

# RELIGION AND THE EARLY ROYAL SOCIETY

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ABSTRACT. The 1663 charter of the Royal Society declares that its activities shall be devoted ‘to the glory of God the Creator, and the advantage of the human race’. Yet other documents associated with the early Royal Society note that its fellows scrupulously avoided ‘meddling with Divinity, Metaphysics, Moralls’. This lecture considers these apparently contradictory statements, and seeks to offer an account of the roles which religion did, and did not play, in the pursuits and aspirations of the early Royal Society. In doing so, it gives consideration to a range of theories about the influence of religion on seventeenth century English science, including those of R. K. Merton, Charles Webster, and Stephen Gaukroger.

## INTRODUCTION

It is sometimes assumed that the rise of modern science was accompanied by an increasing separation of science and religion, and that the success of science was made possible, at least in part, because of its liberation from the stifling influence of religious institutions and dogmas. Viewed in this light, the achievements of the early Royal Society, founded in the 1660s, were premised on a sharp differentiation of science and religion, and by the refusal of its fellows to involve themselves in extra-curricula theological speculations. In keeping with this vision of history, one recent popular history of the early Royal Society has contended that while ‘the dead hand of the Catholic Church stopped the scientific revolution in Italy’, in the latter half of the seventeenth century, Britain [sic] ‘produced a group of people determined, as we shall see, to keep religion out of science and to publish their discoveries for all to share.’<sup>1</sup> This group was, of course, the Royal Society. On the face of it, there seems to be evidence to support at least the latter half of this claim. A memorandum traditionally attributed to Robert Hooke, the Society’s first curator of experiments, asserts that the

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<sup>1</sup> John Gribbin, *The Fellowship: The Story of a Revolution* (Penguin, 2006), p. xiii.

fellows scrupulously avoided ‘meddling with Divinity, Metaphysics, Moralls’.<sup>2</sup> Bishop Thomas Sprat, who wrote the first history of the Society—somewhat prematurely, we might think, in the 1660s—agreed that ‘the *Royal Society* is abundantly cautious not to intermeddle in *Spiritual things*’ and that its members ‘meddle no otherwise with divine things’. Similarly, Sir Robert Moray, one of the most influential founders of the Society, declared that the *Philosophical Transactions*—the official journal of the fraternity—would not be concerned with ‘legal or theological matters’.<sup>3</sup>

In spite of this apparently unambiguous endorsement of a separation of science and religion in the seventeenth century in general and the Royal Society in particular, some historians and sociologists of science have taken a different view. In the 1930’s, sociologist Robert K. Merton analysed the religious affiliations of the early members of the Society, and developed an influential thesis according to which some elements of the puritan ethos promoted the development of modern science. Subsequently, the eminent historian Charles Webster claimed that the great flourishing of scientific activity in the decades immediately preceding the foundation of the Royal Society, was motivated by a puritan millenarianism.<sup>4</sup> More recently, Stephen Gaukroger has argued against the general picture of a separation of science and religion during this period, contending that these two enterprises enjoyed a more intimate relation than in the Middle Ages, and that it was the capacity of the new science to harness the legitimizing power of religion that moved it from the margins to the centre of Western society.<sup>5</sup> In my own work, I have advanced similar arguments, suggesting that the new experimental practices advocated by the Royal Society were underpinned by theological considerations.<sup>6</sup>

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<sup>2</sup> The memorandum is most probably by Sir Robert Moray, one of the most energetic and influential founders of the Society. See Michael Hunter, *Science and the Shape of Orthodoxy* (Woodbridge: Boydell, 1995), p. 171.

<sup>3</sup> Thomas Sprat, *History of the Royal Society* (London, 1667), pp. 347, 82.

Robert Moray, Letter to Christiaan Huygens, 1665, qu. in Henry Lyons, *The Royal Society, 1660-1940: a history of its administration under its Charters* (Cambridge: Cambridge University Press, 1944), p. 56.

<sup>4</sup> Charles Webster, *The Great Instauration: Science, Medicine and Reform, 1626-1660* (London: Duckworth, 1975).

<sup>5</sup> Stephen Gaukroger, *The Emergence of a Scientific Culture* (Oxford: Oxford University Press, 2005), ch. 1.

<sup>6</sup> Peter Harrison, *The Fall of Man and the Foundations of Science* (Cambridge: Cambridge University Press, 2007).

This idea that religion played some role in the Royal Society's understanding of its activities also draws support from contemporary witnesses. The 1663 Charter declares that the activities of the Society shall be devoted 'to the glory of God the Creator, and the advantage of the human race', and its officers were required to swear an oath on 'the holy Gospels of God'. While Thomas Sprat observed that the fellows did not meddle with divine or spiritual things, he noted at the same time that the new philosophy would be advantageous to the Christian religion, and that the experimental study of nature was really a form of religious worship.<sup>7</sup> Finally, a number of key figures in the early Royal Society made explicit connexions between their scientific activities and their religious convictions.

All of this suggests that the question of the relationship of religious considerations to the activities of the early Royal Society is a complicated one. In this lecture I hope to shed some light on this question and find ways of resolving some of these apparent contradictions. We will begin with a consideration of some of the terms used in the seventeenth-century discussions and with some general observations about the different ways in which religion may have influenced the early Royal Society. Following this discussion about the modes of interaction of science and religion during this period I will identify some specific ways in which religious considerations played a significant role in the aspirations and activities of the Royal Society, and look to three case studies that support this view.

#### 'MEDDLING WITH DIVINITY'

It is important at the outset to clarify some of the key terms used by the historical actors since even this modest exercise will go some way towards accounting for the apparent contradictions that have already been alluded to. Perhaps we should note first that in the seventeenth century 'divinity' and 'theology' did not mean the same thing as 'religion' in general. The kinds of topics regarded as off-limits to fellows of the Royal Society were those dispute-engendering doctrines which, in the wake of the Reformation, had divided Europe and, closer to home, England itself. These concerned such matters as the nature and number of the sacraments, the ultimate source of

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<sup>7</sup> Sprat, *History*, pp. 323, 349f., 371.

religious authority, the appropriate form of Church government, and so on. What was not included in ‘divinity’, thus understood, were fundamental religious doctrines to do with God’s existence, power, and wisdom, and even some more specific, but relatively uncontroversial, Christian doctrines. Accordingly, when Thomas Sprat announced that the members of the Society ‘meddle no otherwise with divine things’, he immediately qualifies this by excepting from his prohibition considerations to do with ‘the Power, Wisdom, and Goodness of the Creator [as] display’d in the admirable order, and workman-ship of the Creatures.’<sup>8</sup> For Sprat, the exclusion of discussions of ‘divinity’ was not motivated by a belief in the irrelevance to experimental science of general religious concerns, but by the desire to avoid unnecessary and pointless debates about technical and indifferent points of theology and ritual. This stance, then, is entirely in keeping with the Charter’s declaration that the Society’s endeavours would promote ‘the Glory of God’.

Further support for this interpretation comes from the fact that during this period ‘meddle’—the term used by both Sprat and Moray—bore a meaning that it has since lost, namely: ‘to engage in conflict, contend, fight’.<sup>9</sup> This meaning is most likely the intended one in this context, since the proscription of discussions of divinity had an irenic intent. Theological disputation, rather than theology *per se* was the perceived problem. In fact, similar phrases occur in the writings of those who are quite openly dealing with theological questions, but who wish to indicate their avoidance of controverted theological territory. Clergyman George Hakewill, for example, discussing the issue of the world’s decay under the heading of ‘Divinity’, adds the immediate qualification that he will not ‘meddle with doctrinall points in controversie at this day’.<sup>10</sup> In a sense, then, even those writing on religious topics might plead that they were not ‘meddling with Divinity’, and the use of the phrase during this period can reasonably be construed as expressing a desire to avoid becoming entangled in unnecessary doctrinal disputation, without necessarily implying a desire to avoid making more broad religious claims.

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<sup>8</sup> Sprat, *History*, p. 82.

<sup>9</sup> *Oxford English Dictionary*, <http://dictionary.oed.com>, sv. ‘meddle’, v.

<sup>10</sup> George Hakewill, *An apologie of the povver and providence of God in the gouernment of the world* (London, 1627), p. 2.

Another term that we need to pay attention to is ‘philosophy’, and its more specific forms ‘natural philosophy’ and ‘experimental philosophy’—for it is these that are typically identified as primary activity of the Royal Society and which are contrasted with ‘divinity’. In this context, philosophy is really just shorthand for ‘natural philosophy’, which referred to the formal study of nature and provision of causal explanations for natural events. That said, ‘natural philosophy’ is not simply just another expression for ‘science’, and it has even been argued that one key difference between natural philosophy and science lies in the fact that natural philosophy is ultimately ‘about God’.<sup>11</sup> It is not possible to evaluate this characterization here, and certainly not all historians agree with it.<sup>12</sup> Yet it is relatively uncontroversial to conclude that natural philosophy had somewhat fluid boundaries during this period and that for at least some of its practitioners, it included a theological component.<sup>13</sup> Isaac Newton, president of the Royal Society from 1703 until his death in 1723, wrote in the General Scholium to his *Principia Mathematica* (1687), that ‘the most beautiful system of the sun, the planets, and comets, could only proceed from the council and dominion of an Intelligent and powerful being’, before concluding that to discourse of God from the appearances of things, ‘does certainly belong to Natural Philosophy.’<sup>14</sup> Such a conception of natural philosophy is consistent with an activity devoid of reference to ‘divinity’, but not religion.

From this brief discussion we can conclude that in spite of the existence of a range of documents testifying to the early Royal Society’s avoidance of ‘divinity’, it does not follow from this alone that its fellows observed a sharp division between scientific and religious activities, nor that they were oblivious to the possible positive religious implications of their endeavours.

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<sup>11</sup> Andrew Cunningham, ‘Getting the Game Right: Some Plain Words on the Identity and Invention of Science’, *Studies in History and Philosophy of Science* 19 (1988), 365-389.

<sup>12</sup> Margaret Osler, ‘Mixing Metaphors: Science and Religion or Natural Philosophy and Theology in Early Modern Europe’, *History of Science* 35 (1997), 91-113; Edward Grant, ‘God and Natural Philosophy: The Late Middle Ages and Sir Isaac Newton’, *Early Science and Medicine* 6 (2000), 279-298; Peter Dear, ‘Religion, Science, and Natural Philosophy: Thoughts on Cunningham’s Thesis’, *Studies in History and Philosophy of Science* 32A (2001), 377-86; Andrew Cunningham, ‘A Response to Peter Dear’s “Religion, Science, and Philosophy”’, *Studies in History and Philosophy of Science* 32A (2001), 387-91;

<sup>13</sup> See, e.g., Peter Harrison, ‘Physico-theology and the Mixed Sciences: The Role of Theology in Early Modern Natural Philosophy’, in Peter Anstey and John Schuster (eds.), *The Science of Nature in the Seventeenth Century* (Dordrecht: Springer, 2005), pp. 165-183; Ann Blair, ‘Mosaic Physics and the Search for a Pious Natural Philosophy in the Late Renaissance’, *Isis* 91 (2000), 32-58.

<sup>14</sup> Isaac Newton, *Mathematical Principles of Natural Philosophy*, tr. Andrew Motte, ed. F. Cajori (Berkeley: University of California Press, 1934), pp. 544f.

## WAYS IN WHICH RELIGION MIGHT INFLUENCE SCIENCE

Another way of shedding light on apparently contradictory claims about the role of religion in the early Royal Society is to give some consideration to the different ways in which religion might influence scientific activity. Following John Brooke, we can identify a number of modes of science-religion relations in history, all of which are relevant to our period.<sup>15</sup> First of all, religious considerations might provide the *presuppositions* for scientific investigation. During the seventeenth century, one such presupposition was that nature was possessed of a particular kind of intelligibility—specifically that it was governed by mathematical laws promulgated by God.<sup>16</sup> A second way in which religion might play a role is by *informing choices between competing scientific accounts*. Isaac Newton, for example, claimed that his system of the world was more compatible with the Christian religion than that of Descartes, while Leibniz argued, to the contrary, that the Newtonian system presupposed a deficient conception of God and his activity, and on that account was to be rejected. Religion might also *underpin specific modes of investigation*. Accordingly, historians have argued that particular religious convictions—such as theological voluntarism or commitment to the doctrine of the Fall—promoted an experimental approach to the study of nature.<sup>17</sup> A fourth way in which religion might influence scientific development is to do with the *motivations of individual investigators*. Almost without exception, early modern natural philosophers cherished religious convictions, although these were not invariably orthodox. Some (but by no means all) made the point that they were motivated to pursue scientific enquiry on account of these religious commitments. Fifth, theological doctrines might provide

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<sup>15</sup> John Hedley Brooke, *Science and Religion: Some Historical Perspectives* (Cambridge: Cambridge University Press, 1991). See also Brooke, 'Science, Religion, and Historical Complexity', in Donald A. Yerxa (ed.), *Recent Themes in the History of Science and Religion* (Columbia: University of South Carolina Press, 2009), pp. 37-46

<sup>16</sup> John Henry, 'Metaphysics and the Origins of Modern Science: Descartes and the Importance of Laws of Nature', *Early Science and Medicine*, 9 (2004): 73-114. Peter Harrison, 'The Development of the Concept of Laws of Nature', in Fraser Watts (ed.), *Creation: Law and Probability* (Aldershot: Ashgate, 2008), pp. 13-36.

<sup>17</sup> M. B. Foster, 'The Christian doctrine of creation and the rise of modern natural science', *Mind*, 53 (1934), 446-68; J. E. McGuire, "Boyle's conception of nature", *Journal of the History of Ideas*, 33 (1972), 523-42; Eugene Klaaren, *Religious Origins of Modern Science* (Grand Rapids, 1977); Peter Heimann, "Voluntarism and immanence: conceptions of nature in eighteenth-century thought", *Journal of the history of ideas*, 39 (1978), 271-83; Margaret Osler, *Divine Will and the Mechanical Philosophy: Gassendi and Descartes on contingency and necessity in the created world* (Cambridge: Cambridge University Press, 1994); Harrison, *The Fall of Man*, pp. 11f.

the *constitutive content of some scientific positions*. Thus, for much of the eighteenth century the pursuit of natural history was understood by many to be the quest for divine design in the created world. Finally, religion might offer *social sanctions* for the scientific enterprise. The idea here is that in a society that cherishes doubts about the moral legitimacy and practical utility of a particular scientific programme—as was the case in seventeenth-century England—religion can provide support by showing that science promotes desirable religious and moral ends.

This is not the place for a detailed discussion of each of these modes, but we can consider two examples that show how some of them, at least, are consistent with the maintenance of a clear separation between science and religion in the actual practice of natural philosophy. In the case of laws of nature, which acted as a *presupposition* for seventeenth-century science, there is little doubt that these laws were then understood as having been instantiated by God. Thus, when René Descartes, one of the pioneers of the concept, first set out his three ‘laws of nature’, he states that ‘God imparted various motions to the parts of matter when he first created them, and he now preserves all this matter in the same way, and by the same process by which he originally created it.’ Descartes goes on to say that God always preserves the same quantity of motion in matter: in other words, the principle of conservation of motion is underwritten by divine immutability.<sup>18</sup> But while this conception is clearly grounded in a theological assumption, one of the consequences of holding such a view is that the natural realm becomes completely determined and predictable. Put simply, it is God’s immutability that guarantees the independence of the natural realm as an arena in which explanations can be offered which make no reference to specific or particular divine actions (as opposed to God’s initial and ongoing act of creation). In this case, then, not only does this theological presupposition not call for any ‘mingling’ of divinity and philosophy, at some level it acts as a guarantee of their independence.

Another way to see the force of the general point that theological considerations might actually promote the independence of science and religion is to consider the *motives* of some of the investigators. Steven Shapin reminds us that ‘the more a body

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<sup>18</sup> Descartes, *Principles of Philosophy*, § 61, in *The Philosophical Writings of Descartes*, tr. J. Cottingham et al., 2 vols. (Cambridge: Cambridge University Press, 1985), vol. 1, p. 240.

of knowledge is understood to be objective and disinterested, the more valuable it is as a tool in moral and political action.’<sup>19</sup> Many seventeenth-century natural historians believed that the disinterested study of the structures of living things could offer independent support for the truth of the Christian religion, and refute atheism. But the study of nature could only offer such support if it was the kind of activity based on premises that the atheist would accept. (Unlike the arena of physics, natural history was not premised on assumptions about the laws of nature). Again, then, we have a case where, paradoxically, individuals might be motivated by religious considerations to ensure the religious neutrality of their scientific endeavours.<sup>20</sup>

Perhaps the single mode of science-religion relations which is most directly relevant to the early Royal Society is the way in which religion can *provide social sanctions* for scientific activity. While we have become accustomed to thinking of science as either intrinsically worth pursuing, or as justified by its practical outcomes (in the spheres of technology and medicine, for example), one of the chief complaints against the early Royal Society was that the knowledge it generated was useless, that its scientific programme was inconsistent with widely held values about the purposes of learning, and that its general philosophy was conducive to impiety.<sup>21</sup> In Royal Society responses to these criticisms we see explicit attempts to establish the legitimacy of the organization through appeals to particular religious and moral values. These defences of the Royal Society point to the importance of religious considerations in providing a rationale for scientific activity in general, and for the experimental natural philosophy of the Society in particular. A number of scholars have pointed to elements of Puritanism or Protestantism as providing important sanctions for the particular kinds of scientific activity and, in particular, the experimental philosophy of the early Royal Society.

#### PURITANISM, PROTESTANTISM AND THE ROYAL SOCIETY: SOME HISTORICAL THESES

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<sup>19</sup> Steven Shapin, *The Scientific Revolution* (Chicago: University of Chicago Press, 1996), p. 2.

<sup>20</sup> It is interesting to note, in this general connection, that the term ‘methodological naturalism’ was coined (and the approach advocated) by a believing scientist. See Ronald L. Numbers, ‘Science without God: Natural Laws and Christian Beliefs’, in *When Science and Christianity Meet*, ed. David C. Lindberg, Ronald L. Numbers (Chicago: University of Chicago Press, 2003), pp. 265-285.

<sup>21</sup> For contemporary criticisms of the Royal Society, see Harrison, ‘Religion, the Royal Society, and the Rise of Science’, *Theology and Science*, 6 (2008), 255-71.

During the first decades of the twentieth century historical understandings of the relation between science and religion tended to follow the general lines of the ‘conflict model’ articulated by John Draper and Andrew Dickson White.<sup>22</sup> In the 1930’s, however, a number of writers—Dorothy Stimson, R. F. Jones, R. K. Merton, and S. F. Mason—began to explore possible positive connections between Puritanism and the remarkable flourishing of science that took place in seventeenth-century England. A major focus of attention in these explorations was the membership of the early Royal Society. In 1935, Dorothy Stimson analysed the religious and political affiliations of the ten members of the proto-Society, whose members had met in London during the years 1645-9 and whose activities had been described by the cleric and mathematician John Wallis.<sup>23</sup> She concluded that one of the group was definitely Anglican, two could not be characterized, and the remaining seven were ‘Puritan in training and Parliamentary in affiliation’. Extending her analysis to the 1662 membership of the Royal Society (which numbered 119), she determined that of the eighty-seven whose religious allegiances could be established, about half had ‘Puritan experience in greater or less degree’.<sup>24</sup> On this basis she argued, along with R. F. Jones, that Puritanism provided particularly fertile soil for Baconian utilitarianism, and hence for scientific activity.<sup>25</sup>

Robert K. Merton followed in 1938 with his celebrated essay that provides the classic account of the link between the Puritan ethic and the growth and institutionalization of science. The ‘Merton thesis’, stated in typically modest fashion by its author, is ‘that the Puritan ethic, as an ideal-typical expression of the value attitudes basic to ascetic Protestantism generally, so canalized the interests of seventeenth century Englishmen as to constitute one important element in the enhanced cultivation of

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<sup>22</sup> See Robert K. Merton, *Science, Technology and Society in Seventeenth Century England* (New Jersey: Humanities Press, 1970), pp. xvi, 55.

<sup>23</sup> Christoph J. Scriba, ‘The Autobiography of John Wallis, F.R.S.’, in *Notes and Records of the Royal Society of London* 25 (1970), 17-46; 39-41.

<sup>24</sup> Dorothy Stimson, ‘Puritanism and the New Philosophy in 17th century England’, *Bulletin of the Institute of the History of Medicine* 3 (1935), 321-324.

<sup>25</sup> Stimson, ‘Puritanism and the New Philosophy’, p. 321; R. F. Jones, *Ancients and Moderns: A Study of the Background of the Battle of the Books* (St Louis: Washington University Studies, 1936), pp. 62f., 53-6, 82f. See also S. F. Mason, ‘The Scientific Revolution and the Protestant Reformation’, *Annals of Science* 9 (1935), 64-87 and 154-75; George Rosen, ‘Left Wing Puritanism and Science’, *Archives Internationales d’Histoire des Sciences* 28 (1948), 376-443; Christopher Hill, *Intellectual Origins of the English Revolution* (Oxford: Clarendon, 1965).

science.’<sup>26</sup> Merton identified specific elements of the puritan ethic that he believed led to this special relationship: ‘The Puritan complex of a scarcely distinguished utilitarianism; of intramundane interests; methodical unremitting action; thoroughgoing empiricism; of the right and even the duty of *libre examen*; of anti-traditionalism—all of this was congenial to the same values in science.’<sup>27</sup>

It is important to understand that Merton was chiefly seeking an explanation not so much for the emergence of particular methods or scientific doctrines, but rather for the enhanced social standing of science—for increasing interest in science and technology, for the growth of its prestige, and for the beginnings of its institutionalization. He also astutely observed that the frequent appeals of early modern natural philosophers to religion suggest that ‘religion was a sufficiently powerful social force to be invoked in support of an activity which was intrinsically less acceptable at the time.’<sup>28</sup> The membership of the early Royal Society was one test case for the hypothesis.<sup>29</sup> Following the lead of Dorothy Stimson, Merton amassed an impressive body of statistical data about the early Royal Society that for him confirmed the view ‘that the originative spirits of the Society were markedly influenced by Puritan conceptions.’<sup>30</sup> Merton also drew upon statistical studies from Continental Europe which demonstrated a disproportionately large involvement of Protestants in scientific activities.<sup>31</sup> Again, this confirmed his general thesis about the importance of a Protestant ethos in promoting science.

Since its first appearance, the Merton thesis has been subjected to considerable discussion, much of it critical.<sup>32</sup> However, it must be said that many critics simply

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<sup>26</sup> Robert K. Merton, *Social Theory and Social Structure* enlarged edition (New York: Free Press, 1969), pp. 574f.

<sup>27</sup> *Ibid.*, p. 136.

<sup>28</sup> *Ibid.*, p. 91.

<sup>29</sup> *Ibid.*, p. 112.

<sup>30</sup> *Ibid.*, p. 114.

<sup>31</sup> *Ibid.*, pp. 130f, 134f.

<sup>32</sup> For representative discussions of the thesis see Richard Kroll’s introduction to *Philosophy, Science, and Religion in England 1640-1700*, ed. Richard Kroll, Richard Ashcroft, and Perez Zagorin (Cambridge University Press, 1992), pp. 1-28; John Brooke, *Science and Religion: Some Historical Perspectives* (Cambridge University Press, 1991), pp. 82-116; Lotte Mulligan, ‘Puritanism and English Science: A Critique of Webster’, *Isis* 71 (1980) 456-69; Elizabeth Eisenstein, *The Printing Press as an Agent of Change*, 2 vols. (Cambridge: Cambridge University Press, 1979), vol. 2, pp. 636-708; Charles Webster (ed.) *The Intellectual Revolution of the Seventeenth Century* (London: Routledge and Kegan Paul, 1974)—this work includes a number of papers from the 1965 numbers of *Past and Present*; R. Hooykaas, *Religion and the Rise of Modern Science* (Grand Rapids, Eerdmans, 1972), pp. 135-160;

failed to understand the relatively modest scope of the thesis, the qualifications which Merton attached to it, and what it was that he was trying to explain.<sup>33</sup> Merton did not contend that Puritanism was sufficient or even necessary for the growth of science. Neither does his thesis entail a denial of the scientific contributions of Catholic scientists such as Copernicus, Galileo, and Descartes. What Merton sought to account for was the spectacular and unprecedented growth of science in seventeenth-century England. His goal was not an explanation of the emergence of particular scientific ideas, but rather of the increasing cultural prestige of science in England, as measured in part by the formation of the Royal Society. Of lasting importance was his realization that the scientific values that we now tend to take for granted required, at that time, justification and support, and that a particular kind of religious impulse was capable of providing it.

That said, one area where criticism is justifiable lies in difficulties with the idea of a specifically puritan ethos, and with determining who was, or was not, a 'puritan'. The claim that the membership of the Royal Society was disproportionately Puritan is difficult to sustain, and subsequent analyses have suggested otherwise.<sup>34</sup> Part of the problem here is that following the Restoration in 1660 many Puritans conformed, which is to say, returned to the Anglican fold. These shifting religious allegiances complicate any statistical analysis. The extent of the lingering influence of any puritan ethos then becomes a matter of speculation because one's official allegiance may or may not reflect one's basic religious values. Some have argued that the dominant ideology of the Royal Society—insofar as it had one at all—was not Puritan, but Latitudinarian.<sup>35</sup> The Latitudinarians believed in compromise in relation to religious dogma, were undogmatic about doctrinal claims, inclined to defer to civil

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P.M. Ratansi 'The Social Interpretation of Seventeenth-Century Science', in *Science and Society 1600-1900*, ed. Peter Matthias (Cambridge University Press, 1972) pp. 1-32; Richard Greaves, 'Puritanism and Science: The Anatomy of a Controversy', *Journal of the History of Ideas* 30 (1969), 345-368; Leo Salt, 'Puritanism, Capitalism, Democracy, and the New Science', *American Historical Review* 73 (1967), 18-29; Also see issues of these journals devoted specifically to this topic: *Isis* 79 (1988), and *Science in Context* 3 (1989).

<sup>33</sup> On common misunderstandings see G.A. Abraham, 'Misunderstanding the Merton Thesis: A Boundary Dispute between History and Sociology', *Isis* 74 (1983) 368-87; Steven Shapin, 'Understanding the Merton Thesis', *Isis* 4 (1988), 594-605.

<sup>34</sup> For a prosopographical study of the early Royal Society, see Michael Hunter, *The Royal Society and its Fellows, 1660-1700*. See also Lotte Mulligan, 'Civil War Politics, Religion and the Royal Society', *Past and Present* 59 (1987), 92-116

<sup>35</sup> Barbara Shapiro, 'Latitudinarianism and Science in Seventeenth-Century England', *Past and Present*, 40 (1986), 16-41.

authority in matters of religion, and emphasized the importance of piety and morality rather than orthodoxy in belief. A Latitudinarian ethos could explain the apparent ease with which a numbers of individuals could, in good conscience, thrive in both Puritan and Anglican contexts. Still others have suggested that neither Puritanism or Latitudinarianism, but Anglicanism was dominant in the nascent Royal Society.<sup>36</sup> Taken together, these confusing analyses have led some to conclude that religion was not a significant factor in the early Royal Society.<sup>37</sup> Certainly, much of the scholarship that addresses the Merton thesis problematizes the claim that a specifically puritan ethic dominated the group. But it does not necessarily follow from this that some elements of Puritan thought, or of Protestantism more generally, might have promoted scientific enquiry, and the Merton thesis continues to be discussed by historians.

One modification of the thesis was offered in Charles Webster's classic, *Great Instauration* (1975). Focusing more closely on the scientific and religious culture of mid seventeenth-century England, Webster argued that the great efflorescence of scientific activity that preceded the foundation of the Royal society was motivated by a distinctively puritan eschatological vision, partly informed by a Baconian utopianism. What Webster designated 'the great instauration' had as its ambitious goal the reform of all aspects of human society—religion, the sciences, technology and agriculture—in order to prepare for the imminent end of the world.<sup>38</sup> The expressed intent of these reform movements was the regaining of a dominion over the natural world that had been lost as a consequence of the Fall. While Webster's focus was the period immediately preceding the foundation of the Royal Society, and while the millenarian commitments of this earlier period came to be viewed with some suspicion following the Restoration of the monarchy in 1660, there is no doubt that major elements of the earlier Baconian programme were incorporated into the ethos of the Royal Society. Webster's work also raised the question of whether seventeenth-century England was home to a distinctive set of religious values that might have been

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<sup>36</sup> Douglas Kemsley, 'Religious Influences in the Rise of Modern Science', *Annals of Science* 24 (1968), 199-226.

<sup>37</sup> Lotte Mulligan, 'Civil War Politics'; L. S. Feuer, *The Scientific Intellectual: The Psychological and Sociological Origins of Modern Science* (New York: Basic Books, 1963); Hunter, *Science and Society in Restoration England*.

<sup>38</sup> Webster, *The Great Instauration*.

particularly conducive to scientific endeavour. This was precisely the question posed by Robert Merton.

More recently, Stephen Gaukroger has taken on the larger question of why an enduring scientific culture appeared in the West in the seventeenth century. In his *Emergence of a Scientific Culture* (2006) he points out that while a number of cultures witnessed intermittent scientific growth at various times—he alludes to the Classical world, China, medieval Islam, medieval Oxford and Paris—these scientific movements never consolidated, and science never came to occupy the central place that it does in the contemporary West. In some respects, then, Gaukroger also asks a similar question to Merton's. He is less interested in why scientific ideas arise in a culture than in the factors that lead to the consolidation and institutionalization of science once initial breakthroughs have occurred. In essence what Gaukroger argues is that science became successful in the West because over the course of the seventeenth and eighteenth centuries it was able to harness the legitimating power of religion, establishing itself as a religiously useful enterprise. As Gaukroger puts it:

... a good part of the distinctive success at the level of legitimation and consolidation of the scientific enterprise in the early-modern West, derives not from any separation of religion and natural philosophy, but rather from the fact that natural philosophy could be accommodated to projects in natural theology: what made natural philosophy attractive to so many in the seventeenth and eighteenth centuries were the prospects it offered for the renewal of natural theology. Far from science breaking free from religion in the early modern era, its consolidation depended on religion being in the driving seat....

If Gaukroger's question is similar to Merton's, his answer is consonant with Merton's, but less specific. It was the capacity of the new natural philosophy to be adapted to the purposes of the defense of Christianity that led to its incorporation into the natural theological projects of the following centuries. This incorporation was crucial to the consolidation of science in the West. Gaukroger concludes: 'Christianity took over natural philosophy in the seventeenth century, setting its agenda and projecting it forward in a way quite different from any other scientific culture....'<sup>39</sup>

My own past work has developed similar themes. In *The Bible, Protestantism, and the Rise of Natural Science* (1998), I suggested that the Protestant reformation

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<sup>39</sup> Gaukroger, *Emergence of a Scientific Culture*, p. 23.

effected a dramatic contraction of the realm of the sacred, through its constriction of sacramental practices, its incipient iconoclasm and, crucially, its emphasis on the word and the literal sense of scripture.<sup>40</sup> The move away from allegorical readings of scripture and nature, and the new focus on the historical or literal sense—a development promoted by both humanist scholars and Protestant reformers—contributed to the collapse of the symbolic world of the Middle Ages and paved the way for new mathematical and taxonomic readings of nature. Moreover, when read in a literal way, the biblical narratives of Genesis, which emphasize the divine imperative to exercise dominion over nature and stress the extent of the loss of that dominion after the Fall, took on a new force. The this-worldly orientation of Protestantism, its elevation of the status of earthy vocations, its word-oriented literalist mindset, and the new incentives provided by biblical imperatives to establish dominion over nature, were all of profound importance for those new ways of interpreting nature that we associate with the emergence of modern science, and for providing its practitioners with the requisite motivations. These factors were particularly significant in seventeenth-century England. (Some of these impulses, it must be said, were echoed in the Catholic reformation.)

One biblical theme in particular—the Fall and the loss of dominion that ensued—was of enormous importance during this period, and provides the theme of my most recent book, *The Fall of Man and the Foundations of Science* (2007). This work explores this recurring motif which first appears in Francis Bacon, was subsequently rehearsed during the Interregnum, and found its way into Restoration justifications of science.

As Bacon himself expressed it:

For man by the fall fell at the same time from his state of innocency and from his dominion over creation. Both of these losses however can even in this life be in some part repaired; the former by religion and faith, the latter by arts and sciences. For creation was not by the curse made altogether and for ever a rebel, but in virtue of that charter, ‘In the sweat of thy face shalt thou eat bread,’ it is now by various labours (not certainly by disputations or idle magical ceremonies, but by various labours) at length and in some measure subdued to the supplying of man with bread; that is, to the uses of human life.<sup>41</sup>

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<sup>40</sup> Harrison, *Bible, Protestantism and the Rise of Natural Science*.

<sup>41</sup> Bacon, *Novum Organum* II, §52, in *The Works of Francis Bacon*, ed. James Spedding, Robert Ellis, and Douglas Heath, 14 vols., (London: Longman and Co., 1857-74), vol. 4, pp. 247-48. Cf. *Valerius Terminus, Works*, vol. 3, p. 222. On Bacon’s motivations see Peter Harrison, *The Fall of Man and the Foundations of Science* (Cambridge: Cambridge University Press, 2007), pp. 172-85; Stephen A. McKnight, *The Religious Foundations of Bacon’s Thought* (Columbia: University of Missouri Press,

Not only did this idea of a partial restoration of lost dominion over nature join together the goals of the Christian religion with those of the new natural philosophy, but the notion of a fallen intellect and limited human senses also underpinned justifications for the new experimental approach to nature. Given the infirmities of the human mind, our proneness to error, and the fallen state of the natural world itself, the regimen of an experimental natural philosophy was proposed as the best way forward.

A compact summary of these ideas is offered by Robert Hooke, in the Preface of *Micrographia* (1665). Hooke writes that ‘every man, both from a deriv'd corruption, innate and born with him, and from his breeding and converse with men, is very subject to slip into all sorts of errors.’ He goes on to say that ‘the only way which now remains for us to recover some degree of those former perfections, seems to be, by rectifying the operations of the Sense, the Memory, and Reason’ by which means ‘our command over things is to be establisht.’ In short, in order to recover the knowledge of nature lost as a consequence of the Fall and to regain our dominion over natural things, we presently need special measures to overcome our fallen conditions. These are provided by the kind of experimental science practiced by the Royal Society. As Hooke concludes: ‘These being the dangers in the process of humane Reason, the remedies of them all can only proceed from the real, the mechanical, the experimental Philosophy.’<sup>42</sup>

Returning briefly to Robert Merton, it is significant that the systematic suspicion of the knowledge-making capabilities of human beings—engendered by a belief in the fallen condition of the human mind—yields an experimentalism that shares two of the key elements that Merton associated with a puritan-inspired natural science: communalism and organized skepticism.<sup>43</sup> But whether these features can any longer be linked exclusively with a puritan ethos now seems doubtful. Rather, the kinds of religious motivations for scientific pursuits identified here appear to be distributed

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2006); Steven Matthews, *Theology and Science in the Thought of Francis Bacon* (Aldershot: Ashgate, 2008).

<sup>42</sup> Robert Hooke, *Micrographia* (London, 1665), Preface.

<sup>43</sup> The other two are disinterestedness and universalism. See R. K. Merton, *The Normative Structure of Science*, in *The Sociology of Science: Theoretical and Empirical Investigations* (Chicago: University of Chicago Press, 1973).

over a range of Protestant positions. The spread and broad appeal of these religious conceptions makes head-counting exercises in some respects irrelevant, and confounds attempts to align the religious ‘ideology’ of the early Royal Society with Puritanism, Latitudinarianism, or Anglicanism. But the failure of these narrow statistical correlations does not necessarily threaten a more general thesis about the recurrence of particular Protestant values and ideas in justifications of the activities of the Royal Society and of its experimental approach.

To put it another way, certain key religious themes recur with remarkable consistency in discourse about science and its justifications in seventeenth-century England, and they do not necessarily correlate with any narrowly defined religious identity. These motifs include the idea of re-establishing dominion over nature; the importance of recovery of Adamic knowledge; the idea of scientific activity as a religious vocation and the accompanying conviction that the pursuit of science is inherently religious; the belief that experimental philosophy is a regimen that overcomes moral and intellectual deficiencies; an advocacy of the pursuit of useful knowledge, often understood as promoting Christian charity; and, not least, the idea that the growth of science and technology in England during this period was part of a providential plan or a prelude to the Eschaton. Most of these themes are present in the work of Francis Bacon, but they are consistently rehearsed throughout the century, and appear in defenses of the Royal Society. Typically, they are also overlaid with the more general theme of natural theology, according to which natural history and natural philosophy establish the wisdom and power of God in the created order.

In the final section of this lecture we shall give brief consideration to three early and influential fellows of the Royal Society with a view to seeing how some of these themes are represented in their work.

### THREE CASE STUDIES: SPRAT, BOYLE, AND RAY

Thomas Sprat (1635-1713) became a Fellow of the Royal Society in 1663, following John Wilkins’ nomination, and was almost immediately commissioned to write a history of the Society. The work was intended to silence the scoffing of the Society’s detractors, answer the doubts of those skeptical about its methods, and reassure those

who feared that the activities of the Society constituted a threat to religion and society. There has been considerable discussion of the extent to which Sprat's *History* is representative of the ideology of the Royal Society and, if it were, of the precise nature of that ideology. On the first point, it is clear that Sprat's work was both encouraged by Wilkins and informed by the council. On publication it raised some concerns amongst members, although some effort was made to stand behind it.<sup>44</sup> On the second, it has been argued that the ideology of *History* is Latitudinarian, which would comport with Wilkins' religious views, although as we have seen, it is not clear how representative this stance is of the general membership.<sup>45</sup> Certainly, the *History* does not seem to present a Puritan perspective, although it does put forward ideas which are consonant with some puritan justifications of science. But of more immediate interest is whether Sprat gives voice to those common features identified above, and which transcend more narrow religious identities.

While, as we have seen, Sprat claims that the fellows of the Royal Society do not meddle with divinity, he makes an unambiguous appeal to religion to establish the legitimacy of the Royal Society and its experimental approach. 'The weightiest and most solemn part' of the *History*, he declared, was 'to make a defence of the *Royal Society*, and this new *Experimental Learning*, in respect of the *Christian Faith*.'<sup>46</sup> This is largely accomplished through an appeal to the religious utility of the Society's work. Accordingly, Sprat points out that the experimental philosopher is 'praepar'd to admit a *Deity*, and to embrace the consequences of that concession.' The experimental philosopher, he adds, 'is also from his *Experiments* as well furnish'd with *Arguments* to adore [the Deity]: he has always before his eyes the *beauty*, *contrivance*, and *order* of *Gods Works*: From hence, he will learn to serve him with all reverence, who in all that he has made, consulted *Ornament*, as well as *Vse*.'<sup>47</sup> Sprat here makes reference both to general natural theological considerations, and to

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<sup>44</sup> Sprat, *History*, pp. 94, 143. Michael Hunter, 'Latitudinarianism and the "ideology" of the Royal Society', in Kroll (ed.), *Philosophy, Science and Religion in England*, pp. 199-229, (esp. pp. 199-207). On misleading aspects of the History see P. B. Wood, 'Methodology and Apologetics: Thomas Sprat's *History of the Royal Society*' *British Journal for the History of Science*, 13 (1980), 1-26.

<sup>45</sup> Hunter, *Royal Society and its Fellows*; Mulligan, 'Civil War Politics'. See also the discussion in John Morgan, 'Religious conventions and the science in the early Restoration: Reformation and 'Israel' in Thomas Sprat's *History of the Royal Society* (1667)', *British Journal for the History of Science* 42 (2009), 321-344.

<sup>46</sup> Sprat, *History*, p. 345.

<sup>47</sup> Sprat, *History*, p. 345.

the idea that God has created useful things, whose purposes can be discovered by diligent investigators. The new philosophy, he claimed, ‘shall impart to us the uses of all the *Creatures*.’<sup>48</sup>

Beyond this, Sprat also advances the claim that experimental philosophy is really a privileged kind of theological exercise. Because of the experimental natural philosopher’s expert knowledge of the ways of the Creator, his praises will be more suitable to the divine nature, ‘than the blind applauses of the ignorant’. Sprat then makes the bold claim that such praise was actually the original form of religion, practiced by Adam in Eden before his Fall: ‘This was the first service, that *Adam* perform'd to his *Creator*, when he obey'd him in mustering, and naming, and looking into the *Nature* of all the *Creatures*. This had bin the only *religion*, if men had continued innocent in *Paradise*, and had not wanted a *redemption*.’<sup>49</sup> The activities of the Royal Society were thus regarded as a rehearsal of prelapsarian religion.

In the realm of revealed theology, the experimental natural philosopher also possessed singular advantages, being able to distinguish genuine prophecy from spurious. Thus, ‘he will be very scrupulous, in believing all manner of Commentaries on *Prophetical Visions*, in giving liberty to new *praedictions*, and in assigning the causes, and marking out the paths of *God's Judgments*, amongst his *Creatures*.’<sup>50</sup> The experimental investigator will similarly be able to discern the true from the false miracle: ‘He cannot suddenly conclude all extraordinary events to be the immediat Finger of *God*, because he familiarly beholds the inward workings of things.’ These capacities were of great importance since arguments from miracles and fulfilled prophecies constituted ‘external evidences’ of revealed religion. Sprat thus claimed that the kind of natural philosophy promoted by the Royal Society would support both a generic natural religion and the specific truths of the Christian faith.

Finally, Sprat considers the emergence of the new learning, and the founding of the Royal Society in particular, as part of a providential plan for a general reformation. He asks his readers to ‘behold the agreement that is between the present *Design* of the

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<sup>48</sup> Sprat, *History*, p. 438

<sup>49</sup> Sprat, *History*, p. 349f.

<sup>50</sup> Sprat, *History*, pp. 358f.

*Royal Society*, and that of our *Church* in its beginning.’ These institutions, he argues, ‘may lay equal claim to the word *Reformation*, the one having compass’d it in *Religion*, the other purposing it in *Philosophy*.’<sup>51</sup> Indeed, it has been recently argued, plausibly in my view, that Sprat regarded England as the ‘New Israel’, especially favoured by providence, and that the Royal Society was destined to play a key role in the scientific and economic fortunes of the nation.<sup>52</sup> In sum, Sprat’s *History* gives voice to most of the themes that I have identified as common currency in discussions of the relation of religion and the new natural philosophy during this period in England.

Our second exemplar of these common values is Robert Boyle. Boyle’s scientific achievements are well enough known to need no repetition. He was a key figure in the pre-Society group that met at Oxford in the later 1650s, was present at the very first meeting of the Royal Society, and came to be regarded, by some at least, as the very personification of the activities of that group.<sup>53</sup> Boyle’s conviction that the new natural philosophy would offer support for religion is a persistent theme throughout his work. He continually stressed the fact that natural philosophy and natural history provide us with rational grounds ‘to believe, admire, adore, and obey the Deity.’<sup>54</sup> It was Boyle’s conviction that, as he put it, ‘the *New Philosophy* may furnish us with some new Weapons for the defence of our ancientest *Creed*’, that inspired him to endow the Boyle Lectures.<sup>55</sup> These famous lectures (which were reinstated in 2004 at St Mary-le-Bow in the City of London) were intended ‘to prove the truth of the Christian religion against infidels, without descending to any controversies among Christians’. This latter condition was another way of stating that the lectures would not ‘meddle with divinity’.

Like Sprat, Boyle also suggested that natural philosophers go beyond simply offering arguments in support of the truths of natural theology, because they have special expertise in discerning the veracity of miracle claims and prophecies. Those familiar with the methods of the experimental philosophy, says Boyle, ‘will examine with

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<sup>51</sup> Sprat, *History*, p. 371.

<sup>52</sup> See Morgan, ‘Religious conventions and the science in the early Restoration’.

<sup>53</sup> Joseph Glanvill, *Plus Ultra* (London, 1668), p. 93.

<sup>54</sup> Robert Boyle, *A Disquisition about the final causes of Natural Things* (London, 1688), p. 89.

<sup>55</sup> Robert Boyle, *Some Physico-Theological Considerations about the Possibility of the Resurrection* (London, 1675), Preface.

more strictness and skill, than ordinary men are able, miracles, prophecies, or other proofs, said to be supernatural, that are alleged to evince a real religion' and determine whether 'the certain and genuine characters of truth appear in it.'<sup>56</sup> Natural philosophers could thus help adjudicate the competing claims of various religious sects, and promote a broadly rational religion.

Boyle is also conscious of our epistemic limitations, and of how these must now inform the conduct of natural philosophy. He speaks of the 'inbred pride of man,' exemplified in Adam's presumption in Eden. As a consequence of pride 'our Understandings are so universally byass'd, and impos'd upon by our Wills and Affections.' Once aware of this, however, we can guard against our inherent biases, and the experimental philosophy provides just the right kind of regimen to correct our natural inclinations towards error.<sup>57</sup> The circumscribed nature of our cognitive capacities also means that the ends for which God has designed things are not immediately obvious to us, and we need diligently to seek them out. 'We shall hereafter discover *other* Utilities', suggests Boyle, 'and perhaps *nobler* Ones' than those discovered hitherto.<sup>58</sup> As Francis Bacon had suggested earlier, the discovery of these uses of natural things can promote human welfare and result in acts of charity. In Boyle's words: 'And therefore I reckon the investigation and divulging of useful truths in physick, and the discovering and recommending of good remedies, among the greatest and most extensive acts of charity.'<sup>59</sup>

If the discovery of the uses of things leads to charitable acts, it also satisfies another divine imperative—the command to exercise dominion over nature. The pursuit of natural philosophy, Boyle writes, 'is not only delightful, as it teaches us to know nature, but also as it teaches us in many cases to master and command her.' Boyle goes on to observe that Adam, on account of whose transgressions we lost our original dominion over the natural world, 'would admire to see what a new world, as

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<sup>56</sup> Robert Boyle, *The Christian Virtuoso* in *The Works*, ed. Thomas Birch, 6 vols. (Hildersheim: Georg Olms, 1966), vol. 5, p. 538.

<sup>57</sup> Robert Boyle, *Some Considerations about the Reconcilableness of Reason and Religion* (London, 1675), p. 33.

<sup>58</sup> Robert Boyle, *A Disquisition about the Final Causes of Natural Things* (London: Pr. by H.C. for John Taylor, 1688), p. 82.

<sup>59</sup> Robert Boyle, *Some Considerations touching the Usefulness of Experimental Natural Philosophy*, in *Works* vol. 2, p. 201.

it were, or set of things has been added to the primitive creatures by the industry of his posterity.’<sup>60</sup> This divine command to exercise dominion over nature and produce knowledge of benefit to the common weal was, on Boyle’s account, conspicuously absent from an Aristotelian natural philosophy which was uninformed by these biblical imperatives: ‘the barren philosophy, wont to be taught in the schools, hath hitherto been found of very little use in human life.’<sup>61</sup>

Finally, Boyle also develops the idea that on account of these religious themes, the performance of natural philosophy is a kind of religious practice. The study of nature, Boyle suggests, ‘is the first act of religion, and equally obliging in all religions’ and is a kind of ‘philosophical worship of God.’ This form of worship is to be preferred to religious cult, for ‘discovering to others the perfections of God displayed in the creatures, is a more acceptable act of religion, than the burning of sacrifices or perfumes upon his altars.’<sup>62</sup> In this sense, experimental natural philosophers are really ‘priests of nature.’<sup>63</sup>

Our final example is John Ray, who was elected to fellowship of the Royal Society in 1667. Ray was an eminent naturalist, pioneer of modern taxonomy, and author of the classic seventeenth century physico-theological treatise, *The Wisdom of God manifested in the Works of the Creation* (1691). In an earlier work, the *Ornithology* (1678), Ray offered that now familiar disavowal of ‘divinity’ before going on to insist that a primary reason for publishing the book was that it would conduce ‘To the illustration of Gods glory, by exciting men to take notice of, and admire his infinite power and wisdom displaying themselves in the Creation of so many *Species of Animals*’.<sup>64</sup> Again, the omission of references to divinity was regarded as consistent with the general motive of highlighting the wisdom and power of God. In the later work, Ray also takes pains to invoke the authority of experiment and ‘matters of fact’,

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<sup>60</sup> Boyle, *Usefulness of Experimental Natural Philosophy*, in *Works*, vol. 2, p. 14.

<sup>61</sup> *Ibid.*, p. 65.

<sup>62</sup> *Ibid.*, pp. 62-3.

<sup>63</sup> *Ibid.*, p. 32. See also H. Fisch, ‘The Scientist as Priest: A Note on Robert Boyle’s Natural Theology’, *Isis* 44 (1953), 252-65; Harrison, ‘“Priests of the Most High God, with respect to the Book of Nature”: The Vocational Identity of the Early Modern Naturalist’, in *Reading God’s World*, ed. Angus Menuge (St Louis: Concordia, 2004), pp. 55-80.

<sup>64</sup> John Ray, *The Ornithology of Francis Willughby* (London, 1678), Preface. The work omits references to ‘Divinity, Ethics, Grammar, or any sort of Humane Learning’. In fact, the *Wisdom of God*, although published after the *Ornithology*, is derived from earlier material.

grounding his physico-theology in the authority of a disinterested science. I have admitted ‘nothing for matter of Fact or Experiment but what is undoubtedly true’, he writes, ‘lest I should build upon a sandy and ruinous foundation.’<sup>65</sup> The book that follows is a catalogue of instances of the wisdom and power of God.

Like Boyle, Ray also considered his scientific activities to be linked to a kind of religious vocation. *The Wisdom of God* had its origins not in the lecture halls of Cambridge, but had been delivered as ‘Morning Divinity Exercises’ in Trinity College chapel.<sup>66</sup> The Sabbath, Ray proposed, ‘seems to have been instituted for a commemoration of the Works of the Creation’. And as for ‘physiology’ [i.e. natural philosophy], it ‘may be justly accounted a proper propaedeutic, or Preparative to Divinity.’<sup>67</sup> Later in life, in his correspondence, Ray declared that divinity was his true profession, and the study of plants but ‘a diversion’. He declined nomination for the position of Secretary of the Royal Society on the grounds of its ‘inconsistency with my Profession’.<sup>68</sup>

Ray also rehearsed the idea that the human tenants of the world have a duty to establish their dominion over it. Given that God has provided all things for our use, it pleases him when we labour to put them to use: ‘the Author of Mans Being and Faculties, and all things else, delights in the Beauty of his Creation, and is well pleased with the Industry of Man in adorning the Earth with beautiful Cities and Castles, with pleasant Villages and Country Houses, with regular Gardens and Orchards and Plantations.’ These are to be vastly preferred over the underwhelming of ‘a rude and unpolished *America*, peopled with slothful and naked *Indians*, instead of well-built Houses, living in pitiful Hutts and Cabans, mode of Poles set endways.’<sup>69</sup> This advocacy of the cultivation of nature, linked with scientific activity, was allied with commercial success. The pursuit of natural philosophy and natural history, Ray wrote, make possible not only the increase of knowledge but also ‘benefit thy Country by encrease of its Trade and Merchandise.’<sup>70</sup> Again, what is evident here is a sense of

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<sup>65</sup> Ray, *Wisdom of God*, preface.

<sup>66</sup> *Ibid.*

<sup>67</sup> *Ibid.*, pp. 124, 127.

<sup>68</sup> R. T. Gunter (ed.), *Further Correspondence of John Ray*, (London: Ray Society, 1928), pp. 163, 159.

<sup>69</sup> Ray, *Wisdom of God*, pp. 117-8

<sup>70</sup> *Ibid.*, p. 116.

England's divinely ordained role in history, along with an indication of ways in which the imperative to 'have dominion' motivated not only the extension of the human empire over nature, but of the English empire over the world.<sup>71</sup>

In all of this, Ray remains aware of the limitations of human knowledge. For all that we must seek evidence of God's wisdom in the natural world, he also insisted that 'our Eyes and Senses, however armed or assisted, are too gross to discern the curiosity of the Workmanship of Nature', by which he meant that we can only grasp in a limited fashion the true intricacies of natural things. Similarly, while we should be motivated to search for beneficial uses of things, 'our understanding [is] too dark and infirm to discover and comprehend all Ends and uses to which the infinitely wise Creator did design them.'<sup>72</sup>

Sprat, Boyle and Ray each give voice to a number of the central themes that I have identified as providing religious motives or social sanctions for the pursuit of science. My aim in considering these three individuals is not to propose that every single Fellow of the early Royal Society subscribed to all these views, but to point to the way in which certain broad claims tend to recur even in authors with somewhat different religious orientations. The claims set out by these individuals were not the exclusive property of any one religious constituency, but formed part of a broad currency of religious ideas that underpinned and motivated scientific enquiry in seventeenth-century England.

## CONCLUSION

A number of historians have maintained, and continue to maintain, that religion played a significant role in the emergence of experimental science in the seventeenth century. These claims, at one level, are hardly surprising in view of the fact that the seventeenth and eighteenth centuries were in one sense the most religious in the

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<sup>71</sup> See Sarah Irving, *Natural Science and the Origins of the British Empire* (London: Pickering and Chatto, 2008); Peter Harrison, "'Fill the Earth and Subdue it': Biblical Warrants for Colonization in Seventeenth Century England', *Journal of Religious History* 29 (2005), 3-24.

<sup>72</sup> Ray, *Wisdom of God*, p. 58.

history of the Christian West.<sup>73</sup> Given this, it would have been astounding had religion not played some role in the emergence and persistence of science, and on such scientific institutions as the Royal Society. What there has been less agreement on is precisely how religion might have exerted its influence, and this has been manifested in disagreements about whether a specifically puritan ethos motivated early modern science and became the ruling ideology of the Royal Society. My suggestion in this lecture is that an exclusive focus on narrowly defined religious affiliations such as ‘puritan’ is not particularly helpful. I have identified as an alternative focus of attention a complex of religious ideas which, although they transcend tightly defined denominational affiliations, nonetheless inspired and legitimated scientific activity during this period. I hope also to have shown that it is important, when considering the influence of religion upon science, that we ask the right kinds of questions. Whereas we often tend to think of religious influence manifesting itself unhelpfully in the content of scientific ideas, far more important for the period in question is the manner in which religion lent social legitimacy to scientific activities and institutions, provided motivations for key individuals in those institutions and, not least, informed their goals and methods. When we pose these kinds of questions, the importance of religion in the establishment of the Royal Society and in the public justification of its activities seems undeniable.

Before I close, it is worth saying something very briefly about the present situation, and the not uncommon view that science and religion are, of their very natures, in conflict. In the wake of the Michael Reiss affair, in September 2008, Noble laureate Sir Harry Kroto was to articulate this view when he spoke of the ‘fundamentally unresolvable conflict at the science/religion interface’. Michael Reiss, you will recall, was the Anglican clergyman who had been the Royal Society’s Director of Science Education, who was (basically) misreported as having advocated the teaching of creationism in science lessons. Not surprisingly, perhaps, this led to calls for his dismissal. One of the arguments advanced by those who demanded that Reiss be removed his position was that by virtue of his clerical vocation, and religious commitments, Reiss was necessarily unfit for such a post with the Royal Society. Kroto put it this way: ‘He, together with all religious people – whether they like it or

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<sup>73</sup> This notion is carefully developed in the works of Jean Delumeau, the most recent of which is *L’Aveu et la pardon* (Paris: Fayard, 1992).

not, whether they accept it or not – fall at the first hurdle of the main requirement for honest scientific discussion because they accept unfound [sic] dogma as having fundamental significance.’ In other words, religious commitment, and certainly the clerical vocation, is necessarily inconsistent with ‘the scientific mindset’ and ‘intellectual integrity’.<sup>74</sup> Clearly, the seventeenth-century founders of the Royal Society would have been surprised to learn this—not only the significant numbers of clergymen who filled important posts in the early Society, but also such key individuals such as Boyle who thought of himself as belonging to a new kind of priesthood. If we begin our historical investigations with flawed and overstated assumptions about some essential opposition between science and religion, we are bound to create a fictional past and misunderstand the motivations and beliefs of the relevant historical actors. It would be an interesting project to consider the things that have changed since the formation of the Royal Society in the seventeenth century, such that these kinds of claims about an essential incompatibility between science and religion seem plausible. But that is the subject of another lecture.

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<sup>74</sup> Harry Kroto, ‘Blinded by a Divine Light: Creationists such as Reverend Reiss don’t have the intellectual integrity to teach science’, Sunday 28 September 2008, <http://www.guardian.co.uk/commentisfree/2008/sep/28/religion> downloaded Jan30, 2009.