

SCIENCE AND RELIGION, HISTORY OF FIELD

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SCIENCE AND RELIGION, HISTORY OF FIELD

Among many celebrations coinciding with a new millennium was one that had much to do with the subject of science and religion. According to a report by Thomas J. Oord in the January 2002 issue of *Research News and Opportunities in Science and Theology*, at the November 2001 meeting of the

American Academy of Religion (AAR) in Denver, Colorado, “hundreds gathered in the Grand Ballroom to . . . celebrate the remarkable advance of this interdisciplinary field” (p.34). From an earlier obscurity within the AAR, science and religion was now attracting a large audience, boasting a burgeoning literature, and, in some quarters, even claiming to be a new discipline. In the closing years of the twentieth century, a heightened awareness of ethical issues raised by biotechnology, exciting advances in the neurosciences, a greater sensitivity to environmental concerns, and a reconsideration of relations between physical and spiritual health were creating new spaces for dialogue within and between scientific and faith communities. With strong support from philanthropic organizations, particularly the John Templeton Foundation, new research and teaching initiatives were launched, designed to explore the many contexts in which scientific and religious interests might intersect.

Claims for a new field can easily be exaggerated. As James Gilbert observed in *Redeeming Culture* (1997), during the last century a science-religion dichotomy was often used by individuals and organizations in the United States to construct distinctive identities. Without an understanding of the many meanings with which the words *science* and *religion* have been invested, attempts to establish definitive relations between them can easily be naïve. Conversely, definitions proposed for both *science* and *religion* sometimes reflect decisions already taken on the relations between them and how they are to be presented for polemical purposes. Many of the issues currently discussed under the banner of “science and religion” have been recognized from antiquity and have repeatedly been subject to searching analysis. It has even been suggested that the periods during which it has been unfashionable to discuss the mutual bearings of scientific and religious beliefs have been the exception, not the rule. When Alfred North Whitehead (1861–1947) wrote his *Science and the Modern World* (1925), he considered it a matter of urgency that the relations between scientific and religious views of the world should be clarified. And it was already possible for him to argue that, far from a perennial hostility, modern science had been a derivative of medieval theology, and one that could help to purge traditional religions of their superstitious elements. Much earlier still, again with an eye to history, Isaac Newton

(1642–1727) had suggested that the sciences had only prospered in monotheistic cultures.

From antiquity to the Middle Ages

Among recurrent issues discussed in antiquity were the nature of causality, the role of a deity or deities in the making of the world, the ultimate nature of matter, the nature of body and soul, and the place of humans in the cosmos. In the works of the Greek atomists, and later Lucretius during the first century B.C.E., a case was made for a naturalistic philosophy in which worlds came into being and passed out of existence as a result of the chance collision of atoms. There might be life on other worlds, and nature could run by itself without the aid of gods. Other ancient thinkers, such as the second-century physician Galen, were more responsive to the appearance of design, especially in anatomical structures. An Epicurean rejoinder was, however, always possible—that the appearance of design was illusory, simply reflecting the fact that nature had experimented with every possible combination of organs and limbs, the nonviable combinations having long since perished.

The relationship between sacred and secular knowledge and the degree to which the physical world could be considered autonomous were issues faced by the early Church fathers, among whom a diversity of views existed. Augustine of Hippo (354–430) addressed the question of whether the exegesis of Scripture should reflect current secular knowledge, observing that too tight a dependency could prove embarrassing when the state of knowledge changed. In both Christian and Islamic cultures the problem of assimilation was thrown into relief by divergent reactions to Aristotle’s conception of a world that had existed from eternity. Thomas Aquinas (c. 1225–1274) was to take the sophisticated view that the Christian doctrine of creation, affirming the continual dependence of all that exists on a transcendent being, was compatible with either the eternalist position or with the conception of a definite beginning. Reason alone could not decide the issue. Aquinas also illustrates the practice, many times repeated, of appropriating and modifying certain aspects of the latest science for theological purposes. Aristotle’s emphasis on the primacy of final causes (of “goals” inherent in nature) in governing physical processes was attractive because one could ask deeper questions about the coordination of physical processes

which, in remarkable combination, constituted a viable world. For Aquinas the natural philosophy of Aristotle was incomplete without the postulation of the “Being” ultimately responsible for the coordination.

Seventeenth- and eighteenth-century discussions

Even such fragmentary examples from the past confirm that what are perceived today as major issues in the field of science and religion have a long history. In seventeenth-century Europe, as today, scientific innovations prompted new forms of theological reflection. Robert Boyle (1627–1691), for example, found evidence of divine craftsmanship in the exquisite structures of minuscule creatures revealed by the microscope. In response to the overly mechanized universe of René Descartes (1596–1650), Newton saw in the gravitational force a source of activity in the natural world that could not be explained by reference to innate properties of matter. In a celebrated controversy that took place in the second decade of the eighteenth century, Newton’s defender Samuel Clarke (1675–1729) and the German philosopher Gottfried Wilhelm Leibniz (1646–1716) debated the fundamental question of how a divine being might act in the world. If, as Clarke argued, the laws of nature simply defined the way God *normally* chooses to act, there was nothing in the laws themselves to prevent other divine initiatives. Using an analogy that still has currency, Newton argued that it was easier for God to move and control the matter in the world than it is for people to move and control their limbs. Leibniz, by contrast, insisted that the best of all possible worlds, the world made by God, had to be one that needed no maintenance, and emphatically not the “reformations” of the solar system that Newton required for its continuing stability.

Some three hundred years later, comparable metaphysical positions are being staked out in debates over the sufficiency of evolutionary theory to explain the appearance of design in organic systems. Those who argue for a divinely bestowed functional integrity in nature often resemble Leibniz, while advocates of more interventionist models of divine creativity bear some resemblance to Newton. In the original Newtonian debates, positions of subtlety and sophistication were achieved, Newton arguing that the deity would use

secondary causes as instruments of the divine “Will” where they were available. Then, as now, such debates were often infused with political significance, Leibniz seeking to score points against Newton when they were at loggerheads over priority for the calculus and when, with the prospect of the Hanoverian succession to the English throne, Leibniz saw opportunities for advancement in the country of his foe.

From the seventeenth century onwards a discourse involving theological elements has featured in the promotion of the applied sciences and technology. Francis Bacon (1561–1626) argued that empirically based knowledge when applied for altruistic purposes must have a religious sanction and could even restore human dominion over nature which had been lost at the Fall. In one of the manuscripts (Add. 4003) of the Portsmouth collection held in Cambridge University Library, Newton argued that it was not sacrilegious for a chemical initiate to imitate the creative work of the deity because a creator who could produce a cocreator displayed the greater power:

If any think it possible that God may produce some intellectual creature so perfect that he could, by divine accord, in turn produce creatures of a lower order, this so far from detracting from the divine power enhances it; for that power which can bring forth creatures not only directly but through the mediation of other creatures is exceedingly, not to say infinitely greater.

There is a metaphysical position here, reinforceable through the religious claim that humans are to be collaborators with the deity, which finds expression in current debates in biotechnology. There have long been theological resources for both countenancing and criticizing attempts to improve upon nature. Particularly in dissenting religious traditions, concepts of improvement and concepts of providence have been indissolubly linked, as they were for the eighteenth-century minister and chemist Joseph Priestley. Science was prized by Priestley because, together with a rational religion, it helped to eliminate superstition, to promote human welfare and to explode the “arbitrary power” of an established Church. In his *Disquisitions Relating to Matter and Spirit* (1777), Priestley also reconsidered the relationship between body and mind, preferring a monistic view

to the matter/spirit dualism prevalent in Christian tradition.

Such examples indicate that the intellectual preconditions of the “field” of study that is called “science and religion” have long existed and that core issues have been repeatedly discussed as constituents of other fields: philosophy, natural philosophy, and metaphysics. Newton could say that it was part of the business of natural philosophy to discuss the question of God’s attributes and relation to the world. But precisely because elements of theology might still be incorporated within natural philosophy, precisely because in the Anglophone world the word *science* did not take on its modern specialized meaning until the nineteenth century, it would be anachronistic to ask how a field of “science and religion” might have been constituted in earlier periods.

In specific European contexts there were also political pressures that could undo attempts at what today might be described as dialogue. In eighteenth-century France, Voltaire popularized Newton’s natural philosophy as part of his attack on the power of the Catholic Church, whose intolerance toward other religious persuasions he deplored. In eighteenth-century Germany, Immanuel Kant exposed the logical weakness of attempts to argue for a deity on the basis of what was known of nature. The practice of natural science had to proceed on the supposition that nature behaved *as if* it were orderly and designed, but the “as if” introduced an element of agnosticism. In eighteenth-century Edinburgh, David Hume did construct a dialogue—his scintillating *Dialogues Concerning Natural Religion* (1779). These were designed, however, to expose the fragility of the analogies on which the design argument rested. Even if the natural world did resemble a human artifact, such as a clock or a ship, it did not follow that it was made by only one artificer, and certainly not one whose attributes necessarily coincided with those assumed in the main religions. Behind Hume’s critique was an ethic of civic virtue, a commitment to the material improvement of his society and at odds with what he despised as the “whole train of monkish virtues.”

Nineteenth- and twentieth-century research

During the nineteenth and twentieth centuries there were innumerable critiques of religious discourse, contributing to forms of skepticism that

would militate against sympathetic attempts at dialogue. In the positivism of Auguste Comte (1798–1857), human culture, through the facts and laws established by the sciences, was emancipating itself from the theological and metaphysical stages of its development. In England the scientific naturalism of Thomas Henry Huxley (1825–1895) was an ideological as well as a methodological tool in the promulgation of professional standards that would exclude the clerical amateur. Battling to gain greater cultural authority for the sciences, Huxley found in Darwinian evolution welcome support for the continuity and sufficiency of natural causes in accounting for human origins. In the early twentieth century the austere logical positivism of the Vienna Circle precluded meaningful dialogue between science and religion because only scientific propositions had the essential virtue of verifiability. Pretensions to reinterpret religious beliefs in the light of modern science have not surprisingly encountered resistance from theologians themselves, especially those who have shared Karl Barth’s (1886–1968) perception that natural theologies (with their tendency to naturalize prevailing but sometimes insidious social and political orders) embody the presumption of human reason rather than the gift of grace in calls to a spiritual life.

Such deterrents have left their mark, but so too have the pressures that have encouraged assertions of complementarity and efforts at integration. Of these pressures two have been paramount: the desire of scientists with religious convictions to harmonize their loyalties; and the desire of religious institutions to deflect anticlerical hostility. Galileo Galilei (1564–1642) provides an excellent example of the former, since he wished to show that a loyal Catholic could be at the frontier of physical science. The Vatican itself, so often vilified for having condemned him, provides an example of the latter in its reestablishment of an observatory to demonstrate that it was not opposed to the exploration of God’s creation. In his announcement in 1891, Pope Leo XIII said that the plan was that everyone might see that the Church and its pastors were not opposed to true and solid science but that they embraced it, encouraged it, and promoted it with the fullest possible dedication. An opportunity to do so arose when the Vatican Observatory contributed to a major international collaboration, involving a total of eighteen observatories, in which the entire sky was to be mapped and photographed.

Other pressures, too, have sustained a discourse of science and religion. For much of the nineteenth century new scientific theories were examined for their religious implications and often viewed with suspicion if they appeared subversive. Theories of evolution would be a prime example, Darwin smarting from the fact that his contribution was often judged more by its supposed religious ramifications than for its scientific merits. The popularization of science was a task in which it was always tempting to invoke a supposed relevance to religion as a way of winning attention, a practice still visible today as science writers reserve a place for God in their titles if not in their universe. It has been observed of the mid-Victorian period that many members of the public were more interested in science versus religion than in science. In some parts of the world this may still be true, with the caveat, now as then, that much of the conflict has been between competing methods of harmonization.

Until the third quarter of the nineteenth century there would have been little evidence from the titles of books that a separate *field* of study bearing the description "science and religion" might be constituted. Polemical works could, however, set an agenda and two were to prove extremely influential: John Draper's *History of the Conflict between Religion and Science* (1875) and Andrew White's *A History of the Warfare of Science with Theology in Christendom* (1895). Strong personal motives were at work in each. Draper's *History* was a Protestant tirade against the Catholic Church, energized by his reaction to the encyclical *Quanta cura* (1864) and to the assertion of papal infallibility (1870), which he saw as epitomizing illegitimate constraint on the freedom of scientific enquiry. White's *History* reflected animosity toward the dogmatism he had encountered when, as a consequence of advocating a nonsectarian charter for Cornell University in Ithaca, New York, of which he was the first President, he had incited stormy reactions from clerics wishing to preserve their hold over education. Because of the historical orientation of these works, and their more tendentious claims, an important precursor of the modern field took shape in a body of historical literature of increasing sophistication in which the inadequacies of the conflict metaphor were exposed. For example, James Simpson's *Landmarks in the Struggle between Science and Religion* (1925) was

deeply critical of Draper and White for their unsympathetic treatment of the early Church Fathers, notably Augustine, a historiographical correction that continues today. Revisionist literature has recognized a tension among the Church fathers between approving the study of nature and warning that it must not displace the higher priorities of the spiritual life. Classic texts in the history of science, such as E. A. Burt's *The Metaphysical Foundations of Modern Physical Science* (1949), E. J. Dijksterhuis's *The Mechanization of the World Picture* (1961), Robert Merton's *Science, Technology, and Society in Seventeenth-Century England* (1938 and 1970), Charles Webster's *The Great Instauration* (1975), and many more, identified respects in which religious values and beliefs had provided stimulus and not merely obstruction to scientific activity. Historians of science with Catholic, Protestant, and Marxist sensibilities, such as Stanley Jaki, Reijer Hooykaas, and Joseph Needham, respectively, helped to create a literature in which religious variables were germane to any discussion as to why the scientific movements of the sixteenth and seventeenth centuries had proved more enduring in Europe than elsewhere.

In 1962 the work of another historian of science, Thomas Kuhn's *The Structure of Scientific Revolutions*, with its telling critique of linear models of scientific progress, contributed to an emerging disenchantment with positivist accounts of scientific rationality. By focusing on the shared beliefs of scientific communities and the clash of incommensurable paradigms at times of revolution, Kuhn among others emphasized a social dimension to scientific practice that was subsequently explored in depth. As historians and sociologists became increasingly sensitive to the ways in which social, economic, and political forces had shaped the sciences in local contexts, so the relevance of religious variables had also to be taken seriously.

A field of study is one that can be mapped, and during the 1960s such a map appeared in the shape of Ian Barbour's *Issues in Science and Religion* (1966). Significantly, this work also began with a historical overview, but took within its purview the methods of science; the question of objectivity and personal involvement in both the natural and social sciences; the methods of religion; the languages of science and religion; the implications of the indeterminacy arising from quantum physics; the physical basis of life; and the

many issues that could be subsumed under “Evolution and Creation.” The existence of such a comprehensive text helped to make possible the teaching of courses on science and religion in the late 1960s. Such courses were increasingly visible during the 1970s in both Great Britain and North America. In Britain, for example, several thousand Open University students took a course entitled “Science and Belief from Copernicus to Darwin” that was launched in 1974, and later “Science and Belief from Darwin to Einstein.” As a consequence, good quality teaching materials, complemented by radio and television programs, were produced that allowed students to assess their own understanding and progress.

References to teaching remind us that the cultivation of a field assumes not only a map but also an institutional base. In the United States, associations dedicated explicitly to “science and religion” began to appear in the middle years of the twentieth century. They multiplied as a need was felt to address the adversarial positions that manifested themselves in public on such matters as the status of scientific expertise, the moral implications of nuclear weapons, the wisdom of genetic engineering, and the seriousness of environmental degeneration. An early association was the Institute on Religion in an Age of Science (IRAS) founded in 1954 by Ralph Burhoe and Harlow Shapley. Enjoying support from Unitarian constituencies, it sought a new religiousness derivable from science. For Burhoe this required a detailed evolutionary cosmology with science as its base. For Shapley too it meant the proclamation of scientific primacy in religious contexts, which could however attract pessimistic responses even from sympathetic scientists. The neurophysiologist R. W. Gerard could not think that the great bulk of people would accept the austerity of a rational religion any more than they accepted the austerity of science. His question would still be salient in many contexts: How can publicly misunderstood science and publicly dogmatic religion ever illuminate each other? In 1966, Burhoe, with Shapley’s aid, established the journal *Zygon*, diverse in the essays it has published, but retaining a vision of unity between science and religion, achievable through the scientizing of theology. Twenty-five years earlier, another enduring organization, with quite different objectives, had taken shape—the American Scientific Affiliation (ASA). Having evangelical roots, the ASA wished to

promote a unity between the sciences and the fundamentals of a biblical theology. One of its immediate postwar tasks was to produce a science handbook for college students, reflecting the concern of its leaders that the nation’s universities had ceased to be Christian.

Most of the earliest organizations dedicated to an underlying unity of science and religion had their distinctive religious agendas, which could make cooperation difficult. An attempt in 1958 to establish a formal link between the ASA and the Society for the Scientific Study of Religion (SSSR), which had been founded in 1949 to explore the relations between religion and the social sciences, ended in failure. The very meaning of the word *religion* was often a bone of contention. In Europe as well as North America, societies for the study of science and religion increased in number during the latter part of the twentieth century. A moving spirit in England was Arthur Peacocke who founded a Science and Religion Forum and a Society of Ordained Scientists. Out of the Research Scientists Christian Fellowship, a branch of the evangelical Inter-Varsity Fellowship, a Christians in Science association was formed, publishing the journal *Science and Christian Belief*. A step toward a more international association was taken with the inauguration in 1986 of the European Society for the Study of Science and Theology (ESSSAT), which continues to hold biennial conferences and to award prizes for promising work by young scholars.

The expansion of a field, especially one seeking greater academic recognition, can be difficult when academic and apologetic goals are not clearly distinguished. Even if the majority of scientists do not share the strident antireligious rhetoric of well-known science writers, it has long been part of scientific culture that scientific academies are not the place for religious debate. The common conviction that a person’s religion is a private matter adds to the reticence and the resistance. Issues discussed at conferences on science and religion can sometimes seem naïve to historians and philosophers who may observe the reinvention of wheels that turn on axioms long since discredited. A constraint of a different kind concerns the dearth of career opportunities, particularly within academe, for those whose research has been in such an interdisciplinary and multidisciplinary arena.

At the beginning of the twenty-first century, it is, however, possible to discern signs and advances that may presage a shift into a less transitional state. Those scientific societies concerned with the public image of science, such as the British and American Associations for the Advancement of Science, have opened their doors wider for sessions on science and religion. The European Science Foundation has sponsored workshops on the theme of science and human values. During the 1990s, there was a quantum leap in the number of courses on science and religion taught in universities and colleges of higher education. This was in large measure due to incentives provided by the John Templeton Foundation, which defines its mission as the pursuit of “new insights at the boundary between theology and science through a rigorous, open-minded and empirically focused methodology,” privileging the “methods and resources of scientific inquiry having spiritual and theological significance.” Independently of such support, academic posts were created during the 1990s at Britain’s oldest universities with science and religion as their specified field—the Starbridge Lectureship in Cambridge and the Andreas Idreos Chair in Oxford. Though few in number, chairs in science and religion have also been established elsewhere. The first of these, the James I. McCord Chair in Theology and Science, was established at the Princeton Theological Seminary in New Jersey. Other American centers have been particularly active in cultivating the field, especially the Center for Theology and Natural Sciences (founded by Robert J. Russell in 1981) in Berkeley, California, and the Chicago Center for Science and Religion (founded in 1988). New encyclopedic works of reference have begun to appear (of which this is an example), including *The History of Science and Religion in the Western Tradition* (2000) published by Garland. The year 2002 saw in Granada, Spain, the first meeting of a new *International Society for Science and Religion*, part of whose mission was to embrace and encourage the discussion of science and religion in religious traditions other than Christianity. In a world where partisan and warring identities are still so strongly reinforced by religious beliefs, few would deny that such interfaith dialogue has become as great a priority as a disembodied dialogue between science and religion.

See also BUDDHISM, HISTORY OF SCIENCE AND RELIGION; CHINESE RELIGIONS, HISTORY OF

SCIENCE AND RELIGION IN CHINA; CHRISTIANITY, HISTORY OF SCIENCE AND RELIGION; HINDUISM, HISTORY OF SCIENCE AND RELIGION; ISLAM, HISTORY OF SCIENCE AND RELIGION; JUDAISM, HISTORY OF SCIENCE AND RELIGION, MEDIEVAL PERIOD; JUDAISM, HISTORY OF SCIENCE AND RELIGION, MODERN PERIOD

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SCIENCE AND RELIGION IN PUBLIC COMMUNICATION

After World War II, the United States faced a considerable challenge: How would communications continue in the aftermath of a nuclear war? The solution proposed was a network of computers that had no central authority and were capable of almost infinite message rerouting. This system, known as ARPANET (Advanced Research Projects Agency Network), debuted in 1969. Telenet, the first commercial version of the ARPANET, appeared in 1974. In 1979 the first network-wide discussions groups were up and running as USENET. But before cyberspace could become readily navigable, hypertext, the World Wide Web, and search engines had to be developed. The first point-and-click way of navigating Internet files, known as *gopher*, was released in 1991, and the same year the first computer code of the World Wide Web debuted in the relatively innocuous newsgroup alt.hypertext. Thus, the rich global communications medium called the Internet was born.

By the mid-1990s several science and religion organizations had a basic presence on the World Wide Web. Typically this consisted of information about the organization and its upcoming events and programs. One of the first sites of this kind was a web site for the Institute on Religion in an Age of Science (www.iras.org). Online discussion on science and religion topics was initially confined to private email distribution lists and various USENET newsgroups such as *The Talk.Origins Archive* (www.talkorigins.org), which covers the creation/evolution controversy.

The need to handle an ever increasing number of discussion participants led to the employment of

listservs (managed email discussion lists), such as the *Meta-lists*, now *Metanexus*, which began operating in 1997. An "edited, moderated, and public listserv dedicated to promoting the constructive engagement of science and religion and to sharing information and perspectives among the diverse organizations and individuals involved in this interdisciplinary field," by 2002, *Metanexus* had over six thousand subscribers in approximately sixty countries.

By their second generation, many web sites had incorporated some basic science and religion content in addition to the organizational information. Initially the content was preexisting text made available in plain electronic form, but there has been a constant evolution in the sophistication with which the web has been used to present science and religion content.

In 1998, the Counterbalance Foundation based in Seattle, Washington, in conjunction with the Center for Theology and the Natural Sciences (CTNS) in Berkeley, California, developed a suite of interactive topics specifically for the web. Initially available at the web site for the PBS/New River Media documentary television program *Faith and Reason*, (www.pbs.org/faithandreason) the content was also accessible from www.ctns.org and www.counterbalance.org. This suite was tailored to the web in three ways: It included extensive use of hypertext linking, a writing style that allowed the reader to visit topics in any particular order, and use of streaming audio. These features allowed readers from diverse backgrounds to approach the same content and follow different paths through it. The availability of streaming audio opened up the appeal of science and religion topics to a still broader audience.

In 2000, Counterbalance combined the CTNS content with new material, including the textbook *God, Humanity, and the Cosmos* (1999) edited by Christopher Southgate, to create the *Meta-Library*. The *Meta-Library* is a single shared location that provides content to several science and religion sites, most notably www.metanexus.net. As of 2002, the *Meta-Library* had over one hundred hours of interactive video material and thirty thousand links in the text material.

By mid-2002, the web was home to a variety of sites on science and religion that were diverse both