Chapter 6
Science and Religion in Popular Publishing in 19th-Century Britain

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Going Beyond the Conflict Thesis

Although it is still frequently asserted that science and religion are naturally in conflict, historians have long since demonstrated that the myth of inevitable conflict was created in the late 19th century (Helmstadter & Lightman, 1990; Russell, 1989). Rather than being rooted in a rational philosophical debate over the relative merits of scientific or theological explanations of natural phenomena, the relations between science and religion in the 19th century were grounded in social and professional structures. The myth of an inevitable philosophical conflict was a useful campaigning tool for a group of British men of science (most famously Thomas Henry Huxley and John Tyndall) who hoped to increase the cultural authority of science and the status of its practitioners at the expense of religion and its practitioners. These men found it rhetorically useful to claim that science and religion were in conflict (Turner, 1978). But, as historians have shown, the outspoken opposition to theology and organized religion that characterized many of these scientific naturalists had not been shared by previous generations of devout scientific practitioners (Brooke, 1990; Cantor, 1985; Corsi, 1988). Moreover, even in the late 19th century, many men of science retained their personal faith, most prominently, the North British group of physicists (Smith, 1998). Thus, historians have found many problems and inadequacies in the "inevitable conflict" thesis.

My aim in this chapter is to take the revisionist historiography still further. Historians have so far tended to focus on highly educated men, such as members of the respectable middle classes and professors at the universities. These members of the intellectual elite were, of course, the sort of people who might be expected to have philosophical worries about the relations between science and theology or to undergo crises of faith. The fact that so many of these intellectuals did value scientific explanations over theological ones by the end of the 19th century tells us nothing at all about what the rest of the population thought about the matter, and that silence, I believe, is a serious omission.

To address the question of what the bulk of the population might have thought about science, religion, and their interactions, one needs to think about how knowledge traveled beyond those intellectual circles. How did people outside the London elites

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come to know anything about either science or theology, let alone their relations? This question involves both a geographical and a social answer. It means thinking about people in the provinces and about people lower down the social scale. Once one begins to think in these terms, it becomes even more important to consider the social presence (rather than philosophical position) of both science and religion in 19th-century culture and society.

There is already an extensive body of work on religion in popular culture. This research has uncovered the extensive infrastructure of churches, Sunday schools, Bible classes, and missionary societies that pervaded 19th-century Britain (Knight, 1995; Martin, 1983). Britain was a predominantly Protestant country, and, despite denominational distinctions, religious faith was a key component of middle-class British life from childhood onwards, supported by church attendance, devotional reading, and family prayers (Davidoff & Hall, 2002). And for the working classes, whose limited opportunities for education were most likely to come from schools run by churches or religious charities, religious instruction comprised an intrinsic part of that very basic education (Laquer, 1976). Thus, the infrastructure of religion ensured that every child in Britain was introduced to theological explanations of the world and that these were enforced and supported by church and community throughout adult life.

Despite the great enthusiasm for religion among the Victorian middle classes, religious observation among the population at large did decline by the end of the 19th century. This trend, however, had very little to do with the rising cultural authority of science among the intelligentsia. It had far more to do with the decline of traditional community structures during rapid urbanization, the inadequacy of church provision in the expanding cities, and the growth of alternative leisure activities on Sundays (Chadwick, 1975; Williams, 1999). A few working-class radicals and socialists opposed Christianity on philosophical grounds, but the vast majority of the British population seems to have moved away from religion out of apathy.

There is also a growing body of literature on science in popular culture. Much of that research directly engages with questions of the communication and dissemination of knowledge (Fyfe, 2004; Fyfe & Lightman, 2007; Secord, 2000; Topham, 2000). At no point in the 19th century were the sciences supported by anything equivalent to the well-established system of churches, schools, and missions that promoted theological knowledge. Science did not have churches or missionaries, nor was it even a usual school subject. People fortunate enough to get secondary schooling were likely to be drilled in the classical languages. That great majority who spent only a year or two at a charity-run school or sporadically attended Sunday school once a week in the local church were unlikely to learn much more than basic literacy skills and a smattering of Christianity.

Thus, most people who knew anything about the sciences would probably have gained it from their own informal reading, attendance at lectures, or visits to museums or exhibitions. For most of the 19th century, these options were the main ways in which most people would encounter the sciences (if they did so at all). That is why I believe it is so important to study the manner in which the sciences were presented in these popular formats. Their relative importance declined only once science

became a routine part of school education at the very end of the century. Although a full story of the public dissemination of the sciences should also include public lectures, exhibitions, museums, and botanic gardens, I concentrate in this chapter on printed matter. From the mid-19th century onwards, print was easily the most effective means of disseminating knowledge more widely—both socially and geographically. As one commentator remarked in 1853, the press "has long been the rival of the pulpit, and is now, if we mistake not, in the wide range of its influence, far ahead of it" (Pearson, 1853, p. 473).

Outline of the Argument

The heart of this chapter examines the relative abilities of Christian and secular science writers and commentators to engage successfully in the competitive literary marketplace and thus to bring their vision of the sciences to a wider audience. I start by outlining the role of religious organizations in making possible the flood of cheap print that contemporaries observed in the mid-19th century. Although theological knowledge, in contrast to scientific knowledge, was effectively disseminated by a variety of methods, religious organizations were nonetheless actively and innovatively involved with print culture. Although they had helped to make cheap print possible, religious groups came to feel that it threatened their Christian vision of science, and I examine how they responded. Finally, I contrast the efforts of scientific naturalists to overthrow the authority of religious explanations at the end of the century. Before beginning, however, I need to make three general points about the scope of my argument.

Firstly, I am not contrasting "science" with "religion" but am rather contrasting two alternative visions of the sciences, one Christian and the other secular. In the early 19th century, the sciences were routinely understood to be part of a theological understanding of nature. Virtually everyone who pursued the sciences at any level regarded the study of nature as the study of God's Works, which would ultimately reveal His benevolence, power, and wisdom. Anglican educational institutions, from grammar schools to the University of Cambridge, encouraged the study of nature as a suitable pursuit for Christian gentlemen, and the Scottish minister Thomas Chalmers felt astronomy to be a suitable topic for a series of sermons. Science was not something separate from religion but was widely regarded as an intrinsic part of it. This Christian vision remained strong throughout the 19th century, but it faced an increasing range of competing alternatives. For example, in the 1830s, some popular instructive publishers began to omit religion from their publications because they recognized that it was controversial and might alienate some potential customers. In the 1840s, radical atheists tried, unsuccessfully, to find an audience for a vision of the sciences that was proudly materialistic and opposed to Church and State. And by the 1860s and 1870s, the new generation of men of science, led by Huxley and Tyndall, tried to make certain that their secular vision of scientific naturalism became widespread.

My second and third points principally have to do with the development of the book trade rather than with either science or religion. The mid-19th century was

the period in which print emerged as the first mass medium. At the start of the century, books (like lectures and museums) had been too expensive to be accessible to anybody outside the affluent classes. Thus, at the start of the century, print could help knowledge travel geographically but did not do much to make it available to a wider selection of social groups. By the 1840s and 1850s, this situation had been transformed as publishers came to terms with the production and distribution capacities of the new steam-powered technologies and realized the potential profits to be made from the newly literate members of the lower-middle and working classes (Twyman, 1998; Vincent, 2000). Rather than producing a small number of expensive books for a limited circle of affluent readers, some publishers began to produce large print runs of cheap works. It became possible for printed matter to reach almost all sectors of literate society (Eliot, 1994; Feather, 1988).

My third point is that British commentators were proud of their traditions of liberty and the free press. There was no censorship in Britain, although blasphemy and obscenity laws were occasionally invoked. With most of the book trade driven by purely commercial concerns, it was publishers who made the key decisions about what got published, based upon what they thought would sell profitably. In this commercial marketplace, neither clergymen nor men of science could hope to control the press. The best they could do was work with it and try to use it effectively. Given this background, I think it is significant that people supporting a Christian vision of the sciences had vastly more experience and more resources in working with the book trade than did those who hoped to promote scientific naturalism to a wider audience.

A Flood of Cheap Print

At the start of the 19th century, literacy rates were still low and printed matter was relatively expensive. Most commercial publishers made their profits from a small number of expensive books. A typical print run for a new book might be just 750 copies, and it could cost as much as 30 shillings (far beyond the reach of an artisan earning 30*s*. to 40*s*. a week).[1] By the 1850s, print runs had risen, prices had fallen, and people had started to talk about print as a mass medium. Religious organizations had been intimately involved in this transformation and thus, despite their worries about its effect, were well placed to engage in the new literary marketplace. As I show below, the scientific naturalists found it more difficult to compete.

During the evangelical revival in the late 18th and early 19th centuries, reading and the Bible had returned to central importance in British Christianity. In the absence of a state-sponsored education system (until 1870), evangelical organizations set up schools

[1] Before decimalization in 1971, Great Britain used a monetary system in which 12 pennies (12*d*.) equaled 1 shilling (1*s*.), and 20 shillings (20*s*.) equaled one pound (£1). Therefore, £1 contained 240*d*.

and Sunday schools to teach the children of the poor to read. Once literacy rates started rising, it was again evangelicals who realized that ordinary books and magazines were far too expensive for most of that readership. They set up new organizations such as the Religious Tract Society (1799; hereafter RTS) and the British and Foreign Bible Society (1804), which were dedicated to the production and distribution of cheap print (Fyfe, 2004; Howsam, 1991). The ability of the religious societies to print so cheaply was largely due to their committed dedication to enormous print runs and their willingness to forgo profits, but it was also materially assisted by their enthusiastic adoption of new technologies (principally steam-powered printing) in the 1820s. Only a few other publishers adopted these strategies in the first half of the century, and they all shared a commitment to philanthropy. The charitable Society for the Diffusion of Useful Knowledge (1826) and the private firm of William & Robert Chambers also sought to help the working classes improve themselves via suitable reading material, but both of these publishers made a point of omitting religious discussion from their publications in an effort to avoid controversy.

With the exception of these secular and religious philanthropists, most publishers took a rather longer time to wake up to the capabilities of the new technologies and the existence of the vastly expanded reading audience (Anderson, 1991; Weedon, 2003). It was around 1850 that commentators began to notice "a flood of cheap print," triumphantly declaring that "The age in which we live, is unprecedented for the cheapness and abundant supply of its literature" (Pearson, 1853, p. 478). Another writer remarked that "it is the glory of our age to have brought science and sound literature within the reach of the humblest citizen" ([Patmore], 1847, p. 124). Readers in the working classes, who had previously had little or no access to newspapers, periodicals, or books, began to have the opportunity to read: either for entertainment or for instruction in everything from politics to philosophy and chemistry.

However, this flood of cheap print created real concerns about the nature of the reading material being thus presented to readers who were barely educated. Historians of science are most familiar with the controversy surrounding the anonymous evolutionary best-seller, *Vestiges of the Natural History of Creation* (1844), but *Vestiges* was unique more for the extent of the vitriol poured upon it than for the specific faults for which it was criticized (Secord, 2000). Many commentators pointed out in despair that the most popular reading material at mid-century was novels, which were hardly calculated to improve anyone's mind. Others worried about the distortions, errors, and platitudes contained in the "popular treatises and essays without number" ([Masson], 1855, p. 166). Was it really better to have badly written introductions to the sciences than none at all? There was a real need for competent writers who could express themselves fluently and comprehensibly as well as present their subject accurately and reliably. But by far the biggest fears were about the religious sentiments—or absence thereof—in popular literature. Many middle-class thinkers were convinced that no book could be really edifying if it did not place its subject matter in a Christian perspective, and they condemned the immorality and infidelity of much cheap literature (Fyfe, 2005b).

To many commentators, it seemed all too clear that "the demon of infidelity is stalking abroad" (Pearson, 1853, p. xiv), and the press was held largely to blame for undermining the authority of the church. One enterprising author went so far as to make calculations on the subject. His 1847 pamphlet entitled *The Power of the Press: Is It Rightly Employed?* surveyed the extent of "corrupting" publications, especially periodicals, and estimated their total annual circulations as 28.9 million issues. For Christianity, he could count only 24.4 million issues (*Power of the Press*, 1847). This was a general survey of all literature, but some commentators felt that scientific publications were a particular problem. As one minister commented, "In literature and science, we have not a little in which upper and under currents of scepticism are too perceptible" (Pearson, 1853, p. 480). In particular, he thought that a "positive hostility to a pure spiritual religion, or that contemptuous disregard of it" had become "woefully characteristic of some modern works of science" (Pearson, 1853, p. 359).

For all those who had been brought up to regard science as the study of God's creation, which would illuminate His wisdom and providence, it was shocking to see publications that presented the sciences in a totally different light and deeply worrying that such publications were being so widely read. The greatest anger was reserved for atheistic—or "infidel"—publications. Perhaps the most infamous was the *Oracle of Reason*, which proudly announced itself as "the only exclusively ATHEISTICAL print that has appeared in any age or country" (*Oracle of Reason*, 1842, p. ii). Its articles on history, philosophy, and the sciences set out to disprove the Bible and used the sciences to demonstrate that the universe, and life in it, had developed without supernatural intervention. Fortunately for those alarmed by such claims, the circulation of the *Oracle* fell steadily from the 4,000 copies sold of its first number, and it ceased publication after 2 years (Chilton, 1843).

More appalling for many Christians were those works that, rather than attacking Christianity, simply ignored it. Some perfectly respectable publishers, such as W. & R. Chambers and Charles Knight, took this secular route to science publication and defended it as a way of making their publications acceptable to a far wider audience. *Chambers's Edinburgh Journal* routinely sold around 60,000 copies in the 1840s and was still being issued at the start of the 20th century (Cooney, 1970, chapter 2). As accepted family reading, it was hugely more influential than the *Oracle*'s blatant atheism. Yet the absence of Christian sentiments meant that even critics who applauded its instructive content deplored the fact that it lacked "the evangelical element—that decidedly Christian tone" (Pearson, 1853, p. 510). Secular works could be held to imply that theology was irrelevant to the study of nature.

Disseminating a Christian Vision of Science

So, what were Christians to do if they wished to maintain a theological vision of the natural world amidst growing secular and infidel competition? Censorship of the press was impossible. Rather, the answer would have to involve fighting back by

providing a Christian alternative that would be competitively priced and would give consumers a choice. In contemporary parlance, these Christian works would be an antidote against the poison of atheism and secularism. The existence of the religious publishing societies gave evangelicals greater power to intervene in the world of publishing and meant that the dissemination of printed religious knowledge was not entirely dependent upon the commercial marketplace. The RTS took the lead in this battle to maintain a Christian tone in popular publishing.

The RTS had been established in 1799 to produce tracts for use by missionaries to the working classes in British inner cities. It developed into a major publishing house, issuing not just tracts but books and periodicals for adults and children. Until the 1840s, its publications had all been avowedly religious, but from 1845, it began to issue books and periodicals on general topics, such as natural history, astronomy, biography, and history (Fyfe, 2005c). The "Monthly Series" of sixpenny books began in 1845 and closed 10 years later, after one hundred volumes had been issued. The closely related *Leisure Hour* periodical was launched in 1852, at the price of one penny per week, and ran until the early 20th century. Because these publications were not intended to be devotional treatises, they rarely contained explicit discussions about the proper relationship between the Word of God and His Works as visible in nature and society. But, in keeping with the society's overall mission, they all had a Christian tone.

For instance, the geological volume, *Caves of the Earth* (1847), opened with the assertion that the earth had been "'given to the children of men' by the Divine Author of all being" (Milner, 1847, pp. 7–9). For this writer, the study of the earth clearly had a theological as well as geological rationale. Passing references to God the Creator or to God's Providence were common in these publications. For instance, the writer of *Garden Flowers of the Year* (1847) attributed spring's "bringing forth the bright verdure and radiant flowers from their wintry darkness" to "the Almighty's word" ([Pratt], 1847, p. 63). Thus, even though most of the RTS texts were similar in content to the treatises offered by secular publishers like Chambers, their readers should have been constantly aware that the sciences could and should be integrated into a theological worldview.

The RTS's works were widely welcomed by commentators, who described them as "a step in the right direction" (Pearson, 1853, p. 509). The literary periodicals praised them for being "intrinsically good" and giving an "intelligent account" (Glimpses of the Dark Ages, 1846) and for being "interesting and trustworthy" (Life of Cyrus, 1847). Although some of the praise came from explicitly religious magazines, much of it came from the general literary press, clearly demonstrating how widespread the assumption still was that the sciences ought to be presented in a Christian tone.

The RTS was not, of course, the only publisher of popular works on the sciences, and many commercial publishers were sympathetic to Christian presentations of the sciences. A substantial number of the best-selling scientific authors at mid-century were committed Christians, including several in holy orders. The Rev. Thomas Milner combined his writing for the RTS with commissions from the commercial firms of W. S. Orr and Longman & Co (Fyfe, 2005a), and the Rev. John George

Wood wrote for the entrepreneurial publisher George Routledge (Lightman, 1999). Routledge specialized in mass-market cheap books for railway travelers and others, a format that enabled Wood's *Common Objects of the Country* (1857) to sell 68,000 copies within a decade. Other ordained science writers included Ebenezer C. Brewer (*A Guide to the Scientific Knowledge of Things Familiar*, 1847), Thomas Dick (*The Solar System*, 1846), and Charles A. Johns (*Flowers of the Field*, 1853). Philip Henry Gosse (*The Aquarium*, 1854) was a lay preacher, and Margaret Gatty (*Parables from Nature*, 1855) was the wife of a clergyman. It is clear that, at mid-century, a vast amount of popular scientific writing was being presented in a Christian tone—especially at the cheaper end of the market, where religious publishing charities had a large market share.

Some of these mid-century writers were still writing in the 1860s and 1870s (and many were still selling), but they were, of course, being joined by a new generation of younger writers. If popular writing followed the trends seen in expert scientific circles, one might expect that popular writing would have become almost entirely secularized by the 1880s. Yet, although some of the new generation were committed evolutionary naturalists, it remains striking that many popular writers in Britain in the late 19th century continued to see the hand of God behind nature (Lightman, 1999, 2000).

Thus, it is clear that theological visions of the sciences were still pervasive and attractive in the British popular press long after the mid-19th century. This means that there was a growing divergence in the second half of the century between the secular writing style that dominated the writings of expert men of science, and the range of writing styles, both secular and theological, that were available in the works of the most successful popular writers. The alleged victory of scientific naturalism over a traditional Christian vision of science would not have been immediately apparent in the realms of the popular media.

Disseminating Scientific Naturalism

The continued success of Christian writers and publishing organizations meant that when Thomas Henry Huxley and his fellow scientific naturalists wished to promote their alternative vision of the sciences in the 1860s and 1870s, they faced no easy task (Barton, 1998). In their campaigns for an authoritative new profession of science in which religious thinking would have no place, they would clearly have preferred popular writings on the sciences to be secular. But, with notable exceptions, the scientific naturalists did not themselves write these popular works, and the people who did write them were not necessarily committed to writing in a style that suited the scientific naturalists. Furthermore, the reality of the publishing industry meant that it was publishers, not scientists (nor theologians), who made decisions about what would sell. As long as publishers thought there was a market for Christian works of science, they would continue to commission and publish such works. Commercial necessity meant that the publishing industry reflected popular tastes rather than the happenings in intellectual circles.

How, then, could the scientific naturalists intervene in the publishing world? When Christian thinkers had faced the same problem in the 1840s and 1850s they had been able to mount a convincing response. Not only were many commercial publishers sympathetic to Christianity, but there were several major charitable publishing houses entirely devoted to religious publishing, and they enabled Christian writers to engage directly in the book trade. Moreover, there was a vast army of committed Christians who were willing and eager to write for the cause (and a small fee). The scientific naturalists, in contrast, had the disadvantage of being few in number and having no tame charitable publishing societies ready to do their bidding.

There was, however, no shortage of commercial publishers who were willing to publish such eminent authors as Huxley. But Huxley's attitude to popular writing is revealing. Early in his career, he had been a harsh reviewer of scientific works written by nonexperts, and he had made some deeply critical remarks about the whole validity of popular writing on the sciences. In the 1860s, he had repeatedly refused to write for popular audiences, preferring to spend his time on research and on writing about that research for his fellow men of science. By the 1870s, however, Huxley had at last become convinced that an intervention was needed to bring the naturalistic vision of the sciences to a wider public—and that this would mean getting involved himself. He became involved in two publication projects, Macmillan's series of 'Science Primers' (very cheap books, especially intended for use in schools) and the Anglo-American 'International Science Series' (intended for the educated general reader). He was on the editorial board for both projects and promised to contribute a volume to both. Strikingly, however, both of his contributions were late, with his introductory volume to the 'Science Primers' series appearing almost 10 years after the rest of the volumes (Desmond, 1997; Lightman, 2007; MacLeod, 1980). Thus, although Huxley finally realized the importance of intervening in popular publishing, he himself had too many other calls on his time to be able to make those interventions effectively. In contrast, many of the Christian writers were not trying to build a scientific career for themselves. Mothers, teachers, ministers, and professional writers generally had more time available for writing and fewer fears about the impact of such writing on their scholarly reputations.

Where the scientific naturalists were successful was in their long-term strategy of institution-building. They made no attempt to build a system equivalent to the churches and missions that promulgated and endorsed theological explanations of the world, but they did become heavily involved in education. Before the Education Act of 1870, most schools in Britain were run by church groups. The Education Act supplemented these schools with nondenominational ones, in which scriptural education was optional and the governors were laypeople. Huxley and his friends were active in lobbying government to gain science a higher status in the school curriculum. Huxley also had a direct role in the implementation of the new curricula, for it was his staff at the Normal School in South Kensington, London, who ran summer schools giving teachers the knowledge and skills to teach scientific subjects that they themselves had never studied. The Normal School staff also produced school textbooks to accompany the new subjects.

By the 1880s and 1890s, the scientific naturalists were thereby able to ensure that science was taught in schools and that it was being presented from a secular perspective. This investment of time and effort in science education made certain that the next generation of children grew up far more knowledgeable about the sciences than their parents or grandparents had been. They also grew up in a society in which religion was declining in power.

Conclusions

Until the developments in the education system filtered through at the turn of the 20th century, there is no denying that religious organizations had far more effective means of disseminating their vision of knowledge. Not only was there the infrastructure of churches and church-run schools, but the activities of hordes of Christian writers, not to mention the dedicated religious publishing societies, ensured that the Christian vision of the sciences was widely disseminated through popular books and magazines. It was difficult for scientific naturalists to match this achievement, for they lacked the necessary publishing societies and did not personally have time to write many popular works. Some popular writers did choose to espouse scientific naturalism—Grant Allen was a highly successful writer on evolutionary topics—but it was not until the 20th century that they outnumbered the Christian writers (Bowler, 2006).

Thus, it seems to me highly unlikely that the population at large in late 19th-century Britain would have regarded scientific explanations as having yet replaced theological ones. Only the better educated and the determinedly self-improving would have been aware of the sorts of arguments that were taking place between scientific naturalists and theologians in the 1870s and 1880s. To understand how those arguments traveled beyond the intellectual circles requires a look at how knowledge traveled, and in 19th century Britain, that was primarily through print. And I argue that the supporters of a Christian vision of science had far more experience and success in operating through the popular press than did the supporters of scientific naturalism.

It seems clear to me that the increasing trend towards secularization in intellectual scientific circles was not straightforwardly repeated in the general population. As much as scientific naturalists would have liked to make scientific explanations as widely known and authoritative as theological explanations already were, they simply did not have control of an infrastructure equivalent to that of the Christian religions. They did make extensive use of the press, but neither they nor the religious organizations could control the press, which continued to offer a plethora of visions of the sciences long after such options had been restricted within expert science. If science has indeed replaced religion as the dominant system of knowledge, it did not do so among the general British population in the 19th century. That transition should be sought instead in the early 20th century.

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