SCIENCE AND RELIGION

New Historical Perspectives

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CHAPTER 1

Introduction

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John Hedley Brooke is well known to students of science and religion as the slayer of the 'conflict thesis' – the hackneyed but popular idea that, ever since the Scientific Revolution, 'science' and 'religion' have been locked in a deadly battle in which science emerges triumphant. In his *Science and religion: Some historical perspectives* (1991) and other writings, Brooke has used historical scholarship to show how wrong this picture is.[1]

The systematic dismantling of received ideas about the nature of the scientific enterprise was one of the starting points for this reappraisal of scientific and religious relations. In the 1950s and 1960s historians and philosophers of science began to criticize the 'Whig' view of history, according to which science in the past should be seen as slowly but surely approaching the truths put forward by science in the present.[2] The new anti-Whig conception of science underpinned Thomas Kuhn's *The structure of scientific revolutions*, first published in 1962, which helped set the agenda for future generations of scholars. In Kuhn's picture, the history of science was a discontinuous series of traditions or paradigms dedicated to solving particular puzzles with greater empirical accuracy, but not necessarily approaching some unseen objective reality in the process.[3] This shift in the history of science also inaugurated a new ideal of the historian of science as an observer of the science of past ages, rather than an advocate for modern science. In other words post-Kuhnian historians of science have tried to approach past science on its own terms and not as a curious but unsuccessful attempt to deliver the scientific truths of the present.

Histories of the relationship between science and religion written in this spirit started to appear in the 1970s. This new history of science and religion would replace over-simple master-narratives with a richer sense of the complexity of past engagements between science and religion; it would place those intellectual engagements firmly in their proper social and political contexts; and it would undermine the very idea that 'science' or 'religion' could be reified as entities with timeless essences.[4] Brooke by

no means achieved the ascendancy of this new historiography single-handedly.[5] However, his *Science and religion* and his 1998 book with Geoffrey Cantor based on their Gifford Lectures, *Reconstructing nature: The engagement of science and religion*, have been particularly influential.[6] The present volume offers an opportunity for a group of scholars actively developing new historical perspectives on the history of science and religion to take stock of Brooke's landmark contributions to the field and also to map out the new directions being taken by historians of science and religion almost two decades after the publication of Brooke's classic study. In the rest of this introduction I engage briefly with each of these tasks, highlighting what I take to be the most important themes that run through the contributions to this volume and sketching out the agenda for future research that they collectively suggest.

JOHN BROOKE AND THE HISTORIOGRAPHY OF SCIENCE AND RELIGION

Noah Efron's chapter includes a vivid account of the impact that Brooke's 1991 book had on him personally as a young historian at the start of his career. Efron was certainly not alone in finding himself forced by Brooke's work to rethink his assumptions about the history of science. But, as any reader of Brooke will know, 'forced' is not quite the right word. The persuasive effect of Brooke's writings arises from a very subtle combination of factors: sophisticated and sympathetic readings of published and unpublished historical documents, a palpable delight in the richness and intricacy of the intellectual histories he unfolds, and a rhetorical style which manages to convey caution and modesty at the same time as a certain steely resolve.

These techniques were deployed by Brooke in the pioneering course materials he developed for the Open University in the 1970s and subsequently in his studies not only of European natural theology and of the religious commitments of notable English men of science, including Isaac Newton, Joseph Priestley, William Whewell, Robert Owen, and Charles Darwin, but also in a series of studies on the history of chemistry, and in his work in editing and contributing to many collections of essays, including recent volumes on *Heterodoxy in early modern science and religion* (2005), *Religious values and the rise of science in Europe* (2005), and *Science and religion around the world* (2010).[7] Brooke's writings are marked not only by elegance and erudition but also by a fondness for nuance and even occasional wordplay. Brooke suggests, for example, when

writing of Priestley's utilitarian interest in science that 'it was through salt that he came to Bacon'.[8] He writes of the difficulties that confronted the mathematician Mary Somerville in her bid to become 'a queen of the sciences'.[9] And Charles Darwin, Brooke concludes, cannot be easily pigeon-holed at the various stages of his intellectual development: 'On reflection it would be surprising if the man who showed us that we cannot pigeon-hole pigeons could be pigeon-holed himself'.[10]

There is more to this last remark, though, than mere wordplay. The refusal to pigeon-hole is central to Brooke's project. He has repeatedly emphasized the complexity of individuals and their intellectual commitments and warned us of the distortions involved in lumping them together. He particularly cautions historians against trying to group people or ideas into pigeon-holes labelled 'science' or 'religion', or historiographical ones labelled 'conflict' or 'harmony'. Brooke famously wrote in his 1991 book: 'Serious scholarship in the history of science has revealed so extraordinarily rich and complex a relationship between science and religion in the past that general theses are difficult to sustain. The real lesson turns out to be the complexity'. And again: 'Much of the writing on science and religion has been structured by a preoccupation either with conflict or with harmony. It is necessary to transcend these constraints if the interaction, in all its richness and fascination, is to be appreciated'.[11]

Some might wonder whether in the midst of all this richness and fascination, however, any historical generalizations can be sustained at all. It sometimes seems not. One reviewer of Brooke's *Science and religion* described it as 'a very cautious book, a detailed, nuanced description of complexity and diversity that lacks an argument of its own'. That reviewer went on to say that, in his view, the 'almost astonishing balance' on display was a sign of 'historiographical maturity rather than lack of nerve'.[12] Brooke himself has been aware of the danger of over-complexification as an issue in the history of science. In his Presidential Address to the British Society for the History of Science in Leeds in 1997, speaking about whether the history of science was a unified field with a unified subject matter, Brooke asked his fellow historians of science: 'if we stress the permeability of the boundaries with which the word "science" has been ringed, does the subject not simply dissolve into fragments of socio-cultural history?' Such a prospect, Brooke admitted, would worry many. 'But if *the* history of science has no future', he went on, 'histories of different sciences in their different local contexts surely still have a bright one. As scholars in the field we can map the multiple spaces in which the sciences have taken shape and we can relish the differentiation'.[13]

That final phrase could serve very well as a motto to encapsulate Brooke's approach to history: 'Relish the differentiation'.

In that same talk Brooke spoke of the 'dissonance between simple narrative forms that have proven public appeal and the complexities disclosed by serious scholarship'.[14] This moves us from the dangers of reifying the categories 'science' and 'religion' to the harm that can be done by misleading historical master-narratives. Brooke's own solution to the problem of how to popularize the history of science without falling prey to misleadingly simplistic narratives, in his 1991 book, was to use the simplistic narrative as a foil for his own more complex and scholarly account. The wrongness of the conflict narrative motivated Brooke's whole book. A comparable historiographical ploy can be found in Jim Endersby's 2007 book, *A guinea-pig's history of biology*.[15] The historiographical villain for Endersby is the narrative of the lone scientific genius. As one reviewer put it, Endersby 'explodes the persistent myth that science is a series of eureka moments by heroic individuals, instead revealing a complex reality of social interaction and interdependence'.[16]

Drawing attention to this relationship between simplistic popular narratives and academic complexification, Richard Olson has written: 'There is a serious question about whether the forceful presentation of simple master narratives precludes or is a necessary prerequisite to more subtle investigation. Brooke seems to assume the former; I am inclined to believe the latter'.[17] Olson is right that the craft and rhetoric of the academic historian frequently makes use of a contrast between scholarly rigour on the one hand, and sweeping generalizations, overly simple narratives, popular misconceptions, and one-sided explanations on the other. But, as Olson implies, such complexification cannot be an end in itself. The success of Brooke's work should not mean that conflicts or generalizations are forever banned from the historiography of science and religion. The traces left by past individuals and societies impose upon the historian neither clear narratives, nor self-evident categories. But neither are they entirely without pattern. Several chapters in this volume, especially those by Peter Harrison, Geoffrey Cantor, and Ronald Numbers, directly address this question of how to find legitimate places for both conflict and generalization in a post-Brookean historiography.

I have discussed two of the most salient points of the new historiography of science and religion: its aversions to reification and to master-narratives. A third important feature is the idea that this new approach to the subject is less partisan than what went before. Brooke and Cantor have written of their desire to approach their subject as an 'impartial observer' would.

Historians, on this view, should 'strive not to be partisan but instead should seek to understand all the protagonists and the historical nexus in which they operated'.[18] Likewise, in their introduction to *When science and Christianity meet* (2003), David Lindberg and Ronald Numbers write that recent historians of science and religion have 'laid aside apologetic and polemical goals, choosing to understand rather than to judge'.[19]

These are very admirable historiographical principles, but they are not immune from scrutiny themselves. Historians of science are trained to raise a sceptical eyebrow at claims to be able to produce value-free knowledge. And no historian of religion will readily accept the notion that a history of religious thought might be composed that was entirely innocent of apologetic intentions. Future generations of historians will wish to historicize and question the 'impartial' and 'non-judgemental' histories of science and religion produced since the 1970s, just as the contributors to the present volume have used the tools of historical analysis to unearth the genesis of those master-narratives against which recent historians have been reacting. We should never stop asking whose interests a particular historical narrative serves and for what purposes it has been constructed. And we should not exempt our own narratives from those searching questions.

HISTORICIZING NARRATIVES AND CATEGORIES

Our histories themselves have histories, as several of the chapters in this volume illustrate. The idea that there was a 'Scientific Revolution' between 1500 and 1700 and that this marked a definitive moment of separation between science and religion was, as Margaret Osler shows, the creation of nineteenth-century positivists and twentieth-century historians, who read their own secularist aspirations and experiences back into the history of the sciences during a period when they were, in fact, pursued in a climate of diverse, serious, and vibrant theological concern. Frank Turner, who was one of the historiographical pioneers in this field thirty years ago, offers a comprehensive unpacking of the 'conflict narrative' with reference to its origins in the intellectual and cultural world of the late nineteenth century. Turner reminds us that we should not discount the existence of real conflicts between science and religion in that period as one of the reasons that such an historical narrative would emerge. But the fact that a strong public sense of a conflict between science and religion emerged when it did still itself needs to be explained. Particularly important here is an appreciation of the history of religious

life and thought during the nineteenth century, and of the emergence of a new sphere of state education, over which different interest groups could tussle. Turner thus provides a definitive study of the intellectual and social milieu into which the infamous 'conflict thesis' was born.

Cantor's chapter reinforces Turner's argument about the origins of the 'conflict thesis' in the 1870s and makes the very interesting further observation that John W. Draper seemed to be predisposed to see history in almost Manichean terms as a preordained conflict between opposing forces. Shortly before composing his notorious *History of the conflict between religion and science* (1875), Draper had completed a history of the American Civil War which was organized around the central narrative of an inevitable conflict between two essentially opposed ideologies – in this case freedom *versus* slavery, rather than science *versus* religion. It makes one wonder whether individual psychology as well as social history needs to be employed in an explanation of the origins of our ideas of a conflict between science and religion.

Chapters by Harun Küçük and Salman Hameed put famous historical narratives of conflict between science and Christianity in a different light by looking at the role given to Islam within such works. Küçük points out that both Draper and Andrew Dickson White, author of *A history of the warfare of science with theology in Christendom* (1896), made polemical use of the history of Islamic science in their works. In both cases a narrative of harmony between Islam and science was used as a foil for the main narrative, according to which either Christian theology in general or Roman Catholicism in particular was to be held responsible for an outrageous antipathy to scientific progress. Hameed also notes that Draper congratulated Muslim thinkers for having originated the idea of organic evolution centuries before Darwin. Thus a narrative of conflict between science and one religious tradition can simultaneously be reinforced by a story of harmony with another.

Understanding the provenance of dominant historical narratives is an important step, but only the first step, towards a fuller historicizing of our contemporary thoughts about 'science and religion'. The next step is to examine the histories and meanings of the very terms 'science' and 'religion' themselves. If, for instance, Draper and White alleged that Islam, unlike Christianity, had historically been hospitable to scientific endeavours, then that implies that, at the very least, we need to specify which religion we have in mind when we speak of the relationship between 'religion' and science. However, as Peter Harrison demonstrates in his chapter, what is in fact required is a deeper questioning of these

categories. The idea that Christianity and Islam are both members of the generic category 'religion' is itself a product of the nineteenth-century development of the sciences of religion, which Harrison and Küçük both explore. And the category of 'science', as any student of the subject knows, has certainly not had a stable meaning over the centuries. Nor can we easily exchange our 'science' for an earlier category of 'natural philosophy'. Harrison reproduces a telling quotation from John Locke who, while explaining the difference between empirical investigations and more certain knowledge, wrote that he suspected 'natural philosophy is not capable of being made a science'.[20] It is debatable when modern 'science' as we now understand it emerged, but the question of the continuity or lack of it between attempts to comprehend nature in earlier periods and the activities of scientists today has profound implications for any research into the history of 'science', including the question of its relationships with whatever we might mean by 'religion'.

What might we mean by 'religion'? One of the recurring questions below, which emerges not only in Harrison's chapter but also in those by Jan Golinski and Jonathan Topham, is whether 'religion' refers to something cognitive or to something practical; to beliefs or to practices. Harrison sympathizes with the view of Wilfred Cantwell Smith that 'religion' has come, partly through the influence of the sciences, to be taken as a term for a set of intellectual beliefs expressed as propositions.[21] What began as a reduction of Christianity to a set of beliefs was then generalized to include all non-Christian faiths in this same propositional category of 'religions'. This tended to obscure the fact that religious traditions include elements of practical piety, inward spirituality, social organization, and much else beyond the purely intellectual. It also made for easy comparisons with scientific theories, which were also expressible in propositional form. Yet this strategy usually worked to the detriment of religion.

How, then, might historians recover a proper sense of the practical as opposed to the propositional nature of religion? Jan Golinski approaches this question through the work of the anthropologist and sociologist of science Bruno Latour, whose analysis of religion as a 'performative' realm is less well known than his theories about the practices of science. Golinski explores the implications for discussions of science and religion of adopting such a non-propositional view. Topham, in summarizing the key contributions that historians of the book and of publishing have made to the field, likewise suggests that a shift in historical focus from beliefs to practices is an important recent trend. All of this amounts to a powerful

case for rethinking our categories along less propositional, less cognitive lines. Histories of experimenting and writing, preaching and worshipping, publishing, and reading can offer historical insights to complement histories that have focussed on the cognitive dimensions.[22]

These recent reappraisals of the categories of 'science' and 'religion' have shared a basic philosophical outlook with what went before. The historiography of science and religion articulated by Brooke, Cantor, Lindberg, Numbers, and many others has always been nominalist rather than realist in tone. To put it another way, the new historians of science and religion from the 1970s onwards were always opposed to the reification of categories of thought. But nominalism about our categories can be pushed to uncomfortable extremes. Any category at all can be profitably historicized. The various and unexpected semantic shifts through which a category has passed may well give us good reason to pause before using it ourselves.[23] We might ask, however, whether there are special reasons for ultra-nominalism in the cases of 'science' or 'religion'. Are these terms any more problematic than, say, 'nature' or 'God'? Historical awareness about our categories is absolutely essential, but we shall sadly never be able to lay our hands on any unproblematic alternative categories which somehow transcend history. And it is for this reason that books about 'science and religion' routinely, simultaneously, and unavoidably both use and problematize those central categories.

THE POLITICS OF KNOWLEDGE

Recognizing that science and religion involve worldly practices as well as intellectual beliefs encourages us to become aware of the political dimension. If the main strategies involved in Brooke's own overturning of the conflict narrative were complexification and contextualization, for other scholars the same end has been pursued through politicization. As I have already implied, historians of science and religion have learned to ask whose interests are served by the promotion of particular scientific or religious ideas, and the same question can be asked about historical narratives themselves. In other words, the tools of social and political history can be used to look for the power struggles that motivated intellectual disputes.

The chapters below reveal that the power struggles that give motive and meaning to engagements between science and religion can be global or local in scale. Osler and Turner both identify large-scale social shifts in European history that can explain conflicts between natural knowledge

and religious teachings. Osler points out that socio-political factors, including urbanization, were responsible for the decline in the influence of religion in modern Europe. This was just as important a factor as intellectual disputes about the compatibility of the new sciences with Christian teaching. In the same vein, Osler notes that the new seriousness with which historians of science have recently engaged with early modern religion and theology must also tell us something about the politics of the late twentieth and early twenty-first centuries.

Looking beyond Europe, the struggles involved are no longer always between interest groups within the borders of one society but rather involve the added dimension of encounters between the colonizers and the colonized. Sujit Sivasundaram's chapter, focussing on the impact of the British empire in Africa, Asia, and the Pacific, shows that to reject or accept European science in the nineteenth century could simultaneously be a way to resist or to be assimilated by a colonizing power (and by their religion). For example, Sivasundaram recounts the story of Nan Inta, who was converted simultaneously to Christianity and to western science by a correct astronomical prediction. Hameed's chapter reveals that colonial dynamics have persisted in the Islamic world up to the present day. Evolutionary science has been accepted by some Muslims as a mark of modernity and as an intellectual development in harmony with their faith and prefigured in the Qu'ran, while being rejected by others as an oppressive, corrupting, and illegitimate western influence. Hameed further points out that Muslim engagements with evolutionary science have varied in line with the different political contexts to be found in Islamic countries, whether secular or theocratic, monarchical or republican, democratic or elitist.

To recognize the importance of pre-existing political contexts is one way to politicize the relationship between science and religion. A more direct politicization treats science and religion as forms of power themselves. And it is in the histories of education and publishing, innocuous as such subjects might initially sound, that we find the history of the raw exercise of power in the production and reproduction of knowledge. If knowledge is power, in other words, then those who control the dissemination of knowledge are those who wield the real power. This highlights the importance of Turner's observation, mentioned above, that the story of an historical conflict between science and religion was produced by those engaged in a struggle for dominance in the newly created domain of state education in the nineteenth century. The chapters by Adam Shapiro and Bronislaw Szerszynski reinforce this point in twentieth-century contexts,

with reference to the famous 1925 Scopes trial and to more recent developments in debates about the content of science education. These chapters show that the conflict between evolutionists and creationists is a struggle to control the apparatus of state education. Shapiro sheds fascinating new light on the Scopes case by unearthing evidence of the local political skirmishes in the town of Dayton, Tennessee, that led up to the infamous 'Monkey Trial'. Szerszynski's chapter contrasts modern European and American educational systems and, using recent sociological research, suggests that religious education is just as important as scientific education in shaping popular attitudes to evolutionary science and to creationism.

To control the production and dissemination of the tracts, treatises, books, and periodicals through which ideas are spread is, in addition to deciding what should be included in school syllabuses, another way to exercise this sort of power. Historians of publishing, who are interested in this process of dissemination, are able to suggest answers to absolutely fundamental questions about how people come to have ideas about science and religion in the first place. The answer, very often, has been through reading books and periodicals made available to them by a trusted individual or an authoritative institution. The distribution of ideas in books and periodicals gives a certain amount of influence to individual authors, and the history of science and religion has, up until now, been overwhelmingly a history of authors. But historians are now turning their attention to publishers and readers as well as authors in order to fill out our understanding of the processes involved.[24] The chapters by Shapiro, Sivasundaram, and Topham all illustrate the great importance of recognizing that it is in the history of publication and reading, as well as in literary and intellectual history, that we find the means of production of those rather abstract-sounding 'relationships between science and religion' with which we are concerned.

ISLAM, CHRISTIANITY, AND EVOLUTION

As is clear from the preceding comments, understanding the politics of knowledge often entails also studying the geography of knowledge.[25] Ideas and practices do not travel around the world in disembodied form but are taken to particular places in particular forms by particular people. Much of the pioneering work in the history of science and religion focussed on the ways that ideas about Christianity and its engagement with such sciences as astronomy, geology, and evolutionary biology had developed

in British, European, and North American contexts. More recent work has pushed back the geographical and the confessional as well as the methodological boundaries of this enterprise by asking how modern European science historically interacted with non-European peoples and their religions. The history of science looks very different when it is viewed from a Jewish, Buddhist, or Hindu perspective rather than from the point of view of Catholic or Protestant Christianity. Historians have made considerable progress in reconstructing those many and various views.[26] In the present volume, however, there is a particular comparative focus on Islamic and Christian perceptions, which itself reflects one of the main political preoccupations of the early twenty-first century.

Unsurprisingly, given the crucial importance of Islamic culture to the development of the sciences in the medieval and early modern periods, there is a strong tradition of Muslim thought according to which Islam and science are in harmony. Sivasundaram mentions nineteenth-century Muslim translators and promoters of Darwin's works who sought to use Darwin to reinforce Islamic faith by quoting Qu'ranic verses about life beginning in water. Hameed's chapter shows that this same tradition flourished in the twentieth century, in such works as Maurice Bucaille's book *The Bible, the Qu'ran, and science* (1976), and in the prevailing positive attitude towards science in the modern Islamic world, where the conflict model is generally, albeit not absolutely, absent. As we have already seen, this existence of harmony between Islam and science was used by John William Draper and Andrew Dickson White in the nineteenth century to suggest that the conflict with science was a peculiarly Christian religious problem. To some extent, then, the idea of Islam as an anti-intellectual or anti-scientific tradition is a minority view, and one imposed from outside the tradition itself. Küçük's chapter traces the idea back to the work of Ernest Renan and other European scholars of religion in the late nineteenth century. In fact both harmonious and conflictual histories of Islam and science were used by opportunistic secularists in that period to emphasize the anti-scientific animus they claimed to be so characteristic of the Christian churches in general and Roman Catholicism in particular.

As Hameed, Szerszynski, and Numbers all explain, the organized anti-Darwinian creationist movement was created by American fundamentalist Protestants during the twentieth century. To the extent that an Islamic creationist movement has now emerged in the Muslim world, that is often as much a western export as was Darwinian biology. And there is a danger, as Hameed points out, that if Islamic creationists such as Harun

Yahya, who have borrowed their ideas from American Protestant creationists, succeed in identifying evolutionary biology with atheism – an identification that is also made by scientific atheists like Richard Dawkins – then a new level of conflict between Islam and modern science may soon emerge. These chapters thus raise the important question of how to interpret the globalization of American creationism. It is undoubtedly true that creationism and, more recently, 'Intelligent Design' (ID) arose when and where they did because of a uniquely American set of religious, legal, and educational circumstances.[27] The question then is whether it is misleading, or indeed complacent, to continue to insist that creationism is a peculiarly American phenomenon. Numbers's comparison of creationism and ID with hip-hop and blue jeans is apt. These are all phenomena that have spread around the world but without losing their strong and distinctive associations with American culture and history.

Important and Brookean morals can be drawn from all this. As Brooke wrote in 1991: 'Conflicts allegedly between science and religion may turn out to be between rival scientific interests, or conversely between rival theological factions. Issues of political power, social prestige and intellectual authority have repeatedly been at stake'.[28] In the case of apparent conflicts between Islam and evolution there are several such issues at stake. In one way the conflict is a mere shadow of a western battle between fundamentalist Christians and evolutionists, which itself has been extensively historicized and deconstructed. One might also interpret tensions between Islam and evolution as consequences of historic political hostilities between colonizers and colonized. Or perhaps the most significant conflict here is between modernizers and conservatives within the Islamic world itself.

COMPLEXITY, CONFLICT, AND BEYOND

Finally, what answers do these recent developments in the historical study of science and religion suggest to the historiographical questions with which I began this introduction? Do they, for instance, amount to a recipe for yet more complexification and the final abandonment of narrative and of generalization? Emphases on particularities of place and on the experiences of individual readers can sometimes make it seem that way. Among the closing chapters of this volume mapping out historiographical ways forward, Noah Efron brings out extremely clearly how radically pluralist a Brookean historiography can become. Efron is essentially an enthusiast for such a development but realizes that an emphasis on historical

contingency can be a barrier not only to historical generalization but also to interfaith discussions. If there is no single 'relationship between science and religion', if each faith tradition has encountered the sciences in very particular ways, and if neither 'science' nor 'religion' has even had a stable meaning across time, then it becomes extremely difficult for a discussion to take place about common experiences and shared concerns. Harrison's chapter makes similar points. And, as Efron puts it, this realization may well demoralize (in more ways than one) those who wish to study science and religion as a way to make sense of their own identities and to answer their own present-day concerns.

Although histories of science and religion produced in recent decades have tended to argue that complexification and contextualization militate against all master-narratives, whether of conflict or of harmony between science and religion, in reality historians' efforts have been directed almost exclusively towards the destruction of conflict narratives. One might be forgiven for thinking that there was some pro-religious apologetic intention lurking here.[29] At the very least, whatever the intentions of particular historians, the scholarly destruction of the conflict thesis is of obvious utility to those seeking to argue for the reasonableness of religious belief on the basis of its compatibility with modern science. What Harrison and Efron spell out, however, is that the true import of recent work on the history of science and religion for religious believers is much less reassuring than that.

It is also evident that there is still plenty of room for narrative and generalization in a post-Brookean historiography. Although the experiences of people of different faiths and on different continents were widely divergent, that does not prevent the historian from successfully generalizing about, for instance, the dynamics of power between colonizers and colonized, or about the centrality of education and publishing to the history of science and religion. Numbers directly addresses the question of what 'mid-scale generalizations' can now be made about science and religion, and suggests several useful answers. He notes, for example, that the gradual removal of God-talk from professional scientific publications can be dated and documented. This was clearly a post-Darwinian development, since *On the origin of species* (1859) both began and ended with references to God. Both Numbers and Cantor also point to the growing autonomy of professional science from the churches as one reason for nineteenth- and twentieth-century conflicts. Although, as Osler's chapter shows, many twentieth-century historians of science over-stated the separation of science from religion between 1500 and 1700, such a separation

had certainly emerged by the twentieth century. Indeed, it was just that separation which inclined historians to impose something similar on earlier centuries.

An extremely important task, undertaken especially by Harrison and Cantor, is the attempt to find an historically respectable way to get conflict back into the story. Of course, in some respects, conflict never went away. There have been two approaches to conflict in the new historiography. One has been to accept conflict in certain circumscribed cases but to deny it as a general characterization of engagements between science and religion. The second, more popular approach has been to keep the conflict story but to recast the protagonists. One famous example of this is the suggestion that the Galileo case was a conflict between two factions within the Catholic Church about how to read the Bible, or a contest between the old and the new astronomy, rather than between the Church on the one hand and modern science on the other.[30] The various recastings of the Victorian conflict over evolution in sociological, political, and professional terms by Frank Turner, James Moore, and Adrian Desmond constitute another excellent example. What emerges in this case is a contest between scientific professionalizers and the Anglican establishment for control of the institutions of science and education.[31]

Harrison and Cantor suggest two particularly important further ways in which conflict needs to be put back into our understanding of science and religion. The first is the recognition of psychological conflict within particular individuals. Cantor starts his chapter with the example of the eighteenth-century Dublin Quaker and apothecary John Rutty, whose spiritual diary reveals how he was torn between the pursuit of science and medicine on the one hand and his spiritual life on the other. The second way that conflict needs to be reinstated, for both Harrison and Cantor, is by recalling the legitimate 'prophetic' voice of religion. It has long been a function of religion and theology to provide resistance to dominant social forces. While science and technology remain among those dominant forces, then religious resistance of some kind might be welcomed. A lack of conflict in this case, Cantor argues, could be a sign of the failure of religions to engage with the wider world with sufficient critical awareness.

Future histories of science and religion will inevitably and rightly reflect the concerns of those who produce them, which are impossible to predict. The present volume is offered as a collective reflection on the motives, methods, and meanings to be discerned in past and contemporary histories of the subject. It is intended as a combination of stock-taking and agenda-setting. The impact of John Hedley Brooke's work, and that of his

colleagues in this area of scholarship, has been very considerable. It has established a new consensus about the right way to approach the history of engagements between science and religion. The contributions below sometimes endorse and sometimes challenge that consensus. They pursue still further the ambition to understand both the sciences and religions of the past on their own terms and in their own contexts. They also indicate ways to go beyond the cognitive dimension by thinking more sociologically and practically about both religion and science, and they give us tools with which to reflect critically on our own historical practices as well as on those of the nineteenth-century writers who have so frequently served as the villainous foils to more virtuous recent historiographies.

My own hope is that future studies will further extend the application of techniques from literary and cultural history to this subject. In addition to the histories of publishing and reading, which have already been developed in this area, there are histories yet to be written of the way that relationships between science and religion have been represented in literature, drama, the cinema, and the visual arts. Historians of science have explored some of the classic locations of the 'conflict narrative' in works of history, but there are many more sources to be explored before we shall understand how this resilient narrative took such a hold on our culture. Bertolt Brecht's play *The life of Galileo*, composed during the Nazi era, and the 1960 film *Inherit the wind*, which used the Scopes trial as a way to attack anti-Communist purges of the McCarthy era, both show that the idea of a conflict between a heroic scientific individual and an authoritarian religious establishment is a very compelling one, and one which can be used to many different political ends. It might be the conflict between the heroic individual and the authoritarian regime that is the most significant element of the story, but we still must wonder about the recurrence of the scientific and religious motifs. We might also ask whether there are equally powerful stories to be told, or that have already been told, in which heroic religious individuals stand up against technocratic and scientific regimes.

Theoretical trends and methodological preferences may come and go, but Brooke's suspicion of reification, his demolition of master-narratives, and his relishing of differentiation have already made their mark on the historiography of science and religion. The example his work provides of how history can be conducted as a work of intellect, imagination, sympathy, and humanity is also of enduring value. What accounts for the real historical power of Brooke's work is his constant attempt, at once as a professional duty and as a philosophical discipline, to achieve something that is ultimately impossible: to put aside his own preconceptions and

concerns, and even his own intellectual categories and beliefs, in order to listen to what other people living in very different cultures from his own were really trying to say and to understand why they were saying it. The particularity that features most regularly in Brooke's own writings has been the particularity of the individual human personality. It is through a disciplined and imaginative engagement with other minds that Brooke has set about accomplishing the deceptively simple task he set himself at the outset of his classic study: not 'to tell a complete or definitive story' about science and religion but 'to assist in the creation of critical perspectives'.[32]

NOTES

I am grateful to all those who have contributed to this volume, and to the Lancaster conference from which it arose, for their help and collaboration in bringing this project to fruition. I would like especially to thank my co-editors, and not only for their perceptive and constructive comments on this introduction. Stephen Pumfrey was the driving force behind the conference in John Brooke's honour, and provided encouragement and guidance at every stage. Geoffrey Cantor, himself one of the pioneers of the new historiography of science and religion, provided the unfailing support, guidance, and graft which made the production of this book possible.

1 John Hedley Brooke, *Science and religion: Some historical perspectives* (Cambridge: Cambridge University Press, 1991). A list of all Brooke's principal publications from 1977 to 2010 is included as the first section of the Select Bibliography below.

2 See Nick Jardine, 'Whigs and stories: Herbert Butterfield and the historiography of science', *History of Science* 41 (2003), 125–40.

3 Thomas S. Kuhn, *The structure of scientific revolutions* (Chicago: University of Chicago Press, 1962). For helpful reflections of the massive impact of this work both within and beyond the history of science, see: Thomas S. Kuhn, *The road since structure: Philosophical essays, 1970–1993, with an autobiographical interview*, ed. James Conant and John Haugeland (Chicago: University of Chicago Press, 2000); Alexander Bird, *Thomas Kuhn* (Chesham: Acumen, 2000); John Preston, *Kuhn's 'The structure of scientific revolutions': A reader's guide* (London: Continuum, 2008).

4 John Brooke and Geoffrey Cantor, *Reconstructing nature: The engagement of science and religion. The 1995–6 Gifford Lectures at Glasgow* (Edinburgh: T & T Clark, 1998). Chapter 1 provides an excellent articulation of this approach.

5 Important early contributions to this tradition were Frank M. Turner, 'The Victorian conflict between science and religion: A professional dimension', *Isis* 49 (1978), 356–76; James R. Moore, *The post-Darwinian controversies: A study of the Protestant struggle to come to terms with Darwin in Great Britain and*

America, 1870–1900 (Cambridge: Cambridge University Press, 1979). Other significant milestones include two collections edited by David C. Lindberg and L. Ronald Numbers: *God and nature: Historical essays on the encounter between Christianity and science* (Berkeley, CA: University of California Press, 1986) and *When science and Christianity meet* (Chicago: University of Chicago Press, 2003). James Moore's review of Brooke's *Science and religion* in *History of Science* 30 (1992), 311–23 is also very helpful on these historiographical matters. I have discussed these issues in two places: Thomas Dixon, 'Looking beyond "The Rumpus about Moses and Monkeys": Religion and the sciences in the nineteenth century', *Nineteenth Century Studies* 17 (2003), 25–33; Dixon, *Science and religion: A very short introduction* (Oxford: Oxford University Press, 2008), ch. 1.

6 Geoffrey Cantor had himself already made important contributions to reforming the historiography of science and religion, notably in *Michael Faraday: Sandemanian and scientist* (London: Macmillan, 1991). Cantor's subsequent research has enriched historical understandings of the subject through an investigation of Jewish and Quaker engagements with the sciences; see Geoffrey Cantor, *Quakers, Jews, and science: Religious responses to modernity and the sciences in Britain, 1650–1900* (Oxford: Oxford University Press, 2005), and Cantor and M. Swetlitz (eds.), *Jewish tradition and the challenge of Darwinism* (Chicago: Chicago University Press, 2006).

7 Some of Brooke's early writings are included in John Hedley Brooke, R. Hooykaas, and Clive Lawless, *New interactions between theology and natural science* (Milton Keynes: Open University Press, 1974).

8 John Hedley Brooke, 'Joining natural philosophy to Christianity: The case of Joseph Priestley', in Brooke and Ian Maclean (eds.), *Heterodoxy in early modern science and religion* (Oxford: Oxford University Press, 2005), pp. 319–36, on p. 329.

9 John Hedley Brooke, 'Presidential address: Does the history of science have a future?', *British Journal for the History of Science* 32 (1999), 1–20, on 9.

10 John Hedley Brooke, 'Darwin and Victorian Christianity', in Gregory Radick and Jonathan Hodge (eds.), *The Cambridge companion to Darwin* (Cambridge: Cambridge University Press, 2003), pp. 192–213, on p. 199.

11 Brooke, *Science and religion*, pp. 5, 51.

12 Edward B. Davis, review of Brooke, *Science and religion* in *Isis* 83 (1992), 469–70.

13 Brooke, 'Presidential Address', p. 2.

14 Ibid., p. 3.

15 Jim Endersby, *A guinea-pig's history of biology: The plants and animals who taught us the facts of life* (London: Heinemann, 2007).

16 Georgina Ferry, review of Endersby, *Guinea-pig's history* in the *Guardian*, 2 June 2007. The lone-genius model of the historiography of science is also discussed in Brooke, 'Presidential Address', with reference to Dava Sobel's bestselling *Longitude: The true story of a lone genius who solved the greatest scientific problem of his time* (London: Fourth Estate, 1996).

17 Richard Olson, review of Brooke, *Science and religion*, in *American Historical Review* 99 (1994), 191–2, on 192.
18 Brooke and Cantor, *Reconstructing nature*, p. 68.
19 Lindberg and Numbers, *Science and Christianity*, p. 2.
20 John Locke, *Essay concerning human understanding*, IV.12.10, ed. P. Nidditch (Oxford: Clarendon Press, 1975), p. 645.
21 See Harrison's discussion below and the original thesis as developed in Wilfred Cantwell Smith, *The meaning and end of religion* (New York: Macmillan, 1963).
22 'Cognitive dimensions' is also the subtitle of one of Brooke's co-edited volumes: John Hedley Brooke, M. Osler, and J. van der Meer (eds.), *Science in theistic contexts: Cognitive dimensions. Osiris XVI* (Chicago: University of Chicago Press, 2001).
23 My own work in the history of science and philosophy has taken exactly this approach: Thomas Dixon, *From passions to emotions: The creation of a secular psychological category* (Cambridge: Cambridge University Press, 2003); *The invention of altruism: Making moral meanings in Victorian Britain* (Oxford: Oxford University Press for the British Academy, 2008).
24 Notable among many recent works in this vein are James A. Secord, *Victorian sensation: The extraordinary publication, reception, and secret authorship of* Vestiges of the natural history of creation (Chicago: University of Chicago Press, 2000); Geoffrey Cantor and Sally Shuttleworth (eds.), *Science serialized: Representations of the sciences in nineteenth-century periodicals* (Cambridge, MA: MIT Press, 2004); Aileen Fyfe, *Science and salvation: Evangelical popular science publishing in Victorian Britain* (Chicago: University of Chicago Press, 2004); Bernard Lightman, *Victorian popularizers of science: Designing nature for new audiences* (Chicago: University of Chicago Press, 2007).
25 The geography of scientific knowledge has been another growth area in recent scholarship. See, for instance, Sujit Sivasundaram, *Nature and the godly empire: Science and evangelical mission in the Pacific, 1795–1850* (Cambridge: Cambridge University Press, 2005); David N. Livingstone and Charles W. J. Withers (eds.), *Geography and revolution* (Chicago: University of Chicago Press, 2005).
26 See the Select Bibliography (under 'Particular (non-Protestant) religious traditions') at the end of this volume for suggested starting points for further reading on the history of science in particular faith traditions.
27 The definitive study is Ronald L. Numbers, *The creationists: From scientific creationism to intelligent design*, 2nd edn (Cambridge, MA: Harvard University Press, 2006); see also Edward J. Larson, *Summer for the gods: The Scopes trial and America's continuing debate over science and religion* (New York, Basic Books, 1997); Larson, *Trial and error: The American controversy over creation and evolution*, 3rd edn (Oxford: Oxford University Press, 2003); or, for a more condensed account of the emergence of creationism in modern America, see Dixon, *Science and religion*, ch. 5.
28 Brooke, *Science and religion*, p. 5.

29 I have suggested as much myself in reviews of some of the works produced in this recent tradition. See, for instance, Thomas Dixon, review of Brooke and Cantor, *Reconstructing nature*, in *Religion* 34 (2004), 161–2; Dixon, review of Lindberg and Numbers, *Science and Christianity*, in *British Journal for the History of Science* 38 (2005), 469–71.

30 David C. Lindberg, 'Galileo, the Church, and the cosmos', in Lindberg and Numbers, *Science and Christianity*, pp. 33–60; Brooke and Cantor, *Reconstructing nature*, ch. 4.

31 Turner, 'Victorian conflict'; Adrian J. Desmond, *The politics of evolution: Morphology, medicine, and reform in radical London* (Chicago: University of Chicago Press, 1989); Desmond, *Huxley: From devil's disciple to evolution's high priest* (London: Penguin, 1998); Moore, *Post-Darwinian controversies*.

32 Brooke, *Science and religion*, p. 5.