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SCIENCE AND RELIGION: LESSONS FROM HISTORY?

JOHN BROOKE *is professor of the History of Science at Lancaster University. He authored the prize-winning* Science and Religion: Some Historical Perspectives *(Cambridge University Press, 1991), and, with Geoffrey Cantor,* Reconstructing Nature: The Engagement of Science and Religion *(T. & T. Clark, 1998).*

"God knows what the public will think." So wrote Charles Darwin as he contemplated the impact of his *Origin of Species*. In one respect it did not matter because his goal had been to convince "sound naturalists" that there was a viable alternative to separate creation. But in other respects it mattered profoundly because, as he once put it, to admit the mutability of species was like confessing a murder. It also mattered because his own wife was a member of that public whose religious sensibilities might be deeply wounded.

How should scientists respond to religious believers whose concerns may be very different from their own, even to the point of constituting a threat? Whether they ignore them, engage them, or seek to transcend them with an alternative spirituality, there are no easy answers.

There is a strong temptation to ignore them. Within the scientific academy there has been a sacred, if at times elusive, distinction between what counts as "science" and other, less robust, claims for human knowledge. This attempt at ring-fencing began in earnest in the 17th-century, when the first scientific societies were founded. It was, in part, a means of self-protection. "All we claim in common is freedom to philosophize in physical matters" wrote Federico Cesi to members of his Lincean Academy; and since Galileo was a member, we immediately sympathize. When the British Association for the Advancement of Science held its first meetings in the 1830s, clear lines of demarcation were drawn. Cambridge geologist Adam Sedgwick warned that "if we transgress our proper boundaries, go into provinces not belonging to us, and open a door of communication with the dreary wild of politics, that instant will the foul Demon of discord find his way into our Eden of Philosophy." The sciences promised a paradise of consensus. Politics, infused with religion, defined the serpent.

To protect scientific interests by closing doors has the obvious disadvantage of endorsing the image of the aloof and indifferent scientist. For religious believers it may confirm a conviction that, however impressive scientific knowledge has become, it has little moral authority to offer. The common prescription that matters of science and matters of faith should be kept apart has, for understandable reasons, not proven easy to follow. Scientists are themselves members of the public and may have strong religious (or anti-religious) beliefs, which some of them have introduced into popular discourse. The temptation to theologize when attacked by disgruntled zealots can be irresistible, as when Galileo cleverly interpreted Joshua's command that the sun stand still "in the midst of the heavens" as referring to the sun's axial rotation. The miracle was therefore best understood in Copernican terms! To pretend that one's latest research has major implications for religious belief can be one way of giving it an upgrade, as when the scientific guru of France's Third Republic, Marcellin Berthelot, claimed that his artificial synthesis of organic compounds removed all mystery from living organisms. On the other hand, religious apologists have themselves often wanted to show that they are abreast with the latest science. An early popularizer of Newton, Richard Bentley, argued that because the invisible gravitational force acted between the centers of spherical bodies, it was a non-mechanical agent and therefore an instance of divine activity in the world. Adam Sedgwick, who wanted to protect science from extra-scientific demons, was himself a clergyman who read religious meanings into the fossil record, which showed the successive introduction of new species. Living forms had not breathed from eternity. In a pre-Darwinian world, the existence of a Creator with a continuing interest in the world had thus been proven. Far from keeping science and religion separate, Sedgwick engaged religious readers by declaring that atheism was refuted.

If the strategy of separating science from religion has proven impractical, this alternative ploy of marrying them has also backfired. St. Augustine wisely recognized that if the interpretation of sacred texts was allowed to rest on the latest secular knowledge, it would detract from the authority of the text once the science moved on. For the religious apologist there has been the additional trap of seeking evidence for a deity in that which sciences cannot currently explain. Such a god-of-the-gaps may indeed become redundant as the sciences advance.

Scientists who choose not to ignore religious concerns and charge their science with theological implications must also be wary of a trap. It consists in presuming that the cultural implications of a scientific innovation can be uniquely and unequivocally specified. Such presumption may easily be perceived by the public as dogmatism comparable to that which the scientific humanists of the past resented in their clerical oppressors. Commenting in the late 19th-century on the tendency of evolutionary naturalism to become a surrogate religion, the French Catholic physician Pierre Jousset expressed such disenchantment: "Anti-Christian science has perhaps never been more dangerous than at this moment. The intolerance it blames on the Catholic Church has become its supreme law. It imposes its theories as dogmas, its hypotheses as incontestable truths."

Scientists wearing a mantle of infallibility when expounding the religious implications of their science must expect such reactions. It does not help the public appreciation of science when scientific concepts and discoveries are presented as entailing one, and only one, interpretation of their significance. A lesson that history emphatically teaches is that scientific theories

ILLUSTRATION: ALAN M. BURCH

The author is in the Department of History, Lancaster University, Lancaster LA1 4YG, UK.

are not born with implications but have implications thrust upon them. Debates so often construed in terms of an essential "conflict between religion and science" usually turn out to be something else—and far more interesting. The real issue is the cultural meaning of scientific conclusions, which need not be identified with the views of scientific or religious extremists.

Take the famous example of the displacement of the Earth from the center of the cosmos by Copernicus and Galileo. Commentators still write as though there was but a single implication of that dislocation. Like Freud they see a dethroning of the human race, no longer the special darling of God's creation. But contemporaries of Copernicus and Galileo saw things quite differently. Given the entrenched Aristotelian distinction between an imperfect Earth and the incorruptible heavens, to be projected among the planets was a form of exaltation. It was to move upmarket in a cosmos at whose center had been the fires of hell. From divergent points of view, Kepler, Galileo, and the anti-Copernican Jesuit astronomer Christopher Clavius all saw this elevation—not relegation—as the real issue. The mathematical laws governing planetary motion, formulated by Kepler and later embraced by Newton, have often been seen to imply the exclusion of a deity from the clockwork universe. But this was not how Kepler or Newton saw them. On recognizing an elegant correlation between the period of a planet's orbit and its mean distance from the sun, Kepler confessed to being "carried away by unutterable rapture at the divine spectacle of heavenly harmony." For the secular philosophers of the French Enlightenment, Newton's science may have implied an autonomous universe; but for Robert Boyle and Newton himself, clockwork images implied fine engineering and a degree of cosmic maintenance. Newton's God used comets' tails to replenish matter lost by the sun through evaporation. Nor have the so-called implications of science always favored the secularists. With his successful rebuttal of claims for spontaneous generation, Louis Pasteur was able to launch a public attack on materialism and atheism.

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Such examples suggest two lessons from history. The original implications of a scientific conclusion could be very different from later (and sometimes uncritical) reconstructions. Even more importantly, when the cultural and metaphysical implications—whether sacred or secular—of a scientific achievement are assessed, there will be a plurality of competing views of greater or lesser plausibility, but never reducible to one alone. This plurality has been characteristic of religious as well as scientific communities. The most poignant feature of the Galileo affair is that Pope Urban VIII, ultimately responsible for his trial, had repeatedly professed admiration for Galileo and had intervened to prevent the word "heretical" from being used when the Congregation of the Index had condemned the Copernican system in 1616. There were divisions of opinion among Galileo's judges (a chief interrogator Vincenzo Maculano had reputedly expressed an interest in writing on the Copernican system himself), and some Catholic allies, notably Tommaso Campanella, had warned the Church of political embarrassment should it condemn an astronomical system that might be vindicated. Urban VIII himself had allowed Galileo to write on the Copernican system, if treated hypothetically, but was finally angered when Galileo apparently betrayed his trust. Galileo had used the Earth's motion to explain the tides, which gave the Copernican hypothesis a status at variance with Urban's contention that an omnipotent deity could have produced the tides by any number of different mechanisms. It did not help that Galileo had introduced this papal argument through the mouth of Simplicio—the loser in his *Dialogues*.

The reaction to the Darwinian theory was also diverse when it first exploded onto the Victorian scene. This was not the simple polarization that we assume today. There were Anglican clergymen who, after the initial shock, claimed that Darwin had given them new theological insight: For Charles Kingsley, a deity who could make all things make themselves was far wiser than one who simply made all things; for Frederick Temple, a future Archbishop of Canterbury, the unity of the evolutionary process bore more eloquent testimony to the unity of a Creator than a series of separate creations. Other Christians, including the American botanist Asa Gray, claimed that Darwin had illuminated the classic problem of theology: the problem of pain. If competition and struggle were preconditions of the very possibility of evolutionary change, then pain and suffering were the price levied for the production of beings who could reflect on their origins. Even Darwin's "bulldog," Thomas Henry Huxley, conceded that there was no reason, in principle, why the evolutionary process should not have been incorporated into an initial design of the universe. Those who adopt that view today, more fervently than Huxley, point to the fine-tuning of the universe during its first breathtaking instants. As an argument for the existence of a deity it is of course inconclusive, but then so are the arguments which purport to show that once a naturalistic account has been given for the origins and development of the universe the gods can all be buried. Anyone tempted to confront the gods in this way should remember that religious beliefs meet social and existential, as well as cosmological, needs.

Sacred and secular powers have both claimed support from historic facts such as the spirituality of many great scientists or the secularizing tendencies of scientific criticism. Yet such hijacking of history can be terribly facile. There has indeed been a genuine spirituality in the work and outlook of scientific giants, which can make them attractive to religious apologists. But that same spirituality has often been idiosyncratic rather than orthodox to one particular confession, with the consequence that their lives can also be claimed by the militant secularist. It would be more honest to allow historical figures their integrity.

There was something about Kepler, Newton, Darwin, Pasteur, and Einstein that transcended such squabbling. Kepler fell out with the theologians but found ecstasy in the act of scientific discovery. Newton was a heretic in his denial of the Trinity, yet had the profoundest sense of a Providence at work in history. Darwin thought the Christian doctrine of damnation damnable, yet in his response to the sublime still supposed he deserved to be called a theist. If Pasteur held a crucifix on his deathbed it was probably because it had been placed in his paralyzed hand by a pietist. Yet he damned the scientific positivists for their exclusion of the infinite and the world of the spirit. Einstein became a pantheist but could not relinquish belief in a mathematical intelligence pervading a determinate universe. Let us cherish such diversity and independence and not arrogantly reduce such convictions to the implications of science.

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