the vestige in humanity of its animal past. The American theologian Lyman Abbott developed such a view, and one can see why (Barbour 1966, 103; Moore 1979, 226-27). The doctrine was saved by showing not that it was merely compatible with modern science, but in a sense confirmed by it. In extreme form this kind of strategy could be illustrated by Henry Drummond who, in the late nineteenth century, fused evolutionary theory and Christian theology until they were in complete union. In an oft-quoted passage, Drummond explained why it was inappropriate to speak of reconciling Christianity with evolution: "And why? Because the two are one. What is evolution? A method of creation. What is its

object? To make more perfect living beings. What is Christianity? A method of creation. What is its object? To make more perfect living beings. Through what does evolution work? Through love. Evolution and Christianity have the same Author, the same end, the same spirit" (Drummond 1904, 438-39). In science, the process of amelioration had the name evolution. In Christianity, it had the name redemption. Not surprisingly, not all Drummond's evangelical friends were convinced. "Many fell upon me and rent me," he complained after speaking at a Northfield conference in 1893 (Moore 1985, 402).

The problem, of course, is that if one makes the scientific description the basis of theological redescription the potential for secularization is enormous. Why bother with a vocabulary of redemption at all, if it refers to a process which can be apprehended through purely scientific discourse? The other problem is that such complete fusion is usually achieved only at the cost of distortion somewhere along the way. One sits up with a jolt when Drummond says that love is the agency of evolution. He did his best to justify a role for altruism in the mechanism for evolution, but his benign process did scant justice to what Darwin had understood by natural selection (Kent 1966, 24). Yet another defect in the strategy of redescription is that it may make the formulation of a religious doctrine so contingent upon a particular state of scientific theory that embarrassment ensues when the science moves on. We are back, it seems, to St. Augustine where we started. A much-quoted passage from Ralph Wendell Burhoe illustrates the point. It takes some courage to say that it makes "little difference whether we name [the creative power] natural selection or God, so long as we recognize it as that to which we must bow our heads or adapt" (Burhoe 1981, 21). To bow before a scientific hypothesis, the *adequacy* (and I do not mean correctness) of which remains controversial would seem to be a peculiar form of idolatry. Even an evolutionary humanist like Julian Huxley believed that humanity had a calling to transcend (not merely bow before) the agency of natural selection. Burhoe's own approach to the evolution of ethical principles would seem to have been sensitive to *shifts* in the scientific status of concepts like *group selection* (Durant 1985).

The Significance of the Ironic Pattern

It is tempting to draw some discomfiting conclusions from the prevalence of these ironic patterns. By structuring each example in the way I have, it is easy to give the impression that a secular reading of nature is somehow more "natural" than a sacred—that there has been some inexorable process of "secularization" which has eroded every possible argument for a transcendental reality. That, however, has not been my

intention. The object has rather been to stress the extreme fluidity whereby models of nature designed to highlight divine activity have so readily lent themselves to reinterpretation in secular terms.

The critical point is an obvious one, but it places a considerable burden on the historian; namely that much, if not everything, seems to depend on the predisposition of the figure one is investigating. The task must be to determine what it was that informed a theistic, a deistic, atheistic or agnostic mentality in each case. It may then turn out, in the majority of cases, that scientific considerations have been of marginal significance in informing such attitudes. In one of the cases I know best, that of Charles Darwin, it would be a gross oversimplification to imply that his loss of faith was a *derivative* of his science, notwithstanding the subversive implications it undoubtedly had (Brooke 1985). An analysis of the "secularization of nature" requires a much more sophisticated etiology of the secularization of society than one which merely addresses itself to the impact of science on religion. Similarly an ability to perceive something of the divine in nature may have little to do with being abreast of the latest science. The New England philosopher Jonathan Edwards recorded how until the time his life had been touched by divine grace, he had been insensitive to the beauty and intricacy of nature. But having once glimpsed, and been touched by, a reality beyond the visible world, he began to find wonder even in the antics of spiders.

Some years ago, Martin Rudwick laid down a program for how a history of the relations between science and religion might be written (Rudwick 1981). In keeping with a methodology which has become known as the "strong program" in the sociology of knowledge, he emphasized how scientific knowledge can be seen as a cultural resource, constructed, evaluated and used by particular social groups in the service of their specific interests. Rudwick has been a sensitive critic of those who habitually neglect the input of nature in the social construction of science (Rudwick 1985, 450-56), but an emphasis on science as a cultural resource (a resource for both theistically-inclined and -disinclined thinkers) is a vital ingredient of informed historical reconstruction. Once this is recognized, the ironic patterns I have tried to disclose become less surprising, since they can be understood in terms of (though not necessarily reduced to) struggles for cultural control between representatives of a whole range of religious and secular visions of how society should be organized.

One of the respects in which Rudwick dissociated himself from current exemplars of the strong program was in their treatment of religious belief. The error, he suggested, consisted in the asymmetry whereby it was assumed that an alliance between science and religion

would have to be explained in terms of vested social interests, whereas a straightforward scientific naturalism perhaps need not be. Objecting to the asymmetry, Rudwick argued that it had already become clear that "the broad movement of scientific naturalism, and within it the propagation of theories of materialistic transformism (or evolution) in biology, was just as much a resource used to serve specific social interests as was the providentialist view that it opposed" (Rudwick 1981, 250). More recently other writers have agreed (Desmond 1982; Russell 1983; Turner 1978).

Self-Defeating Strategies Among the Secularists

The point about asymmetry has been introduced because it raises the question whether the same kind of ironic pattern that I have been exploring might not also be discerned in the fate of arguments which purport to be *destructive* of a providentialist reading of nature. In conclusion, I should like to give a few examples of this converse irony at play. Apologists for the secular have also played into the hands of their opponents. It is the fluidity across what might be thought to be impassable barriers that is once again remarkable.

During the seventeenth century an atomic theory of matter was probably the most powerful resource for a secular reading of nature. Atomists, irrespective of their religious hue, knew only too well what Lucretius had said—that nature runs by herself without the aid of gods, that worlds had come into and passed out of being by a chance collision of atoms. Without committing himself to an atomic ontology, however, Francis Bacon showed how it could just as easily be given a providentialist interpretation. And it was not just that the alternative providentialist reading was possible. There was a sense in which it was invited: it was more necessary than for an Aristotelian metaphysic. The irony was explicit in Bacon's own remarks: "Nay, even that school which is most accused of atheism doth most demonstrate religion; that is, the school of Leucippus, and Democritus, and Epicurus—for it is a thousand times more credible that four mutable elements and one immutable fifth essence, duly and eternally placed, need no God, than that an army of infinite small portions, or seeds unplaced, should have produced this order and beauty without a divine marshall" (Bacon 1625, 85-86). And that Baconian argument became even more plausible by the end of the seventeenth century when Newtonian science purported to show that there was very little real matter in the universe, making it even less probable that any two atoms would have ever collided, let alone made a world (Bentley [1693] 1973, 158-60).

Moving ahead a century from Newton to the end of the eighteenth century we find Tom Paine ridiculing Christian doctrine through an

appeal to a plurality of worlds. The latter had become a cornerstone of natural theology because it helped to rationalize that excessive number of stars which were of no use to man. Was it really conceivable, Paine objected, that God should have revealed Himself on all these worlds one by one? In a kind of *reductio ad absurdum* he conjured up a vision of Christ on a sort of cosmic package tour, visiting each world in turn. Now there certainly were tensions between an incarnational theology and a plurality of worlds (Crowe 1986), but it is instructive to see how the deist challenge was met. Thomas Chalmers simply asked how it was known that other beings were in need of redemption. Was it inconceivable that we might be the only fallen race? Was it not possible that Christ had come to the earth alone, to rescue that one lost sheep in the universe? And if astronomy had shown that the earth was but a Bethlehem in the universe, where was the inconsistency with Revelation? It is a quaint example to be sure, but the deist objection elicits a reply that is not only in tune with, but actually reinforces, a biblical perspective. The history of God's dealings with the human race was simply the parable of the lost sheep writ large! (Chalmers 1817, 78-81 and 180-81).

A few years after Chalmers's *Astronomical Discourses* were published, we come to the 1830s, the decade which saw the publication of the nine *Bridgewater Treatises*, often seen as the last flowering of the argument from design. Whewell's treatise is of interest because he had to answer a new threat emanating from France: the demonstration by Pierre Laplace that the solar system was self-correcting and did not need the "reformations" proposed by Newton. It was this revelation which secularists could exploit if they wished to rid their science of the God-hypothesis. And yet, as Whewell pointed out, if there was a mechanism for self-correction, the provision of that mechanism arguably indicated greater wisdom and prescience in the Creator, not less: "It would be as if the savage, who had marvelled at the steady working of the steam engine, should cease to consider it a work of art, as soon as the self-regulating part of the mechanism had been explained to him" (Whewell 1839, 350). This style of rejoinder was always open, even after Darwin. One recalls that famous little remark of Charles Kingsley: that God had been proved so much wiser, that He could make all things make themselves (Gray 1963, 282).

Reference to Darwin introduces a fourth example of the converse irony. However much his theory was exploited by naturalists and secularists, it created new opportunities for theists as well. Since it helped to explain why there was so much pain and suffering in the world, it offered a resource to natural theologians which they had lacked before. As Asa Gray pointed out, there was a sense in which the

problem of pain had been more difficult for Paley, since on a traditional creationism it was not clear why the world, in Hume's phrase, should be such a botched job. But if pain and suffering were bound up with the only way God could have made beings as complex, sensitive and responsive as men and women then at least it was not entirely incomprehensible. Without struggle and often painful competition: no evolution. No evolution: no humanity (Gray 1963, 310-11).

There are many more examples from the literature on theistic evolution—the manner, for example, in which the chance elements in neo-Darwinism have been turned to advantage in process theology (Browning 1965, 57-109; Hartshorne 1967). But here are two concluding examples to bring the discussion up to date. The first concerns the ability of matter to organize itself. Such a prospect was once the stronghold of religious rebels such as Bruno and, a century later, John Toland (Jacob 1976, 227-40). It was viewed with apprehension by voluntarists, such as Boyle and Newton, who wished to argue from organization to an Organizer. But there are Christian writers on evolution today who almost seem to rejoice in a conception of a more active matter. "Our understanding of matter has been enormously enhanced," writes Arthur Peacocke, "for matter turns out to be capable of organizing itself into self-reproducing systems" (Peacocke 1985, 122). This enhanced view of matter is then integrated into an argument for continuous creation. Irrespective of one's appraisal of that argument (and some will doubtless experience difficulty in seeing what "continuous creation" means, if systems have assembled themselves), the irony is plain. A conception of matter for which (among other heresies) Bruno was burnt at the stake has become an integral part of a Christian apologia.

My second contemporary example concerns the question whether the universe could have exploded into being out of a quantum mechanical vacuum. There are those such as Alan Guth who have claimed that modern physics shows how the universe may be conceived as a "free lunch": quantum mechanics shows how there can be "creation" without a Creator (Davies 1984, 184-85, 216). Such an argument, however, immediately invites the rejoinder as to why the laws of quantum physics are as they are, and how they assumed a form which made "inflation" possible (Polkinghorne 1986, 67). The theist, as much as the agnostic or atheist, can be irrepressible.

Conclusion: A Revealing Fluidity

By stressing the fluidity between secular readings and sacred readings of nature, I have tried to show that science itself has probably placed fewer constraints on how the natural world is to be interpreted than we

are often tempted to think. The critical question is always the source for the higher level assumptions which determine whether we incline to a naturalistic or a theistic position. In this respect, the various ironies I have tried to expose give considerable support to a point made by Mary Hesse in an essay on scientific reductionism (Hesse 1985). Naturalism is defined by Hesse as the thesis that a spatio-temporal reality containing events, processes, entities, forces and whatever else can be studied by natural science is everything there is. If true, the thesis would be immensely damaging to most forms of western religion. But the issue, Hesse adds, is one that is outside the competence of science to decide (Hesse 1985, 107). By way of endorsing that observation, consider one last irony. During the eighteenth-century Enlightenment, philosophers such as Baron von Holbach "undermined" the Christian doctrine of creation by insisting on the metaphysical principle that nothing *could* be created from nothing. The "miracle" of creation was strictly impossible. Now in the late-twentieth century we are told that the Christian doctrine of creation cannot be true because science has shown how something *can* come from nothing! What a strange world it is that has come from that nothing.

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