University of Reading

The Royal Society of London

A Different Perspective on a Restoration Institution

PhD History

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CONTENTS

Abstract

The Royal Society of London for the Improving of Natural Knowledge is today one of the premier scientific and research institutions in the world. It was also the world's first publicly incorporated institution dedicated to the study of nature, and it set a pattern for other learned societies throughout Europe. For historians of science it has been an organisation of enduring interest primarily for its role in the history of early modern natural knowledge. However, the diversity of its membership, its relationship with England's monarch Charles II, and also its role in the history of the Restoration makes it an institution of far broader significance than has previously been appreciated. Supported by the Society's meticulous record-keeping, and the variety and kinds of texts produced by various of its fellows, this thesis will demonstrate that the Royal Society was an organisation whose early history reveals a far more complex picture of the organisation which was materially impacted by the political, social and cultural contexts of Restoration England. The three main actions taken by the founding fellows in the Society's first decade – founding, acquiring charters, publication of 'history' – reflect their response to the forces in England which could both help their organisation to thrive, but which ultimately nearly defeated their efforts. A greater awareness of the impact of these factors will create a different view of the Society as truly a Restoration institution.

Declaration of Original Authorship

Declaration: I confirm that this is my own work and the use of all material from other sources has been properly and fully acknowledged.

Linda A Friday

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CHAPTER ONE - Introduction: The History of a Royal Corporation

> ...our king bestows remarkable favour upon us and has resolved to endow generously this, his Royal Society. For (as you rightly suppose) if it should lack endowments everything would be hindered. But if they are made rich enough, and if the philosophers themselves remain constant in their independence of mind, their freedom from party zeal, and their eagerness for truth as well as for the welfare of mankind, what can limit their lofty endeavours?[1]

The Royal Society of London for the Improving of Natural Knowledge is today one of the world's premier scientific and research institutions. It counts as its fellows some of the most prestigious modern scientists, and election to its fellowship is public recognition of a scientist's significant and lasting contribution to scientific knowledge. It was also the world's first publicly incorporated institution dedicated to the study of nature and set a pattern for other learned societies throughout Europe. For historians of science it has been an organisation of enduring interest, not only for its role in the history of early modern science, but also because it is almost unique in the diversity of its membership and the meticulous completeness of many of its records.

This thesis grew from an initial research interest in the religious perceptions of natural philosophers as they developed from medieval natural magic to the natural knowledge. Initially through the writings of Joseph Glanvill, one of the earliest Royal Society fellows and a staunch defender of their experimental philosophy, it became clear that interest in the Society extended far beyond the men who have become icons of early modern natural philosophy, such as Sir Isaac Newton, Robert Boyle and Robert Hooke. The study of nature had a far broader appeal, and the Society itself occupied a role in some men's minds which exceeded its role in the institutionalisation of natural knowledge. A chance comment at an early modern conference in 2015 describing the fellows of the Royal Society as 'all gentlemen' also informed this thesis, in that it raised further questions

[1] Henry Oldenburg to Peter van Dam, 23 January 1662/3, in Henry Oldenburg, *The Correspondence of Henry Oldenburg, Vol. II 1663 – 1665*, ed. and trans. A Rupert Hall and Marie Boas Hall (Madison, Milwaukee, WI, 1966), p. 14.

about the nature of the fellowship. This in turn fostered a recognition that the Royal Society should be of greater interest to social historians, since it is increasingly clear that its diverse membership – and the diversity of those who demonstrated an interest in its activities – means that it occupies a unique position in the landscape of Restoration London in particular, and Restoration England as a whole. As such, the Royal Society reveals much about the society and culture of England in this period, reflecting as it does the pressures and challenges faced by those who wished to create a new kind of organisation in a period when public jubilation at the restoration of the monarchy existed alongside an underlying unease and discontent on the part of many who were apprehensive of the consequences of a return to monarchical rule and the established Anglican church. This was combined with a monarch who sought to unite his still fractured country but who was aware that his restoration was by no means universally welcomed. It also raises questions about the appeal of learned leisure activities in the seventeenth century, and the potential for anachronism in understanding effectively what people did for fun.

This chapter will first review the body of research dedicated to the Royal Society, highlighting the themes which have dominated past research. It will then review literature related not directly to the Royal Society, but to the political, social and cultural history of the Restoration. It will then outline the methodology and structure of the thesis and begin to explain the ideas and forces which prompted the founding fellows of the Society to found and begin to establish their organisation as they did. [2]

1.1 Reviewing the Literature

Research which has included a study of the Royal Society has done so within a relatively narrow context: that is, the history and philosophy of science. Within this construct, the Society and its fellows have been examined in relation to a particular set of themes which form subsets of the history of science: the origins and development of scientific ideas and discoveries, religion and philosophy, and the social history of science

[2] For the purposes of this review, the 'early' Royal Society is defined as the Society's existence from its founding in 1660 to the end of the seventeenth century, so its first forty years.

which includes science and its relation to society, politics and culture. It is a measure of the Royal Society's importance that the organisation is central to all. Indeed, it is extremely difficult to discuss seventeenth century natural philosophy without including analysis of the Royal Society and/or its fellows; natural philosophy in England – and the new experimental philosophy - had within a very short time come to be almost routinely identified with the Royal Society, both by contemporaries and by modern historians. Thus, the first three sections of this review will focus on historiography which in contained within both the subsets of the history of science in general, and with that of the Royal Society in particular.

i Histories of the Royal Society and the History of Science

The Royal Society as the world's first publicly incorporated scientific institution necessarily looms large in the history of early modern science and of the 'scientific revolution'. Historians such as Steven Shapin have questioned how appropriate it is to describe the changes in the approach to the study of nature, and those who pursued it in this way. B J T Dobbs questioned whether the change in the study of nature was truly as abrupt and sudden a change as a revolution, [3] while others have highlighted the anachronism of the modern word 'science' when applied to an early modern activity.[4] Nonetheless the Royal Society has continued to be discussed in these terms, since its status as the first of its kind forms part of the narrative of an complete break with past perceptions of the study of nature. In this way, the Society is ubiquitous in studies of the phenomenon.

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[3] B J T Dobbs, "Newton as Final Cause and First Mover", in *Rethinking the Scientific Revolution*, ed. Margaret J Osler (Cambridge, 2000), pp. 25 – 39.

[4] Early texts on the 'scientific revolution' include Herbert Butterfield, *The Origins of Modern Science*, rev. ed. (New York, 1997, originally published 1971); Richard S Westfall, *The Construction of Modern Science: Mechanisms and Mechanics* (New York, 1971); and Allen G Debus, *Man and Nature in the Renaissance* (Cambridge, 1978). More recent texts have begun to challenge or at least qualify the concept of a 'scientific revolution', and include Steven Shapin's, *The Scientific Revolution* (Chicago, 1996) and John Henry, *The Scientific Revolution and the Origins of Modern Science*, 2nd ed. (Basingstoke, 2002), although one of the most recent – David Wootton's *The Invention of Science: A New History of the Scientific Revolution* (New York, 2015) – continues to view the 'scientific revolution' in a more traditional way..

The earliest histories were written by fellows and secretaries of the Society, and were either the result of a particular commission or of the personal interest of their authors: Thomas Sprat in 1667 (this text will be discussed in detail in Chapter 4 of this thesis), Thomas Birch in the mid-eighteenth century, Thomas Thomson in 1812, and Charles Richard Weld in 1848.[5] Birch wrote in a preface to his *History of the Royal Society* that he wished to supplement the *History* written by Thomas Sprat in 1667, by including transcripts of the Society's meetings, and details of experiments contained in the Society's register books. Thomson's work was primarily devoted to a compilation of the contents of the *Philosophical Transactions* and contained only a brief account of the Society's origins and circumstances of its founding. Weld was critical of the three previous histories, claiming in the preface to his own text that the previous histories devoted too much space to details of the experiments conducted by the fellows, and did not give enough information about the origins and conduct of the Society. His *History* was, he claimed, much more of a 'civil history' of the Society, focused on the founding and operation of the Society and including 'memoirs' detailing the work and events of the presidents, although it inevitably included details of some of the most significant work of the Society and some of its more famous fellows. Weld's text was certainly more comprehensive, providing details of the difficulties of the early Society, including problems caused by its at times precarious financial situation, and the impact of the outbreak of plague and the Great Fire in 1665 and 1666. In general, these later histories omit an in-depth analysis of the social, political and cultural forces acting on the organisation, and which surely had a role to play in the founding fellows' efforts at the institutionalisation of natural philosophy.

In modern historiography there were few general histories of the Society. Dorothy Stimson's *Scientists and Amateurs: A History of the Royal Society* was more expansive than Weld's, dealing in detail with the experimental activities of the Society, the nature of the fellowship and the reactions from the public to the new Society. The occasion of the

[5] Thomas Sprat, *History of the Royal Society of London, For the Improving of Natural Knowledge*, 3rd ed. (London, 1722); Thomas Birch, *The History of the Royal Society of London for Improving of Natural Knowledge, From Its First Rise*, Volumes 1 – 4 (London, 1756 -57); Thomas Thomson, *History of the Royal Society From Its Institution to the End of the Eighteenth Century* (London, 1812; digital reprint Cambridge University Press, 2011) Charles Richard Weld, *History of the Royal Society, With Memoirs of the Presidents; Compiled From Authentic Documents, in Two Volumes* (London, 1848).

Society's 300th and 350th anniversaries were also the occasion of the publication of general histories of the Royal Society. Sir Harold Hartley edited a text published by the Royal Society itself which included a chapter largely concerned with the founding and origins of the Society, followed not long after by a text by Margery Purver, *The Royal Society: Concept and Creation*. In 2010, to commemorate the 350th anniversary year of the Society's founding, a collection of essays edited and introduced by Bill Bryson called *Seeing Further: The Story of Science, Discovery, and the Genius of the Royal Society*, was published. This text celebrated the diverse fellows, activities and discoveries of the institution, emphasising the prestige associated with the Society to this day.[6] Again, these texts include little in the way of analysis of societal forces which influenced the establishment of the Society, focusing instead on the intellectual origins of the organisation, and ignoring sociological factors that came to prominence in later treatments of the Society.

The Royal Society most frequently forms an integral part of the history of British science, with a focus on individual fellows, given its growing centrality in intellectual life in Britain, and in Europe, and to a lesser extent North America. Almost from its foundation, most natural philosophers in England were either fellows of the Society or were to a greater or lesser extent engaged with its activities or in contact with its fellows. The historiography thus focused on the Royal Society's role in the dissemination of natural knowledge and the example it set as an institution devoted to the study of nature. Its experimental philosophy has been analysed in detail, tracing the origins of the development of the modern scientific research method. Part of this analysis was the Society's adoption and adaptation of the ideas of Sir Francis Bacon and his approach to reforming the study of nature. Using Bacon's *Novum Organum* (1620) and *The New Atlantis* (1624), historians have assessed the extent to which the Royal Society had attempted to put Bacon's ideas into practice. Dorothea Krook for instance, compared the extent of the 'Baconianism' of Robert Boyle and Joseph Glanvill.[7] The consensus has been

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[6] Dorothy Stimson, *Scientists and Amateurs: A History of the Royal Society* (New York: Henry Shuman, 1948); Sir Harold Hartley, *The Royal Society: Its Origins and Founders* (London, 1960); Margery Purver, *The Royal Society: Concept and Creation* (London, 1967); Bill Bryson, *Seeing Further: The Story of Science, Discovery, and the Genius of the Royal Society* (London, 2010).
[7] Dorothea Krook, "Two Baconians: Robert Boyle and Joseph Glanvill", *Huntington Library Quarterly*, Vol. 18, No. 3 (1955), pp. 261 – 278.

that some fellows' writings indicate that they were more Baconian than others, and that the Society embraced Bacon's broad ideas about the value of inductive rather than deductive reasoning about nature, the need to gather data about nature by direct experience of natural phenomena and objects in order to establish 'matters of fact', and the practical necessity of preparing histories of trade. Bacon's ideas have merged in some of the historiography to form a part of the Society's experimental philosophy.

The embrace of Baconian methods of studying nature formed the backdrop to a wider discussion of the place of the Royal Society in the early modern 'ancients vs. moderns' debate, with specific reference to the conflict between the fellows of the Society and their institutional counterparts, namely, the universities and the Royal College of Physicians. Many members of these institutions adhered to the classical tradition of learning, and specifically Aristotelian natural philosophy, and the Royal Society was seen by some university scholars and fellows of the College of Physicians as upstarts undermining traditional knowledge and learning. Richard Crosse of Oxford University and physician Henry Stubbe have been studied most frequently as representing that opposition. The writings of Meric Casaubon, an Anglican prebendary of Canterbury Cathedral, have also been studied with respect to his criticisms of the Society. Historians Barbara Shapiro and Margaret Osler have explored the epistemological implications of the Royal Society's experimental philosophy, and the challenge it posed to other accepted forms of knowledge and the methods for acquiring it.[8] These studies illustrate the nature of the epistemological challenge that the Royal Society posed with their experimental philosophy, and the depth of the opposition they faced in intellectual circles.

ii The Royal Society in the Social History of Science

The growth of social history has led to a corresponding development of research into the social history of science. Whereas earlier histories of science had focused on more

[8] Barbara Shapiro, *A Culture of Fact: England, 1550 – 1720* (Ithaca, NY, 2003); ibid, *Probability and Certainty in Seventeenth-Century England: A Study of the Relationship Between Natural Science, Religion, History, Law, and Literature* (Princeton, NJ, 1983); Margaret Osler, "Mixing Metaphors: Science and Religion or Natural Philosophy and Theology in Early Modern Europe", *History of Science*, Vol. 36, (1998), 91 – 113.

technical narratives which describe the processes and developments which have led to significant scientific discoveries and theories, increasing interest has been shown in the social, political, religious and cultural contexts within which those discoveries and theories developed. Specifically, research has moved towards analysis of not only the relationship between social, political or religious ideas, but also the mechanisms through which ideas about the natural world were developed and communicated. This included for instance, the study of learned societies and academies, forms of written and verbal communication and their relationship to forms of sociability, as well as research into the significance of social status and the participation in natural knowledge pursuits. As such, the history of science has expanded greatly to encompass a greater understanding of the relationship between science and societal contexts within which it was – and continues to be - practised.

Steven Shapin's *Social History of Truth: Civility and Science in Seventeenth Century England* tackles the issue of the relationship between social status and the epistemological problem of establishing truth from a sociological perspective, with specific reference to the conduct of meetings of the Royal Society and the presentation of 'matters of fact' by its fellows. This approach to the scientific truth was based on the believability of the person presenting it. In this way Shapin challenged the fundamental modern belief of the infallibility and certainty – even the existence - of independent scientific fact. The work of Lorraine Daston and Katharine Park follows a different and more general path, in exploring the medieval and early modern approaches to the observation and understanding of the natural world. Their work in *Wonders and the Order of Nature, 1150 – 1750* reveals a much broader engagement with the natural world beyond the activities of experimentalists. They suggest that the work of natural philosophers was part of a wider cultural trend which manifested itself in a fascination with the natural, supernatural and preternatural elements in nature.[9] A further corollary of the interest of historians in the Society's epistemology is the attention paid to utilitarianism in the pursuit of natural knowledge. It has been shown that Royal Society experimentalists such as Robert Boyle and William Petty were very much influenced by Samuel Hartlib, who advocated that the

[9] Steven Shapin, *A Social History of Truth: Civility and Science in Seventeenth-Century England* (Chicago, 1995); Lorraine Daston, Katherine Park, *Wonders and the Order of Nature 1150 – 1750* (Cambridge, MA, 2012).

pursuit of natural knowledge had to be for utilitarian ends; it had to improve the condition of humankind. This utilitarian bent has been assessed in analysis of the kinds of undertakings the Society was committed to, exploring the extent to which the Society aimed for utilitarian ends for their activities. This research therefore places the study of nature in a cultural context which emphasises broad public engagement with the natural world; as such, it suggests that interest in the study of nature cannot be assumed to be confined to those who were peculiarly fitted for it, through training or special ability.

The Royal Society has been integral to research interest in the wider European growth of academies and learned societies. Harcourt Brown and later Roger Hahn wrote about the French academies of the seventeenth century and the Academie Royale des Sciences respectively; Hahn drew comparisons between the Academie des Sciences and the Royal Society, in terms of their relationships with the monarch patrons, and the impact this had on the nature of the organisations' activities. Both Paula Findlen and Mario Biagioli have written about early modern Italian scientific culture focusing on Italian academies' relationships with their princely patrons, and the courtly conduct expected of the members, including contacts with the Royal Society. Mario Biagioli's research paid attention to the forms of etiquette demonstrated in the conduct of the academies. These texts all highlight that the founding fellows of the Royal Society were influenced by the earlier Italian and French academies, and in turn inspired the creation of a new type of learned society for the study of nature not only in France, but in other parts of Europe and even into the New World. They draw interesting comparisons between organisations which highlight how the measure of involvement of these learned societies' princely or monarchical patrons materially affected the conduct of the societies.[10]

More generally, interest in understanding the rise of the Royal Society and of the interest in the study of nature which developed so strongly in seventeenth century England has formed a part of the debate in the history of science over the source of the

[10] Harcourt Brown, *Scientific Organizations in Seventeenth Century France (1620 – 1680)* (Baltimore, 1934); Roger Hahn, *The Anatomy of a Scientific Institution: The Paris Academy of Sciences, 1966 – 1803* (Berkeley, 1971); Paula Findlen, "Academies, Networks, and Projects: The Academia del Cimento and Its Legacy", *Galileiana*, Vol. 7 (2010), pp. 277 – 298; Mario Biagioli, "Etiquette, Interdependence, and Sociability in Seventeenth-Century Science", *Critical Inquiry*, Vol. 22, No. 2 (1996), pp. 193 – 238.

impulse to pursue natural knowledge, a branch of history which is the social history of science. This debate can be said to have begun in the late 1930s with the publication of Robert K Merton' thesis on the relationship between Puritan ideals and the rise of 'science' in seventeenth century England, with particular attention paid to the fellows of the Royal Society.[11] Many historians argued both for and against the main thrust of Merton's premise, and there are flaws in his theory, most notably his definition of 'Puritan'. In his original thesis Merton stated that he would use the term 'Puritan' to denote all Protestant sects in England, despite the contemporary and historiographical use of the term. His use of the term is inconsistent, often used interchangeably with Protestantism, and even used in opposition to royalism. In fact, the term 'Puritan' was used at least until the mid-seventeenth century as an insult or slur.[12] However, Merton did bring a new aspect to the history of science by highlighting the possibility of external factors affecting the nature and practice of scientific enquiry. This in turn created a new debate: the internal vs. external debate. This debate centres on a concept of the history of science as the history of the development of internal intellectual concepts; that is, a history of ideas. Externalists on the other hand see the history of science as a history of social constructs which had a material impact on the cause and nature of scientific knowledge.[13] Frequently at the heart of this debate has been the Royal Society, since it is an organisation with detailed and extensive records of their activities, and which had a large number of natural philosophers all in one place, many of whom had written extensively about their pursuit of natural knowledge, particularly in relation to for instance, theological issues. This debate roughly coincided with the rise of constructivism in the history of science, which Jan Golinski described as "a determination to explain the formation of natural knowledge without engaging in assessment of its truth or validity." This approach is one which is utilised by most notably Stephen Shapin, although some 'traditional' historians of science remain sceptical of the ability of this approach to

[11] Robert K Merton, "Science, Technology and Society in Seventeenth Century England", *Osiris*, Vol. 4 (1938), pp. 360 – 632.
[12] John Morgan, *Godly Learning: Puritan Attitudes Towards Reason, Learning and Education, 1560 – 1640* (Cambridge, 1988), pp. 10 – 11.
[13] John Andrew Schuster, *The Scientific Revolution: An Introduction to the History and Philosophy of Science* (Department of Science and Technology Studies, University of Wollongong, 1995), esp. Chapter 25

adequately 'explain' how scientific knowledge is formed. [14] Arguably this approach has broadened the history of science to include a consideration of how scientific knowledge was constructed. A more implausible approach to the relationship between the Royal Society and the development of modern science is taken by Robert Lomas, who sought to establish a link between the Royal Society and the Freemasons. He based his theory on the fact that Sir Robert Moray was a freemason. [15] The crucial importance of the social history of science is its attention to the development of scientific ideas as part of a wider understanding of the impact of social roles and traditions on those who sought knowledge of nature. As such, scientific ideas are seen not as abstract 'truths' accessed by skilled people, but products of the societies within which these ideas were produced.

One of the most enduring concerns of much research on the Royal Society has been to trace the relationship between the Royal Society, its fellows and religious ideas and beliefs.[16] As previously mentioned, Merton's thesis formed a part of the desire to find a specific religious impetus for the pursuit of scientific knowledge, including the choice of areas of enquiry and the interpretations that natural philosophers applied to their discoveries. Barbara Shapiro, for instance, has investigated the latitudinarianism of the Society's fellows, and, as a counter to the Merton thesis, has claimed that religious moderation and toleration is more intimately connected with the Royal Society than Puritanism. This area of research has developed into an interest into both Protestant and Catholic approaches to the study of nature, which included an understanding of the role of church leaders in the promotion or even suppression of new scientific ideas throughout the medieval and early modern periods. The Royal Society was again an ideal institution for the reasons described above, since many of its fellows were members of the clergy or

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[14] Jan Golinski, *Making Natural Knowledge: Constructivism and the History of Science* (Chicago, 2005), p. 7. One sceptic of this approach is Michael Hunter in "Scientific Change: Its Setting and Stimuli", in *A Companion to Stuart Britain*, ed. Barry Coward (Malden, MA, 2003), pp. 214 – 229.
[15] Robert Lomas, *The Invisible College: The Royal Society, Freemasonry and the Birth of Modern Science* (London, 2002).
[16] There arose in the late nineteenth century an idea that the rise of science coincided with a necessary decline in religious belief, a result of an inherent incompatibility between science and religion; described by some as a 'war' between the two forms of thought. John William Draper's *The History of the Conflict Between Religion and Science* (1874) and Andrew Dickson White's *A History of the Warfare of Science with Theology in Christendom* (1896) both assert that Christianity, and particularly the Catholic Church, had demonstrated an antipathy towards scientific endeavour, although it is important to note that both men were American, and White's publication coincided with a period in the United States of some hostility towards the Catholic faith.

had written on religious subjects, and because the Society had attracted both positive and negative attention for the religious implications of the knowledge its fellows produced.

There has also been extensive research into the influence of religion on the fellows of the Society and other natural philosophers and on their experimental activities. John Hedley Brooke and Peter Harrison have written extensively on the various aspects of religious belief and its influence on and relationship to scientific endeavour, since the 1970s. They have traced aspects of early modern religious experience and belief such as miracles, divine providence, and the biblical Fall in the Garden of Eden, as well as the connection between science and natural theology. These texts serve as a counter to the supposed 'war' between science and religion in this period, an idea which can be traced back to the late nineteenth century which linked the development scientific knowledge to the necessary and inevitable decline in religious belief. This was a view put forward in John William Draper's *The History of the Conflict Between Religion and Science* (1874) and Andrew Dickson White's *A History of the Warfare of Science with Theology in Christendom* (1896). Both asserted that Christianity, and particularly the Catholic Church, had demonstrated an antipathy towards scientific endeavour, although it is important to note that both men were American, and White's publication coincided with a period in the United States of some hostility towards the Catholic faith.

In contrast Brooke and Harrison have highlighted how many natural philosophers consciously strove to adapt their religious beliefs to their discoveries about nature and the function of what they still believed was God's creation.[17] Frank Manuel and Michael Hunter have also studied the lives and works of individual fellows such as Isaac Newton and Robert Boyle and analysed how their religious beliefs affected their interpretations of their discoveries about the natural phenomena they studied.[18] There has been a point in the historiography where religion and philosophy have intersected in the research into the

[17] For example, John Hedley Brooke, *Science and Religion: Some Historical Perspectives* (Cambridge, 2006); Peter Harrison, *The Fall of Man and the Foundations of Science* (Cambridge, 2007). Peter Harrison has also edited *The Cambridge Companion to Science and Religion* (Cambridge, 2010) which contains essays by several of historians of science on a variety of topics related to science and religion from the medieval to modern periods, including David C Lindberg, John Hedley Brooke, John Henry and Ronald L Numbers.

[18] Frank E Manuel, *A Portrait of Isaac Newton* (London, 1980); ibid, *Religion of Isaac Newton: Freemantle Lectures, 1973* (Oxford, 1974); Michael Hunter, *Boyle: Between God and Science* (New Haven, 2009)

Royal Society. This is particularly so with respect to an understanding of the mechanical philosophy of nature. This relates to some fellows' understanding of the nature of the relationship between God and his creation. The difficulties encountered by fellows in adopting a mechanistic view of God's role in the universe has been analysed, contributing to knowledge of contemporary concerns about the potential harm to religion of the pursuit of natural knowledge. This research sheds light on the religious justifications of fellows like Robert Boyle and John Ray for studying nature. Other philosophical concepts of certainty, scepticism, and probability and truth have also been studied as they were manifested in the experimental philosophy of the Royal Society and its fellows.[19]

The research into the connections between the Royal Society and the political situation in England in the period after its founding has been relatively thin on the ground. This is probably because for most of its existence, neither Charles II nor the government was directly involved in the Society's operation to any significant degree, and historians have struggled to find ideological links between the Royal Society and the politics of the day. Links have been drawn though between the Royal Society and its role as an organ of the Restoration monarchy. J R Jacob presented the Royal Society's science as a means of keeping the polity in check; in other words, a form of political control, related to the aggressive mercantilism of the king and his government. Steven Shapin and Simon Schaffer on the other hand, provide a more nuanced approach in *Leviathan and the Air Pump*, in which they also explore the dispute between Thomas Hobbes' and Robert Boyle's perceptions of the value of the experimental philosophy as a means of promoting political and religious order.[20] Overall, the research on the Society in politics is confined to calculating the number of royalist fellows of the Society. The relationship between the Royal Society and the rise of capitalism has been assessed, although much of this has been

[19] There are numerous texts devoted to this subject. For example, Stephen Gaukroger's *The Emergence of a Scientific Culture: Science and the Shaping of Modernity 1210 – 1685* (Oxford, 2013) is a wide-ranging text which examines a range of philosophical ideas about nature and their relationship to the rise of science, from medieval times to the early modern period. Margaret Osler's *Reconfiguring the World: Nature, God, and Human Understanding from the Middle Ages to Early Modern Europe* (Baltimore, 2010) examines a mixture of theological and philosophical ideas.
[20] J R Jacob, "Restoration, Reformation and the Origins of the Royal Society", *History of Science*, Vol. 13, No. 3 (1975), pp. 155 – 176; Steven Shapin, Simon Schaffer, *Leviathan and the Air Pump: Hobbes, Boyle, and The Experimental Life* (Princeton, NJ, 2011).

based on the writings of Thomas Sprat, such as J R Jacob's research above. [21] Given that in the seventeenth century in England, religion and politics were inextricably linked, Shapin and Schaffer's research suggests that another look at the Royal Society as institution is valuable to expanding the history of the organisation beyond that which has already been presented. Given the significant change in the country represented by the Restoration, the support of the monarch himself, the diverse political and religious antecedents of the early fellows, and the nature of the organisation's activities, it is difficult to believe that politics did not have a role to play in the crucial early years of the Society's existence.

There is much more research devoted to the Royal Society and its impact on late seventeenth century English society, and the most prolific historian in this area is Michael Hunter. Hunter's *Science and Society in Restoration England* – a text which is most often cited by other historians referring to the Royal Society - is devoted to the Society's interaction with Restoration society and the intellectual community in England. He highlights the Society's difficulties in convincing a sceptical public of the value of the its activities, demonstrating the many ideological hurdles the Society encountered in its interactions with established institutions such as the Royal College of Physicians and the universities. Other research by Hunter includes detailed analysis of the Society's fellowship, using such criteria as profession and level of activity.[22] Lotte and Glenn Mulligan have completed a similar analysis, focusing on the social composition of the Society and the role of Robert Hooke in encouraging more men in the trades to become fellows.[23] Hunter's research in particular, has been most influential in portraying the Royal Society as an organisation largely composed of 'gentlemen' whose interest in 'science' was confined to a more superficial, pleasurable interest in the more entertaining aspects

[21] Also Lotte Mulligan and Glenn Mulligan, "Reconstructing Restoration Science: Styles of Leadership and Social Composition of the Early Royal Society", *Social Studies of Science*, Vol. 11, No. 3 (August 1981), pp. 327 – 364.
[22] Michael Hunter, *Science and Society in Restoration England* (Cambridge, 1981); "The Social Basis and Changing Fortunes of an Early Scientific Institution: An Analysis of the Membership of the Royal Society, 1660 – 1685", *Notes and Records of the Royal Society of London*, Vol. 31, No. 1 (1976), pp. 9 – 114; *The Royal Society and its Fellows, 1660 – 1700: The Morphology of an Early Scientific Institution* (Chalfont St Giles, 1994); *Establishing the New Science: The Experience of the Early Royal Society* (Woodbridge, 1989).
[23] Lotte Mulligan and Glenn Mulligan, "Reconstructing Restoration Science: Styles of Leadership and Social Composition of the Early Royal Society", *Social Studies of Science*, Vol. 11, No. 3 (1981), pp. 327 – 364.

of the study of nature. In the early years of the Society, these men outnumbered the 'serious scientists' – men like Hooke and Boyle – who contributed truly valuable scientific work, and these gentlemen's preference for frivolous entertainment contributed to the difficulties the Society faced in convincing the public that their work was of value, and further alienated those who were committed to serious scientific endeavour. However, Hunter's own important analysis of the fellowship of the Society up to 1680 tells a different story, using data such as the social status and/or occupation of individual fellows, their level of involvement with the Society, and the details of their payment of election ad subscription fees. This data – analysed in the light of later research by historians like Steven Shapin, discussed below – highlights that the Society's fellowship can no longer be viewed simplistically; the involvement of many of the fellows in the Society depended on factors such as forms of sociability, the perception of intellectual pursuits as entertainment, as well as the individual motivations of men who were in many ways affected by the nature of society in the late seventeenth century in England.

One of the limitations of this research is that it is concerned about the Royal Society's impact on society at large, rather than considering the impact of society on the Royal Society. Steven Shapin's research has addressed this issue, being concerned with broader societal and cultural trends which were manifested in the seventeenth century, and relating these to, for instance, the physical and social places where experiments took place, who was involved, and the nature of their roles, and the nature of their interactions. Similarly, he has examined who was engaged in the pursuit of natural knowledge and why, by defining who the 'man of science' was in seventeenth century culture, and highlighting the fact that there was no definable role of 'scientist' in the early modern period, and crucially, there was no social basis for the support of the pursuit of natural knowledge.[24] Rob Iliffe and Mario Biagioli have also discussed how gentlemanly culture affected the nature of interaction and exchange with reference to the Royal Society, and how both the Royal Society and other European societies and academies used

[24] Steven Shapin, "The Man of Science", in *Cambridge History of Science, Vol. 3: Early Modern Science* (Cambridge, 2008), pp. 179 – 191; "The House of Experiment in Seventeenth-Century England", *Isis*, Vol. 79, No. 3 (1988), pp. 373 – 404; " 'A Scholar and a Gentleman': The Problematic Identity of the Scientific Practitioner in Early Modern England", *History of Science*, Vol. 29, No. 3 (1991), 279 – 327; " 'A Mind Is Its Own Place': Science and Solitude in Seventeenth-Century England", *Science in Context*, Vol. 4, No. 1 (1991), pp. 191 – 218.

the gentlemanly culture of politeness to set the standard for intellectual exchange. This research provides an intriguing view of the Royal Society and other learned institutions as locations of intellectual exchange which took place within a largely unspoken set of social and cultural mores.[25]

A corollary of this sociological approach to the history of science is a greater awareness of the pitfalls of anachronism in the language historians have used to describe the people and activities that constitute early modern science. Terms such as 'science' and 'scientist' and even 'scientific revolution' have been abandoned in favour of contemporaneous terms such as 'natural philosophy', 'natural knowledge', and 'natural philosopher'. Some historians have argued that 'scientific revolution' as a description of the accelerated pace of scientific discovery in the sixteenth and seventeenth centuries has distorted understanding of this phenomenon because it does not give sufficient credence to people and activities which do not fall into the modern concepts of what constitutes science and scientists. Even so, many continue to describe the activities of men and women who studied nature in the early modern period as 'science', and the modern concepts which are attached to this term dominate the modern perception of what the people of the early modern period were doing. [26] Steven J Harris opted for the term 'scientific practitioner' to designate someone who received some form of formal training in the sciences who recorded observations, descriptions or manipulations of the natural world on paper. This included a broad range of practitioners from many social groups. [27] This greater awareness of the impact of the use of language on perceptions of people, their activities – and with reference to the Royal Society - their institutions, serves to highlight how language concepts create assumptions which can lead to a distorted view of what is being studied. This raises questions about how the perception of the Royal Society has been distorted, if that perception is influenced by modern concepts of what science is, and who should pursue it. Rather, the Society should be examined from the perspective of

[25] Rob Iliffe, "In the Warehouse: Privacy, Property and Priority in the Early Royal Society", *History of Science*, Vol. 30, No. 1 (1992), pp. 29 – 68; for Biagioli, see reference on page 4, footnote 8.
[26] Margaret Osler, ed., *Rethinking the Scientific Revolution* (Cambridge, 200); Steven Shapin, *The Scientific Revolution* (Chicago, 1998).
[27] Harris, "Networks of Travel, Correspondence, and Exchange", p. 346.

contemporary understanding of natural knowledge and natural philosophers, both by practitioners and those observing their practices.

Finally, much research has been devoted to the response of the public and the intellectual community to the Royal Society. Much has been written about the level of support for the Society, both in government and amongst the learned men in England and other parts of Europe, as well as the criticism and satire directed at the Society from several quarters. Michael Hunter's *Science and Society in Restoration England* examines in detail, the comparatively limited impact the Royal Society had in trying to project itself onto the Restoration English consciousness. Research including the series of articles by Rosemary Syfret, as well as work by Quentin Skinner , Mordechai Feingold and K Theodore Hoppen all serve to demonstrate that the Society struggled in its early years to convince a sceptical public of the value of their work, and its benefit in improving the human condition.[28] It suggests that the Society was not universally welcomed even by those in the intellectual community in England, including members of the universities and physicians of the Royal College of Physicians. This research highlights that many natural philosophers in this period did not become fellows of the Society, an indication that not all learned men in this period believed in the need for or value of becoming involved with the organisation and provides a counter to earlier narratives which implied that the Society was an unreserved success. Syfret, Hunter and Hoppen all point to the criticisms of Henry Stubbe and Meric Casaubon, and the satire of Samuel Butler and Thomas Shadwell as representative of the negative reactions to the Society in its early years. However, this research tends to overstate the depth of animosity towards the Society, nor does it demonstrate adequately just how widely held these negative opinions were. While this research self-consciously aimed to avoid a triumphalist approach, which would portray the

[28] R H Syfret, "Some Early Reactions to the Royal Society", *Notes and Records of the Royal Society of London*, Vol. 7, No. 2 (1950), pp. 207 – 258; ibid, "Some Early Critics of the Royal Society", *Notes and Records of the Royal Society of London*, Vol. 8, No. 1 (1950), pp. 20 – 64; Quentin Skinner, "Thomas Hobbes and the Nature of the Early Royal Society", *The Historical Journal*, Vol. 12, No. 2 (1969), pp. 217 – 239; K Theodore Hoppen, "The Nature of the Early Royal Society, Part I", *The British Journal for the History of Science*, Vol. 9, No. 1 (1976), pp. 1 – 24; ibid, "The Nature of the Early Royal Society", *The British Journal for the History of Science*, Vol. 9, No. 3 (1976), pp. 243 – 273; Mordechai Feingold, "Tradition versus Novelty: Universities and Scientific Societies in the Early Modern Period", in *Revolution and Continuity: Essays in the History and Philosophy of Early Modern Science* (Washington, DC, 1991), pp. 45 – 59.

Royal Society as an instant success, it also seems to place undue emphasis on those who opposed the Society and its activities in any way, highlighting the failure of the fellows to achieve broad support. Most importantly it does not explain why or how the Royal Society managed to survive, given this hostile climate.

iii The Broader Perspective

A reading of the historiography described above highlights an important requirement: the necessity of understanding as comprehensively as possible the society, politics, religion and culture of late seventeenth-century England. These kinds of more general social histories are needed to fully contextualise the founding and operation of the Royal Society, to fully appreciate the forces which influenced the circumstances of the organisation's founding and early life. The Royal Society was very much an organisation of its time, and therefore its time – pre- and post-Restoration – must be as fully comprehended as possible. Therefore, while the previous sections have focused on historiography directly related to the Royal Society, the following section will concentrate on general histories of the seventeenth century, as the basis for understanding the time within which the Society was founded.

A starting point is Peter Clark, *British Clubs and Societies 1580 – 1800: The Origin of an Associational World*, as a means of further expanding the theme of the Society's fellowship. Clark explored the ways in which a range of voluntary associations developed and were administered, and the impulses which led to men (and women) to join a range of voluntary associations.[29] Similarly, Shepard and Withington's *Communities in early modern England: Networks, place, rhetoric* emphasises the rewards that for example, men like Samuel Pepys gained from social interaction with a wide range of people in a variety of circumstances, including the meetings of the Royal Society. Their work demonstrates why men like Pepys, with no desire to become an experimenter, would be keen to join the Royal Society, and raises new questions about the motivations of fellows. These kinds of general texts illustrate the dangers of viewing the Royal Society in isolation, as an

[29] Peter Clark, *British Clubs and Societies 1580 – 1800: The Origin of an Associational World* (Oxford, 2001).

organisation that somehow existed apart from the life of Restoration England.[30] Also included are texts which provide a comprehension of broader intellectual life in Restoration England, specifically with reference to learned institutions such as the universities and the Royal College of Physicians. Mordechai Feingold and others have written comprehensively on the universities in the seventeenth century, and specifically on natural philosophy as taught in the universities. George Clark and Harold Cook's work on the College of Physicians is also valuable for illustrating the challenges faced by the College of Physicians both pre- and post-Restoration. [31]

Linda Levy Peck's *Consuming Splendour: Society and Culture in Seventeenth-Century England* and Peter Borsay's *The English Urban Renaissance: Culture and Society in the Provincial Town 1660 – 1770* sheds additional light on the rise of consumer interest in rarities and curiosities, and scientific instruments and mechanical devices during the seventeenth century, highlighting the diversity of reasons why men wished to join the Royal Society, even though they did not appear to be what some historians would call 'scientists'. Borsay's work suggests reasons why the Royal Society may have struggled with attendance during the 1670s and 1670s, as the provincial centres in England expanded partially because of wealthier people escaping the dirt, crowds and potential dangers of London.[32] Understanding popular culture and leisure interests across the social spectrum is also crucial to placing the Royal Society in historical and social context. This can be expanded to include the vast quantity of research on the social and cultural history of seventeenth century England, which includes research on leisure interests and activities, as well as general analyses of attitudes across the social classes towards politics, religion and culture.

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[30]Alexandra Shepard and Phil Withington, eds., *Communities in Early Modern England: Networks, Place, Rhetoric* (Manchester, 2000).

[31] Mordechai Feingold, "The Mathematical Sciences and New Philosophies", *The History of the University of Oxford: Vol. IV Seventeenth-Century Oxford*, ed. Nicholas Tyacke (Oxford, 1997); J Gascoigne, "The Universities and the Scientific Revolution", *History of Science*, Vo. 23 (1985), pp. 391 – 434; Barbara Shapiro, "Universities and Science in Seventeenth Century England", *Journal of British Studies*, Vol. 10 (1971), pp. 47 – 82; George Clark, *A History of the Royal College of Physicians of London*, Vol. 1 (Oxford, 1964); Harold J Cook, *The Decline of the Old Medical Regime in Stuart London* (Ithaca, NY, 1986).

[32] Linda Levy Peck, *Consuming Splendour: Society and Culture in Seventeenth-Century England* (Cambridge, 2005); and Peter Borsay, *The English Urban Renaissance: Culture and Society in the Provincial Town 1660 – 1770* (Oxford, 1989).

Keith Wrightson's influential *English Society 1580 – 1680* paints a fascinating picture of the lives of 'ordinary' men and women in the seventeenth century. Despite its title, Wrightson 's text concentrates on the period up to the 1650s; however, it creates an interesting contrast to the largely urban, social elite focus of many histories of the period, one of the first of the 'history from below'. This text, and the later *Remaking English Society: Social Relations and Social Change in Early Modern England* – written in tribute to Wrightson's work – both raise interesting suggestions about the different motivations, concerns and interests which existed between the social groups in this period, and how these differences may have had an impact on the kinds of men who may have been interested in the Royal Society. [33] It suggests that members of the lower social ranks may have been reluctant or simply not interested in being involved in the kinds of activities which the Royal Society encouraged, and further that this may have been a reason for the failure of the Society's history of trades programme. Even more relevant to a discussion of interest in the Royal Society and its activities is research in social status and leisure activities. Barry Reay's *Popular Culture in Seventeenth-Century England*, and Jonathan Barry and Christopher Brooks' *The Middling Sort of People: Culture, Society and Politics in England, 1550 – 1800* demonstrate that understanding people who could have formed the 'middling sort' – a term which is acknowledged as being extremely hard to pin down – forms a fundamental part of understanding popular culture, and the social and political forces which informed their lives and opinions. The 'middling sort' in its most generous definition seem to have formed the core of the Royal Society's active fellowship, which makes understanding them key in understanding the organisation. [34] In his analysis of early modern England, Phil Withington has taken a different approach, focusing on some 'big ideas' current in society in England, and illustrated how these were demonstrated in the language of the period, examining for instance concepts such as sociability, and how this concept was manifested in the structure of and participation in a variety of forms of

[33] Keith Wrightson, *English Society 1580 – 1680* (London, 2006); Steve Hindle, Alexandra Shephard, John Walter, eds., *Remaking English Society: Social Relations and Social Change in Early Modern England* (Woodbridge, 2015).
[34] Barry Reay, ed., *Popular Culture in Seventeenth-Century England* (London, 1988); Jonathan Barry and Christopher Brooks, eds., *The Middling Sort of People: Culture, Society and Politics in England, 1550 = 1800* (Basingstoke, 1994).

formal and informal association such as urban corporations, trade associations, clubs and societies.[35]

Another of these 'big ideas' is the concept of improvement. While most research into improvement has centred on the social and economic impact of agricultural improvement, [36] Paul Slack has instead illustrated that the concept of improvement was one which was unique to England and was widely understood and to an extent accepted in sixteenth and seventeenth century England. Slack analyses how improvement was tied to the wider prosperity of the nation, as part of England's material progress, and which required a better understanding of the state of the nation. Slack specifically highlights the 'political economy' as practised by Royal Society fellows William Petty and John Graunt, and the Society's history of trades programme. Slack noted that improvement was not undertaken in a systematic or coordinated way, especially with respect to parliamentary legislation; this raises questions about how the Royal Society applied this concept of improvement to their own organisation and its activities. [37] However, the research on improvement does highlight that while it was a concept that was embraced by landowners, it was not one that was popular amongst smaller landowners, farmers and labouring people who reacted negatively, even violently to 'improvements' that entailed the enclosure of common land, as well as the draining of fens and marshes. This also has implications for different social and economic groups' reception of an organisation included 'improving' in its very name.

Greater political contextualisation can be gained from an analysis of the political situation in Restoration England. Although, as previously mentioned, evidence of the direct political engagement of the fellows of the Royal Society is limited, the membership

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[35] Phil Withington, *Society in Early Modern England: The Vernacular Origins of Some Powerful Ideas* (Cambridge, 2010).
[36] Just a few examples: Paul Warde, "The Idea of Improvement, c. 1520 – 1700", in *Custom, Improvement and the Landscape in Early Modern Britain*, ed. Richard Hoyle (Farnham, 2011); Julian Hoppit, "The Landed Interest and the National Interest, 1660 – 1800", in *Parliaments, Nations and Identities in Britain and Ireland, 1660 – 1850*, ed. Julian Hoppit (Manchester, 2003); James P Bowen, " 'Before the breaking of the day, in a riotous manner and with great shouts and outcries': Disputes over Common Land in Shropshire in the Sixteenth and Seventeenth Centuries", *Rural History*, Vol. 26, No. 2 (2015), pp. 133 – 159; Robert C Allen, "Tracking the agricultural revolution in England", *Economic History Review*, 2nd series, 52 (1999), pp. 209 – 235.
[37] Paul Slack, *The Invention of Improvement: Information and Material Progress in Seventeenth-Century England* (Oxford, 2015).

of fellows Sir William Petty, Samuel Pepys and John Aubrey in the republican Rota Club is best viewed with an understanding of the political climate of the Restoration period. Research by Tim Harris et al, Ronald Hutton, Alan Houston and Steve Pincus, and John Miller all demonstrate the continuing unease and potential for unrest which existed and grew as Charles II's monarchy progressed. Tim Harris' *London Crowds* illustrated the pivotal role that London mobs played as the inextricable links between politics and religion played a crucial role in Charles and the Cavalier Parliament wrestled with containing the discontent of Presbyterians and dissenting sects which seemed constantly to destabilise Charles' monarchy, and his research on the Restoration examines the tensions at work throughout Charles' reign and which always threatened to completely destabilise his monarchy. Miller's *Charles II* – which interestingly makes absolutely no mention of the Royal Society - provides a useful insight into both Charles' style of monarchy and the pressures and demands on him as he worked to manage the forces which he feared would lead to another eruption of civil conflict. [38] Basil Duke Hennings' *The House of Commons 1660 – 1690, Vol. 1* is a mine of useful statistics and analysis of the composition of the House of Commons after the Restoration. Many fellows of the Royal Society were men who fell into the category described by Hennings as 'country gentlemen', and these men consistently formed most members of parliament. Hennings' analysis complements Steven Shapin's research on gentlemen scholars in suggesting reasons why the Society – or Charles himself – did not simply petition parliament for funding, a question which historians seem to have ignored. This, along with other primary and secondary sources indicate that the attitude of Parliament to the Royal Society's activities would have been problematic for the Society, and for Charles. Understanding this political context in terms of potential financial and epistemological support for the Society amongst the men who could be most influential in the success or failure of the

[38] Tim Harris, Paul Seaward and Mark Goldie, eds., *The Politics of Religion in Restoration England* (Oxford, 1990); Tim Harris, *London Crowds in the Reign of Charles II: Propaganda and politics from the Restoration to the exclusion crisis* (Cambridge, 1987); Tim Harris, *Restoration: Charles II and his Kingdoms* (London, 2006); Alan Houston and Steve Pincus, eds., *A Nation Transformed: England after the Restoration* (Cambridge, 2001); Ronald Hutton, *The Restoration: A Political and Religious History of England and Wales 1658 – 1667* (Oxford, 1985); Ronald Hutton, *Charles II: King of England, Scotland, and Ireland* (Oxford, 1989); Lionel K J Glassey, ed., *The Reigns of Charles II and James VII and II* (Basingstoke, 1997).

organisation, greatly broadens the scope of the historical framework within which the Royal Society has previously been viewed.

Also important in this period is the role of maritime exploration and commerce, not only in the pursuit of expanding England's global commercial and political dominance, but also in the trade in rarities and curiosities, as well as in the pursuit of natural knowledge. To broaden the themes of the historiography of the Royal Society, it is important to understand the methods and tools that the Society used to obtain natural knowledge, particularly that from distant lands. Steven Harris has written on the influence of merchant shipping, colonial administration and missionary expeditions which have led to the development of vast communications networks, and which facilitated the development of natural history.[39] Daniel Carey has researched the use of travellers' tales in the pursuit of natural history, and the issue of reliability and truthfulness of the travellers who returned with reports of their experiences.[40] These texts illustrate the profound effect that exploration and maritime commerce had on the pursuit of natural knowledge, and especially how effectively the Royal Society was able to exploit such sources of knowledge. This research supports an understanding of the resources available to the Royal Society which enabled it to carry out its work and achieve its goals, as well as providing some background to understanding the kinds of activities which the fellows of the Royal Society were interested in pursuing. The rise of capitalism and mercantile activity in the early modern period has been explored by Fernand Braudel. He has illustrated that the expansion of long distance trade required merchants to have an increasingly sophisticated education, and with related skills in written communication. While his text is written from a European perspective, he has included numerous examples from the English mercantile experience.[41] David Ormrod's more recent research explored the ways in which the increasing importance of England's competition with the Dutch Republic and the French for control of overseas trade and described how England's

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[39] Steven J Harris, "Networks of Travel, Correspondence, and Exchange", *Cambridge History of Science, Vol. 3: Early Modern Science* (Cambridge, online edn. 2008, accessed 27/02/2017), pp. 341 – 362.

[40] Daniel Carey, "Compiling Nature's History: Travellers and Travel Narratives in the Early Royal Society", *Annals of Science*, Vol. 54, No. 3 (1997), pp. 269 - 292. See also Shapin, *Social History of Truth*, Chap. 6

[41] Fernand Braudel, *The Wheels of Commerce. Civilization & Capitalism 15th – 18th Century, Vol. 2*, trans. Sian Reynolds (New York, 1979).

mercantile success became ever more closely tied to the national identity. [42]This research provides some possibility of explaining the interest of merchants such as Sir Joseph Cutler, who was a benefactor of the Royal Society, and why Thomas Sprat devoted a significant part of his *History of the Royal Society*, to praising England's merchants.

References in Thomas Sprat's *History* also bring forward another subject which relates to the Royal Society as an organisation of the seventeenth century: English nationalism. In this respect Shepard and Withington's *Communities in Early Modern England* is also relevant, with particularly significant chapters on the use of the language – the 'King's English' – and the concept of 'public' all related to imaginings of a national community.[43] These chapters suggest that Sprat's nationalism reflects a developing concept of what it was to be English, and how the country's citizens were expected to acknowledge and engage with that national identity. Benedict Anderson's *Imagined Communities* also suggests that the Royal Society could be situated within the context of the development of nationalism in England. He identified factors which helped to create nationalism in countries, and these factors are clearly indicated in England in the late seventeenth century.[44] This raises questions about the Royal Society as a manifestation of growing nationalism in England. As such the Royal Society takes on far greater significance against the backdrop of social, political and cultural change in England during the early modern period. With so many fellows involved in government in some form, and with so many who had written on subjects beyond natural knowledge, the relationship between the Royal Society and nationalism takes on greater significance.

Various social histories of the seventeenth century also provide an opportunity to further develop understanding of the Society's operation and activities, as well as its fellows. Steven Shapin's *Social History of Truth* is one such text, which has already been discussed. Prest's *Professions in Early Modern England* is also relevant, given that physicians and clergymen formed a significant proportion of active fellows in the Royal

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[42] David Ormrod, *The Rise of Commercial Empires: England and the Netherlands in the Age of Mercantilism, 1650 – 1770* (Cambridge, 2008).
[43] Shephard and Withington, Chapter 10, "Rhetorical constructions of national community: the role of the 'King's English in mid Tudor writing" by Cathy Shrank, and Chapter 11, "The 'public' as a rhetorical community in early modern England" by Geoff Baldwin.
[44] Benedict Anderson, *Imagined Communities: Reflections on the Origin and Spread of Nationalism* (London, 2016).

Society. Prest wrote that members of the professions occupied a social position which was far from clear cut, and that most physicians were in fact not members of the gentry or nobility. This has implications for the analysis of the social composition of the fellowship of the royal Society, given that physicians were the single largest active group in the Society. Barry and Brooks' *The Middling Sort* also provides greater perspective on the social status of the professions, and their position in social rankings of the period. This research is particularly important when placed alongside Michael Hunter's social analysis of the Society's fellowship and the conclusions that he drew from it. It provides greater nuance to his portrayal of some of the fellows as being more elite that Prest and Barry and Brook's research suggests they actually were, undermining the view that too many of the fellows pursued frivolous lines of research <u>because</u> of their elevated social status. If they were not members of the social elite, then their pursuit of certain lines of research has to be explained in another way.

The enormous value of these more general histories is that the conclusions they reach pave the way for their application to the history of the Royal Society and its fellows. They illustrate the importance of context in the task of understanding this institution and its members, and that an understanding of the Society, not only as an institution of science but also as a Restoration voluntary association whose members included a broad cross-section of Restoration society, was vital in order to understand why some people did or did not become involved in the Society, and how their involvement was affected by their social status, and how this in turn had an impact on the Society's operation and activities. These histories show that there is a need to reassess the role of politics, and particularly of Charles II in the Royal Society. They also illustrate that the relationship between the Society and its fellows and the public was more complex than has previously been believed. Thus, the contribution of this research is a means by which the history of seventeenth century science can be informed by – and perhaps reintegrated into – the history of seventeenth century England and the rest of Europe. Ultimately the sum of the historiography, both general and from the history of science, demonstrates that research into the ideas and epistemology of the Royal Society and its fellows has to be accompanied by an understanding of the practical contexts – social, political and cultural – within which those ideas were able to come to fruition and within the Society had to

operate. Understanding as much of Restoration society as possible will greatly enhance our understanding of the Royal Society and its fellows.

1.2 Changing the View of the Royal Society

The aim of this present research is to adjust, modify and expand the current image of the Royal Society. This image of the Society as 'a gentlemen's club' is one that has endured for many years, arguably cemented by Michael Hunter's analyses of the Society's fellowship and activities. Hunter's research is itself informed by the rise of social history, specifically, the 'history from below'. From this perspective, it is easy to see Hunter's portrayal of the Society as being more sceptical of the organisation, based on what he clearly saw as the social and intellectual elitism of the fellows. As such, the early Royal Society did not really fit into the mid-twentieth century interest in the history of 'ordinary people', because as Hunter has portrayed the early Society, there were precious few 'ordinary people' who were fellows. This correspondingly meant that most social historians and historians of science accepted Hunter's portrayal and looked no further into the early history of the Society, apart from a few – the Mulligans, P B Wood, Noah Moxham, et al – whose research reinforced this slightly negative perspective. Also, the approach of many historians of science has been to focus too much on the Royal Society's ability to project its experimental philosophy outwards, as it tried to promote the organisation by convincing the public of the value of their activities, and the Society's success or otherwise has been measured in these terms.

This research will instead follow in the footsteps of social historians of science such as Stephen Shapin, who investigated instead the sociological and societal forces which influenced the development of scientific knowledge. While Shapin's research is directed at broad sociological contextualisation of knowledge-making in the history of science, this thesis will apply this methodology specifically to the Royal Society. This will be done by concentrating on the external forces derived from the social, political and cultural context of the Restoration, and will examine how the Society's founders and early fellows attempted to be both <u>proactive</u> in exploiting these forces for their organisation's benefit, and <u>reactive</u>, in revising their approach to adapt to changing circumstances. These forces

will be shown to have presented difficulties for the founding fellows, not all of which they could have foreseen and made provision for. The aim in this research is to combine research directly related to the Royal Society with the broader historiography of the seventeenth century. As such, the goal is to progress the view of the Royal Society by not analysing the organisation based on what it did or did not do to advance natural knowledge through assessment of the nature and content of their experiments and investigations, but by considering what the Society was able to do to establish an organisation in Restoration England. Similarly, by applying different language concepts to the Society, its fellows and its activities, an image of the organisation will develop which places it firmly within its contemporaneous setting, thereby supporting a better understanding of the Royal Society and the men who supported it, engaged with it, and carried out activities as part of its experimental philosophy. As such a changed perspective on the Royal Society will emerge which demonstrate that the Royal Society was very much a product of the Restoration, reflecting as it did many of the social, political, religious and cultural concerns of the day.

This thesis will be confined to the first decade of the Royal Society's existence, what Harold Hartley and Cyril Hinshelwood called 'its critical years of adolescence'. [45] The first thirty to forty years of the Society, up to approximately the end of the century in fact represented the steepest part of the learning curve for the founders and early fellows of the Society. These decades were when the fellows were under pressure to ensure the survival of the Society, and when it faced some of its severest challenges. However, to create a more manageable project, the first decade had been identified as providing sufficient material for analysis. This first decade of the Royal Society also closely parallels the first decade of the Charles II's restored monarchy; political events in Restoration London and the rest of England will be shown to have had a impact on the Society as well. The thesis will thus focus on three seminal periods within this first decade of the Society: the founding in November 1660, the award of the charters in 1663 and 1664, and the commissioning and publication of Thomas Sprat's *History of the Royal Society*, 1664 – 1667. These three events have received relatively cursory attention from historians. This

[45] Harold Hartley and Cyril Hinshelwood, "Gresham College and the Royal Society", *Notes and Records of the Royal Society of London*, Vol. 16, No. 1, The Tercentenary Celebrations (April 1961), p. 134.

research will show that the events were far more significant in that they reveal the societal forces and pressures which the Society's founders and early fellows had to navigate in order to establish their association, and which had a material impact on their ability to properly institutionalise the pursuit of natural knowledge in England. These events are also indicative of the state of Restoration English society as it navigated the return of the monarchy and the growing undercurrents of disillusionment which increasingly characterised the early Restoration monarchy.

What will not be covered in this research is any detailed treatment of the religious implications and objections to the Society's experimental philosophy. This is mainly because this is a road that is already much travelled. In addition, it was not until the 1670s and 1680s and beyond that the Royal Society faced any serious theological challenges related to the religious implications of their natural philosophical discoveries, or of the potential for atheism of some fellows' views of a mechanical universe. Similarly, although the Society became an integral part of the European Republic of Letters as the seventeenth century progressed, in this first decade the Society was only just beginning to carve out a place for itself within the Republic of Letters, particularly in terms of the role of the Society as an information hub, with the increasingly critical role of the secretary of the Society as a conduit for the dissemination of natural knowledge. This aspect of the Society's existence became much more significant as other such institutions such as the French Academie des Sciences began to be organised in other parts of the European continent. This is not to ignore the importance of many of the fellows' contacts overseas: Oldenburg's correspondence was the most successful part of the Society and enhanced the standing of the Society abroad; and many fellows had numerous contacts abroad, some because of periods of exile during the Interregnum. However, this aspect was not a primary focus of the Society's efforts at establishment.

The primary sources used for this research reflects the methodology described above, with attention being paid to sources which have been either almost overlooked, or which have received the minimum of attention. These sources will be analysed with reference to the secondary literature described above, in order better contextualise the circumstances within which they were created. Central to this will be the Royal Society's journals: the volumes which contained the minutes of the Society's general meetings and

meetings of the council. It will also include the text of all three of the Society's charters, and the text of Sprat's *History of the Royal Society.* These texts will form the basis of the research as being the most significant texts produced by and with the Society, and which had the most impact on the association in this first decade.

The writings of individual fellows will also be analysed. The fellows were the Royal Society, and the ideas that some of these men brought to the organisation will be shown to have influenced what the Royal Society did and how they did it. Particularly influential men such as John Evelyn, John Wilkins, Robert Boyle, William Petty, Henry Oldenburg and John Wallis and of course Francis Bacon are included, as are men who are representative of the Society's fellowship: for example, Walter Charleton and Joseph Glanvill and Samuel Pepys. Pepys and Evelyn are particularly valuable because they also kept diaries which contained valuable information not only about the Royal Society, but also Restoration London, which makes their work doubly useful to the researcher.

Other men who were influential not only on the Royal Society but in Restoration England in general are also included in this analysis. Edward Hyde, Earl of Clarendon for instance, was intimately involved in not only Charles' court, but also seems to have been active at court on the Society's behalf. Other contemporary commentators and actors include the Marquis of Halifax (one-time courtier and advisor to Charles II), the cleric Meric Casaubon, Samuel Sorbière, Henry Stubbe, and Charles II himself. These sources will be supplemented with a range of charters, declarations, speeches, letters and other documents which are significant in some way to the early establishment of the Society.

Ultimately it will be shown that the combined analysis of not only the sources related directly to the Royal Society as a natural philosophical institution, and secondary research on Restoration English society, will reveal a different perspective on the Royal Society. The aim is to show that there is more to this early institution than has been fully appreciated. It will show that the early history of the Royal Society informs and is informed by the history of the seventeenth century and of Restoration London and England in particular. It will be revealed that the Royal Society, as a completely new and untried association of men, faced an uphill battle for credibility and financial security in a

period when other political, religious and social forces had a significant impact on the Society as it did on English Restoration society.

CHAPTER TWO - Founding the Royal Society: Pragmatism and Purpose

> ... on the 5th of December, 1660, SIR ROBERT MORAY brought word from the court, that the king had been acquainted with the design of the meeting, and well approved of it, and would be ready to give encouragement to it.[1]

This entry in the Royal Society's first journal book has been quoted or referred to many times in the narrative of the founding of the club which was to become the Royal Society. The details of the founding are now well known in the history of science. Twelve men – Viscount Brouncker, Robert Boyle, Alexander Bruce, Sir Robert Moray, Sir Paul Neile, John Wilkins, Jonathan Goddard, William Petty, William Ball, Lawrence Rooke, Christopher Wren and Abraham Hill – met together in Rooke's rooms at Gresham College after Wren's lecture there, and there "something was offered about a design of founding a college for the promoting of physico-mathematical experimental learning."[2] These twelve men were determined to find a means to "a more regular way of debating things", much in the same manner of men who formed voluntary associations of academies in other countries.[3] However, there are implications in the bare detail in the journal which reflect a more complex picture of the founding of one of an organisation which became the focal point of natural philosophy in England.

The aim of this chapter is to demonstrate how the circumstances of the founding of the Royal Society and the actions of the founders reflected many of the political, social, cultural and intellectual forces current in the early Restoration. It will show how the uncertain political and religious situation in England influenced the behaviour of both the founders and of Charles II whose approval and support they sought. It will demonstrate the importance of institutional patronage, and of the need to encourage the involvement of the social elite to establish credibility for an organisation. The chapter will analyse the intellectual origins of the new club and illustrate how models for a college devoted to the pursuit of natural knowledge were influenced by ideas such as improvement and a

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[1] Thomas Birch, *The History of the Royal Society of London for Improving of Natural Knowledge, From Its First Rise*, Vol. I (London, 1760), p. 4.
[2] Birch, *History*, Vol. I, p. 3.
[3] Birch, *History*, Vol. I, p. 3.

utilitarian approach to the production of new knowledge, as well as the personal preferences of the men who created these models. The social – and political - implications of choosing the potential members of the group will also be explored, within the context of seventeenth century leisure pursuits and forms of institutional sociability and intellectual community. Finally, this chapter will demonstrate the founders' desire to learn from past experiences of similar groups, a desire which paralleled the efforts made by Charles II, the Convention and later Cavalier parliament, and ordinary English men and women to address some of the yet unresolved religious and political issues which precipitated the country into civil war.

In the context of this chapter, the founding is represented as covering the period from late November 1660 when the founding fellows first met, to 1662 when the first charter was granted. This period represents the time when the founders were beginning to develop their plans for the Society: they drew up their first formal statutes, composed a list of potential members, and conceived the plan for incorporation which included the naming of the organisation. The date of the granting of the first charter was also considered to be the official date of the formation of the Society, on which the president and first council were named, and all men listed as fellows on that date were termed 'original fellows'.

It should also be noted that terms such as club, organisation, society or voluntary association will frequently be used to describe the Royal Society in this chapter. This is partly because the new society did not receive its official name until the award of its first charter in 1662, although John Evelyn is generally credited with being the first to name the club in print as 'the Royal Society'.[4] Frequently it was known as for instance, the Gresham College club, or the Philosophic Society, or simply in the journal, 'the society'. Secondly, the use of the terms club or voluntary association particularly, has significance for the way in which the Society was founded, and in which it was first organised by the founders. Quentin Skinner has described the Society as a 'gentlemen's club' in his discussion about the apparent exclusion of many men who would seem to be ideal candidates for

[4] This first use of the name 'Royal Society' was in Evelyn's dedication to the Earl of Clarendon of his translation of Gabriel Naudé's *Instructions Concerning the Erecting of a Library: Presented to My Lord the President De Mesme*, trans. by John Evelyn (1661), p. sig.A3r.

fellowship of the Society. [5] This will be discussed further in the next chapter; however, while it was not strictly speaking a 'gentleman's club', it was founded as a private club of voluntary participants, and this had an impact on the terms upon which the Royal Society sought members, and which influenced the contemporary perception of the organisation. Similarly, as was discussed in Chapter One, terms such as 'natural philosophy', natural philosopher' and 'natural knowledge' will be used to in preference to 'science' and 'scientist'. It will be shown that such terms do not adequately describe the men who became involved with this new club, or their activities. Using more contemporaneous language will create a better understanding of the intellectual basis of founding fellows' efforts at institutionalisation.

2.1 The Role of Charles II

Accounts of the founding and early years of the Society have tended to focus on Charles II's willingness to support the new club described to him by Sir Robert Moray, as being a demonstration of his interest in natural knowledge. The founders' decision to acquaint the king with their club is generally seen as a means of tapping into Charles' enthusiasm for the subject. Charles did demonstrate a genuine interest in the Society's activities, although neither evidence from contemporary sources, nor modern commentators would suggest that he had a deep and abiding personal desire to pursue natural knowledge to any great extent. John Miller made only a passing reference to Charles' interest in the natural world, or of his patronage of the Royal Society, describing Charles' involvement in dissections and chemical experiments. Miller implies though, that it simply was not a significant aspect of his monarchy. [6] The question is really the depth of Charles' interest. Charles did seem to be engaged with natural knowledge to a certain extent, which is demonstrated in contemporary sources. In his diary John Evelyn described

[5] Quentin Skinner, "Thomas Hobbes and the Nature of the Early Royal Society", *The Historical Journal*, Vol. 12, No. 2 (1969), p. 238.
[6] Michael Hunter, *Science and Society in Restoration England* (Cambridge, 1981), p. 130; John Miller, *Charles II*, p. 30. Also Mario Biagioli, "Etiquette, Interdependence, and Sociability in Seventeenth-Century Science", *Critical Inquiry*, Vol. 22, No. 2 (Winter 1996), pp. 193 – 238, for a discussion of the contrast between the nature of Charles II's support for the Royal Society compared to that of King Louis XIV's support for the Académie Royale des Sciences, and that of some of the Italian princes.

several occasions when he was privileged to have conversations with the king on the activities of the Royal Society, and on a range of natural knowledge subjects. On 3 May 1661 Evelyn described an occasion when he and others from the new Society made observations of Saturn and the satellites of Jupiter through "his Majesty's great telescope, drawing 35 foote". On 14 May 1661, Evelyn wrote:

> His Majesty was pleas'd to discourse with me concerning several particulars relating to our Society, and the planet Saturn, &c. as he sat at supper in the withdrawing room to his bedchamber.[7]

On 24 November 1661, he chatted with Charles about bees and on September 1662 he accompanied the king on a visit to Charles' chemist Monsieur LeFebvre who demonstrated "the preparation for the composing Sir Walter Raleigh's rare cordial" and gave "a learned discourse before his Majesty in French on each ingredient."[8] On other occasions, Evelyn conversed with Charles on subjects ranging from shipping to painting and engraving, and described going with some of his relations to view Charles' "cabinet and closset of rarities" which included

> a vast book of mapps in a volume neere 4 yards large; a curious ship model; and amongst the clocks, one that shew'd the rising and setting of the Sun in the Zodiaq, the Sunn represented by a face and raies of gold, upon an azure skie, observing the diurnal and annual motion, rising and setting behind a landscape of hills [9]

Charles' interest in the natural world reflected a wider popular interest in all things unusual, rare or curious, both naturally occurring objects and man-made mechanical devices and instruments.[10]

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[7] John Evelyn, *The Diary of John Evelyn, Esq., F. R. S. from 1641 to 1705.6 With Memoir*, ed. William Bray (London, 1895), p. 276.
[8] Evelyn, *Diary*, pp. 280 and 288.
[9] Evelyn, *Diary*, pp. 269, 280 and 282.
[10] For more about this growing interest and its relationship to the early modern 'consumer revolution', see Linda Levy Peck, *Consuming Splendour: Society and Culture in Seventeenth-Century England* (Cambridge: Cambridge University Press, 2005); Peter Borsay, *The English Urban Renaissance: Culture and Society in the Provincial Town 1660 – 1770* (Oxford, 1989).

Charles was also described in the Society's journal as regularly sending to the Society objects or questions for their investigation. On 16 January 1660/1 the journal records that the king sent to the Society "two load-stones by Sir Robert Moray, with a message, that he expected an account from the Society of some of the most considerable experiments upon them."[11] On 4 March 1660/1 he conveyed via Sir Paul Neile "five little glass bubbles, two with liquor in them, and the other three solid, in order to have the judgement of the Society concerning them." Then on 8 May 1661 the king made a more substantial request: in a letter written and delivered by Moray and Neile, he asked that Christopher Wren construct a "globe of the moon". According to Birch,

> This globe represented not only the spots and various whites upon the surface of the moon, but the hills, eminences, and cavities of it moulded in solid work. ... His majesty received this globe with peculiar satisfaction, and ordered it to be placed among the curiosities of his cabinet.[12]

On 17 July 1661, again via Neile, Charles asked that the Society find out why "sensitive plants stir and contract themselves upon being touched". The Society went so far as to appoint a committee to investigate the phenomenon, consisting of John Wilkins, Robert Boyle, John Evelyn, Timothy Clarke and Jonathan Goddard. Finally on 4 September 1661, Charles conveyed to the Society a maths problem posed by his former maths tutor Thomas Hobbes "*for finding two mean proportionals between two strait lines given*", delivered by Neile.[13]

There was also the matter of Charles' recommendation of John Graunt for fellowship of the Society. Graunt had written a significant text, *Natural and Political Observations upon the Bills of Mortality,* published in 1662. This statistical work produced data on the causes of death of men and women of all ages in London. For this, Thomas Sprat wrote that the recommendation of Graunt's election was one which 'the *King* himself was pleased to make'.[14] As far as is known, this is the only time that Charles' recommended someone for election to the Society. Interestingly he did not recommend

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[11] Birch, *History*, Vol. I, pp. 10 and 17.
[12] Birch, *History*, Vol. I, pp. 21 – 22.
[13] Birch, *History*, Vol. I, pp. 34 and 42.
[14] Thomas Sprat, *The History of the Royal Society of London For The Improving of Natural Knowledge*, 3rd ed., (1722), p. 67.

Thomas Hobbes for election, despite passing on Hobbes' mathematics problem as described above, and despite his apparent affection for Hobbes who had been Charles' mathematics tutor. This may have been because of Hobbes' dogmatism and his opposition to the Society's experimental philosophy.[15]

However, it is the speed with which Moray informed the king of the new club which is so much more significant than has perhaps been appreciated. The club was formed on the evening of 28 November 1660, and by its next meeting on 5 December 1660, Moray procured the king's approval. This means that it was within a week that Moray had met with Charles, discussed the formation of the group and secured Charles' sanction for it. Why then did the founders move so quickly? The answer lies in the political situation in England after the Restoration. Despite the genuine joy of many at the restoration of the monarchy, the reality was that many groups – Presbyterians, dissenting sects, republicans – were resigned to the change in the country from commonwealth to monarchy. Thomas Sprat wrote in his *History of the Royal* Society that the founding fellows found 'the Hearts of their Countrymen inlarg'd by their Joy, and fitted for any noble Proposition' – a situation which they hoped to exploit as being the most propitious time to begin their club. [16] However, there were still pockets of dissent and discontent, as well as the fear that the country would again descend into civil war. Charles attempted to reassure his subjects with his Declaration of Breda, issued in April 1660. This proclamation was essentially a peace offering in which among other things, he promised to work in conjunction with parliament and to allow nonconformists some 'liberty to tender consciences' on the issue of conforming to the Anglican Church.[17] In July 1660, Charles also made a speech to the House of Lords of the Convention parliament encouraging them

[15] For a brief discussion of Hobbes' relationship with Charles see Steven Shapin and Simon Schaffer, *Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life* (Princeton, NJ, 2011), pp. 133 – 134.
[16] Sprat, *History*, p. 58.
[17] John Miller, *Charles II* (London, 1991), pp. 26 – 27; Ronald Hutton, *The Restoration: A Political and Religious History of England and Wales 1658 – 1667* (Oxford, 1985), pp. 150 – 152; Tim Harris, "Understanding popular politics in Restoration Britain", in *A Nation Transformed: England after the Restoration*, eds. Alan Houston and Steve Pincus (Cambridge, 2001), pp. 128 – 129; ibid, *London Crowds in the Reign of Charles II: Propaganda and Politics from the Restoration Until the Exclusion Crisis* (Cambridge, 1987), pp. 36 – 42; ibid, *Restoration: Charles II and his Kingdoms 1660 – 1685* (London, 2005), pp. 43 – 56; George Southcombe and Grant Tapsell, *Restoration Politics, Religion and Culture: Britain and Ireland, 1660 – 1714* (Basingstoke, 2010), pp. 9 – 11.

to pass the Act of Indemnity and Oblivion. In his speech Charles spoke of those who feared for their 'safety and security' because they were known to have fought against the crown. This act, he said, would reassure these people, and thus

> will make them good subjects to me and good friends and neighbours to you and we have then all our end, and you shall find this the securest expedient to prevent future mischief. Therefore I do earnestly desire and conjure you to depart from all particular animosities and revenge, or memory of past provocations; and that you will pass this Act, without other exceptions than of those who were immediately guilty of that murder of my father… [18]

Nonetheless, despite Charles' efforts at reconciliation and his encouragement of celebrations on his return, England was in a state of unease, with at best, many adopting a 'wait-and-see' attitude to Charles' return; and at worst others – albeit a relatively small number – still willing to resist his monarchy by force if necessary. There were rumours of plots of rebellion which caused concern to Charles and to parliament in the early months of his monarchy. This concern was justified: in January 1660/1, a group of about 50 Fifth Monarchists led by Thomas Venner, staged an uprising in London which lasted for four days. The rebels temporarily seized St Paul's Cathedral and engaged in skirmishes with city guards, before they were finally captured on the 9th of January.[19] Samuel Pepys and John Evelyn described the unrest. Evelyn recorded on 6 January 1660/1 in his diary,

> This night was suppress'd a bloudy insurrection of some *Fifth-Monarchy enthusiasts*. Some of them were examin'd at the Council the next day, but could say nothing to extenuate their madnesse and unwarrantable zeale. ... There was another rising of the Phanatics, in which some were slaine.[20]

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[18] Charles II, Speech to the House of Lords, in *The Letters Speeches and Declarations of King Charles II*, ed. Sir Arthur Bryant (London, 1968), p. 101.
[19] Richard L Greaves, "Venner, Thomas (1608/9–1661), Fifth Monarchist", *Oxford Dictionary of National Biography* (2004; online edn. 2010); http://www.oxforddnb.com.idpproxy.reading.ac.uk/view/10.1093/ref:odnb/9780198614128.001.0001/odnb-9780198614128-e-28191 ; Miller, *Charles II*, p. 70; H T Swedenberg, Jr., ed., *England in the Restoration and Early Eighteenth Century: Essays on Culture and Society* (Berkeley, CA, 1972), pp. v – vi.
[20] Evelyn, *Diary*, p. 270.

Pepys' description of the events is more dramatic:

> This morning, news was brought to me to my bed-side, that there had been a great stir in the City this night by the Fanatiques, who had been up and killed six or seven men, but all are fled. My Lord mayor and the whole City had been in armes, above 40,000. … these Fanatiques that have routed all the train-bands that they met with, put the King's life-guards to the run, killed about twenty men, broke through the City gates twice; and all this in the day-time, when all the City was in armes; - are not in all above 31. Whereas we did believe them (because they were seen up and down in every place almost in the City, and had been in Highgate two or three days, and in several other places) to be at least 500. [21]

While the violence was comparatively short-lived and contained, it was an indication that not all of Charles' subjects had accepted his rule. Fears of such plots – and some attempts at insurrection - would be a feature of Charles' reign. There were actual revolts in Yorkshire, Westmorland and Durham in 1663, and the Pentland rising in 1666, not to mention reports and rumours of plots hatched by disaffected groups around the country.[22] Charles' concern for the safety of his monarchy was complicated by the disbandment of the Cromwellian army, and that the Convention parliament did not make financial provision for forces to put in the army's place. He eventually was able to provide for a small force of 3,000 – 4,000 troops out of his ordinary revenue, which was tiny in comparison to the Interregnum force which peaked at 60,000. [23]

Moray's haste in informing the king of the founding of the club and seeking his approval indicates that he and the other founding members wanted to reassure the king that they were not forming a group to plot against him. Some of the founders after all were men who engaged with and even profited by the civil war and Interregnum, which

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[21] Samuel Pepys, *The Diary of Samuel Pepys, Esq, F.R.S, From 1659 to 1669, With Memoir*, ed. Richard Lord Braybrooke (London, 1887; facsimile edn. 2012), pp. 63 - 64.
[22] Lionel K J Glassey, "Politics, Finance and Government", in *The Reigns of Charles II and James VII & II*, ed. Lionel K J Glassey (Basingstoke, 1997), p. 37; Andrew Hopper, "The Farnley Wood Plot and the Memory of the Civil Wars in Yorkshire", *The Historical Journal*, Vol. 45, No. 2 (June 2002), pp. 281 – 303; Harris, *Restoration*, pp. 49 – 50; Miller, *Charles II*, pp. 70 – 71; Richard L Greaves, *Deliver Us From Evil: The Radial Underground in Britain, 1660 – 1663* (Oxford, 1986).
[23] Harris, *Restoration*, p. 65.

makes their caution towards Charles understandable, despite Charles' speech to parliament encouraging the passing of the Act of Indemnity. John Wilkins' appointment to first Warden of Wadham College, Oxford and then Master of Trinity College, Cambridge was most likely facilitated by his marriage to Cromwell's sister Robina. Jonathan Goddard had been appointed physician-in-chief to the army by Cromwell and accompanied him to Ireland. Goddard had also been appointed warden of Merton College, Oxford by Cromwell, and had been returned as the sole MP for the university in the Barebone's Parliament.[24] William Petty had also been closely involved with the Cromwellian regime, and had been a member of the republican Rota Club earlier in the year, although he had stopped attending meetings before the Restoration, and the club had disbanded soon afterwards.[25] In a period when loyalties were fluid, and were often dictated by a pragmatic desire to back the winning side, this would not necessarily have been a deal breaker. Nonetheless, Charles would have had no reason to look particularly fondly on some of the founding fellows. Charles himself though was also a pragmatist: as Lionel Glassey has pointed out, many of the men active in politics after the Restoration were also men who had served Cromwell in the 1650s. Some like General Monck had facilitated the Restoration; others were needed because of their experience serving in various branches of the government. Others, notably later Royal Society fellows Samuel Pepys and Jonathan Goddard, simply continued their careers in government service. [26]

To add to this complex political situation, Charles had to unite a people who displayed nothing like political consensus. The demands of Anglicans, Presbyterians and Puritans vied with those of moderate royalists and 'ultra-royalists' and the small minority of committed republicans. Religion remained the most contentious of all, with the desire to get rid of the sects being the only thing that most agreed on. [27] Against this backdrop, Charles' decision to allow the founding fellows' new society to form is quite remarkable. His approval may have been based on his consideration that such a group did not pose a

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[24] Malcolm Oster, 'Goddard, Jonathan (bap. 1617, d. 1975)', *Oxford Dictionary of National Biography* (Oxford University Press, 2004; online edn., 2006) www.oxforddnb.com.idpproxy.reading.ac.uk/view/article/10857 accessed 8 May 2017.
[25] Toby Barnard, 'Petty, Sir William (1623 – 1687)', *Oxford Dictionary of National Biography* (Oxford University Press, 2004; online edn., 2013) www.oxforddnb.idproxy.reading.ac.uk/view/article/22069 , accessed 16 April 2015.
[26] Glassey, "Politics, Finance and Government", pp. 38 – 39.
[27] Harris, *Restoration*, pp. 50 - 52.

threat to himself or his monarchy; nonetheless, prudence and political awareness meant that Charles' approval for their enterprise was a prize that they needed to secure if they were to progress in their plans. Such prudence was displayed later, when in May 1661, the society received a letter from Prince Leopoldo de Medici, brother to the Grand Duke Ferdinand II of Tuscany and patron of the Academia del Cimento, who wished to correspond with the group. Moray wisely acquainted the king with the letter and received permission from Charles to reply. This was a wise decision: correspondence with someone close to the ruler of a foreign power at this politically charged time, required careful handling; and of course, it could be presented as being flattering to the new society, since someone as exalted as Prince Leopold was already interested in this fledgling group, shedding perhaps a bit of lustre on Charles himself as the society's patron.[28]

Pragmatism would also have informed the choice of Sir Robert Moray to deliver the news of the founding of the Society to the king and seek his permission. Moray had, for a time, a close personal relationship with Charles II: he shared the king's interest in chemistry, and alone of the founding fellows had spent the most time in the king's company. He went to Bruges with Charles in 1656, and on the king's return to London was one of the first courtiers to be given accommodation at Whitehall palace: two rooms in the Privy Garden. Moray was also appointed to the Scottish Privy Council.[29] In this way, Moray used his connection to Charles not for personal patronage, but for institutional patronage. As patron, and a royal patron at that, Charles would add prestige to the new society, credibility and the possibility of funding. With the king leading the way, members of the aristocracy and gentry would follow, increasing the access to other potential wealthy patrons. The fellows may have had the example of Samuel Hartlib in mind when seeking out Charles II as a patron. In 1647, parliament voted to give Hartlib £300 establish an 'Office of Address for Communications' based in Oxford. This was in 1649 reduced to an annual of pension of £100 for 'the Advancement of Arts and Learning'. [30] Christopher

[28] Birch, *History*, Vol. I, pp. 22 – 23
[29] David Allan, 'Moray, Sir Robert (1608/9? – 1673)', *Oxford Dictionary of National Biography* (Oxford, 2004; online edn., 2007; www.oxforddnb.com.idproxy.reading.ac.uk/view/article/19645 , accessed 16 April 2015.
[30] M, Greengrass, "Hartlib, Samuel (c. 1600–1662), educational reformer and writer", *Oxford Dictionary of National Biography* (Oxford, 2004; online edn., 2007) Retrieved 30 Mar. 2018, from http://www.oxforddnb.com.idpproxy.reading.ac.uk/view/10.1093/ref:odnb/9780198614128.001.0001/odnb-9780198614128-e-12500 , accessed 30 March 2018.

Hill has suggested – somewhat implausibly - that Moray was chosen by the founding Fellows to approach the king as part of a wider 'cover-up', designed to obscure 'embarrassing' connections of men such as Goddard, Wilkins and Petty to the parliamentarian cause and their cooperation with the Protectorate. It was to hide their past connections that the founding Fellows sought to shelter behind the patronage of Charles. Given the reality of the political situation in England described above however, for this group of founding fellows no 'cover-up' would have been needed, and this contradicts Charles' own efforts at conciliation. [31]

Charles' grant of the Society's petition for a charter, only about a month after the deliverance of the Society's petition for a charter by Moray, represents a measure of political expediency. According to the society's journal, on the 16 October 1661

> Sir Robert Moray acquainted the society, that he and Sir Paul Neile had kissed the king's hand, in the society's name; and he was desired by them to return their most humble thanks to his majesty for the reference, which he was pleased to grant of their petition; and for the favour and honour done them, of offering himself to be entered one of their society.[32]

With his concern to promote unity in the country, and to find a solution to the religious differences which led to the conflict of the previous two decades, Charles may well have reasoned that support for this apparently non-partisan group would be advantageous. The club was engaged in activities which were innocuous and potentially of benefit to the country. The diversity of the group, representing as it did, members of the social elite as well as those from the clergy and the universities, may have led Charles to conclude that keeping such men on side would help to prevent unrest. This club could demonstrate to his subjects Charles' benevolence and support for an organisation which aimed to promote the national good. By actively supporting men engaged in peaceful activities, Charles signalled in a practical way his desire to reject vengeance against those who supported the Cromwellian Protectorate, in favour of peace and national unity.

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[31] Christopher Hill, "The Intellectual Origins of the Royal Society: London or Oxford?", *Notes and Records of the Royal Society of London*, Vol. 23, No. 2 (Dec. 1968), pp. 144 – 156, esp. p. 145.
[32] Birch, *History*, Vol. I, p. 50.

Charles' character and personality as an individual and a monarch is another dimension which informed his interaction with the Royal Society, and the approach that the fellows adopted towards him. George Savile, the Earl of Halifax, detailed observations of Charles' character which were published posthumously by his daughter in 1776. In it, he described how Charles' courtiers learned that Charles was not a monarch whose words could be taken at face value; in fact, he dissembled so much that often his courtiers and counsellors would gather to compare notes, because Charles would say one thing to one person, and tell a different thing to someone else. Savile wrote that the courtiers had one way of knowing when Charles was telling the truth: "Those who knew his Face, fixed their eyes there; and thought it of more Importance to see, than to hear what he said."[33] As Paul Seaward wrote of Charles: 'Charles' commitment to anything could not really be relied upon. His ability to say one thing and do another was notorious.' [34]

Savile pointed out that to a certain extent Charles needed to practice dissimulation, particularly in the days of his exile in the French court. He took care to "not appear too much of a Protestant, whilst he expected Assistance from a Popish Prince", and often exaggerated his "Injuries and Neglects" to win support. These skills were ones which he continued to use in England, and in Savile's eyes were necessary skills for a monarch.[35] Savile further revealed that the king was a man who hated having to deal with the less pleasant or difficult aspects of his role. Charles is portrayed as a man who loved pleasure and did not enjoy some of the more serious or difficult requirements of his position. He hated formality and 'serious Discourse', and his ministers soon learned that if there was something unpleasant that needed to be dealt with, 'His ministers were to administer Business to him as Doctors do Physick, wrap it up inn something to make it *less unpleasant*...' Often, ministers would introduce levity into an otherwise serious subject merely to maintain Charles' engagement.[36] Similarly, they also realised that often Charles would acquiesce in some matters simply for an easy life, to get rid of men making various

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[33] George Savile, Marquis of Halifax, *A Character of King Charles the Second; And Political, Moral and Miscellaneous Thoughts and Reflections* (London, 1776), p. 15. For a further discussion of Charles' character as depicted by George Savile, see Chapter Three of this thesis.
[34] Paul Seaward, 'Charles II (1630–1685)', *Oxford Dictionary of National Biography*, Oxford, 2004; online edn, May 2011, www.oxforddnb.com.idpproxy.reading.ac.uk/view/article/5144 , accessed 24 Aug 2017.
[35] Savile, *Character of King Charles*, pp. 3, 12 – 13, 56.
[36] Savile, *Character of King Charles*, pp. 28 – 29.

petitions, or to put off dealing with a matter in a proper way.[37] This last aspect of Charles' character could have been used by Moray and the founders to their advantage, and it is an interesting to speculate if this was deliberately used by the founders to further their own ends. In any case, in exploiting Moray's knowledge of the king, it would have been apparent to the founding fellows that Charles' interest was fashionable and most likely fickle, and they would be wise to take as great advantage as possible of his interest before the novelty wore off.

Charles' approval therefore was more important than has previously been appreciated. Historians of the Society such as Dorothy Stimson, Henry Lyons, and Michael Hunter do no more than mention in passing that the king's approval was sought and given. There is no speculation about the significance of that approval, and, in the case of Stimson and Hunter, the approval seems to have been taken for granted, given Charles' interest in natural knowledge. [38] However, its relevance could be better appreciated by asking this question: what if Charles had <u>not</u> given his approval? This is a case where the 'What ifs' of history are more than an idle and pointless exercise, where 'we know what happened in the end'. The 'what if' in this situation reveals that there were forces at work which the members of the Society were aware of, and which they considered from the outset. It can plausibly be argued that the course of the history of the Royal Society would have been very different. Given the characters of the founding members, if Charles had not approved of their venture, it is perfectly conceivable that the Society would have disbanded at once. Men like Moray, Brouncker and Wilkins had committed themselves to Charles and his monarchy, and they would not have wanted to disobey any injunction which he issued. They could perhaps have delayed the formation of the club for another time, in the hopes that once Charles had settled into his monarchy, and he had more opportunity to quell any unrest or significant dissent to his rule, Charles would have been more favourable to their enterprise. It is likely that they would have continued to meet perhaps informally in small groups and conducted their experiments individually. They would have continued to

[37] Savile, *Character of King Charles*, pp. 45, 48.
[38] Dorothy Stimson, *Scientists and Amateurs: A History of the Royal Society* (New York, 1948), p. 51, 52 – 54; Henry Lyons, *The Royal Society 1660 – 1940: A History of its Administration Under its Charters* (New York, 1968; first published 1944), pp. 22 – 23; Michael Hunter, *Science and Society*, pp. 130 – 131.

share their discoveries through correspondence, as they had done throughout the preceding period. In any case, this indicates that they were more concerned about the political ramifications upon which Charles' approval depended, not just his personal interest in their activities. The king and his ministers' concerns about unrest might also have made it more difficult if Charles had withheld his support for new club.

The minutes of the meetings in the journal books indicate just how the Society's activities were affected by Charles' approval. The journal entry for 5 December 1660 shows that, having drawn up a list of possible members and having decided on some basic rules for the members, it is recorded that after Moray brought word of Charles' sanction, "The following orders were *then* [my italics] made, that Mr Wren be desired to prepare against the next meeting for the pendulum experiment ..." Further details are given of other experiments to be conducted, questions to be prepared for conducting an experiment with quicksilver on Tenerife, the agreed maximum number of members, the subscription of the members present prior to the drafting of a constitution and forming of a committee to devise a constitution. The emphasis here is on the word 'then': while the bare bones of the Society were decided at the initial meeting, no further plans could be made <u>until</u> the king's approval was granted. By the third meeting on 12 December the fellows were heavily engaged in deciding rules and regulations which would become the basis of the Society's statutes. These included rules about the number of members needed to be present at any meeting to form a quorum, the maximum number of members, and conditions for membership, and many more statutes relating to the governance of the Society.[39] The sheer volume of activity devoted to the detailed organisation and administration is indicative of how much rested on Charles' approbation of the founding fellows' new organisation.

What then, if Charles <u>had</u> given his approval, but demonstrated no further interest in the Society? It is intriguing here to speculate about the future of the Royal Society if Charles had shown no active interest in the Society, nor in being a patron. The value of Charles' approval and interest in the Society can be seen in the list of fellows drawn up by the Society in 1665. The presence of men including several earls, dukes and lords and even

[39] Birch, *History*, Vol. I, pp. 5 – 7.

the Archbishop of Canterbury exemplifies the influence of the monarch in encouraging engagement with the Society at the highest levels. If Charles had not shown any interest in the Society, the organisation's struggle for credibility would have been harder, and much more protracted, and they might well have decided against seeking a charter. It would arguably have been harder to generate interest among the aristocracy and the gentry as potential patrons, which in turn might have made it more difficult to recruit members generally, since aristocratic and gentle membership conferred so much prestige. The Society's only other recourse for state recognition would have come from a direct petition to parliament. However, given the atmosphere of the times, parliament would understandably have considered that the government had more important things to think about. Indeed, given the composition of parliament – the majority country gentlemen with traditional values – the society would have had a difficult task in persuading such men that their enterprise was a worthwhile venture. Michael Hunter attributed parliament's – and Charles' – lack of interest in 'science' to an inclination 'to do what was easiest' resulting in a preference for 'piecemeal expedients, as well as to the Royal Society's inability to convince parliament of the usefulness and efficacy of their 'science'.[40] The decision might have been made to remain a private club, of interest only to a few, until a monarch more favourable to their enterprise came to the throne. The lack of state recognition would surely have made it much harder for the club to have a public impact in England and particularly abroad. Henry Oldenburg frequently emphasised the involvement of Charles as patron in his foreign correspondence, which he used to promote the new society. This news of Charles' support was greeted with enthusiasm from his foreign correspondents. This may have been an added incentive for foreign correspondents to communicate with or even join the Society.[41] Without Charles' involvement even the name of the society would not have existed, and their group might have remained as provincial and as short lived as the groups which preceded it.

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[40] For a detailed analysis of the composition of Restoration parliaments, see Basil Duke Henning, *The House of Commons 1660 – 1690, Vol. 1* (London, 1983); Hunter, *Science and Society*, pp. 128 – 129.

[41] Henry Oldenburg, *The Correspondence of Henry Oldenburg*, *Vols. I - IX*, ed. and trans. A Rupert Hall & Marie Boas Hall (Madison, Wisconsin, 1965 – 1973), esp. Volumes I – VI.

2.2 Founders and Members United by a Common Purpose

Peter Clark's research on British clubs and societies has shown that there were several practical considerations which groups in this period needed to consider to ensure the success of their group's ventures. Attracting the right sort of members was vitally important to create a viable and long-lived association, and this is demonstrated in the steps taken by the founders to build the Society's fellowship.[42] The journal entry for the first meeting of the founders reveals that from the start, the Society's members understood that inviting the right men to become members was vital for the success of their club. Success would be measured in the level of interest of the prospective fellows, in their ability to contribute to the activities of the club, and in their social and intellectual connections. This was not the same as saying that the founders were seeking men solely based on social status to recruit men who were just like them. Rather, the emphasis was on the intellectual and personal qualifications of the prospective members. Knowledge of these qualifications was derived from a complex network of personal friendships and professional ties, rather than social status, or political or religious leanings. This section will focus on information contained in the journal detailing the decisions made by the founders about membership.

The solid base upon which the founders planned to rest their new club, was on that of recruits who were known to share the interests of the founders in the pursuit of natural knowledge through experiment and observation. The journal entry for the first meeting contains a list of forty names of men who were considered potential members:

> And to the end that they might the better be enabled to make conjecture, of how many the elected members of the society should consist, it was desired, that list might be taken of the names of such persons, as were known to those present, and judged by them willing and fit to be joined with them in their design; and who if they should desire it, might be admitted before any others.[43]

The list is a diverse one, socially, professionally, politically and theologically, including aristocrats such as Lord Hatton and Sir Kenelm Digby; gentlemen such as John Evelyn and

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[42] Peter Clark, *British Clubs and Societies 1580 – 1800: The Origins of an Associated World* (Oxford, 2001), esp. pp. 40 - 59.
[43] Birch, *History*, Vol. I, p. 4.

Elias Ashmole; many physicians, most of whom were also fellows of the College of Physicians as well as a royal physician, including Dr Francis Glisson, Dr George Bate and Dr Christopher Merrett; and university professors and educators such as Christopher Wren, Seth Ward and Henry Oldenburg. The emphasis in the list was on personal knowledge.

This socially diverse group of men formed part of a distinct intellectual community in England. Michael Hunter has described this community as a scientific community; however, that is to make assumptions about both the nature and extent of the activities they were interested in pursuing, and their qualifications for being part of this community. Hunter refers to them as 'lesser' and 'major' men, based on their lasting contributions to modern science, and that these 'major' men enjoyed a 'predominantly professional status'. [44] It is though, more accurate to think of these men as learned men with an interest in all aspects of the study of nature. The most important characteristic of this community for the new society was that they were known to each other as part of the many groups which met in London and Oxford in the mid-seventeenth century. The London groups were centred either at Gresham College or around Samuel Hartlib in a mainly correspondence network that Robert Boyle has famously described as the 'invisible college'.[45] At Oxford, many of these men were involved in groups meeting at the lodgings of various men including William Petty or Robert Boyle, or centred at Wadham College, Oxford during John Wilkins' wardenship in the 1650s. In France, Kenelm Digby became part of the circle around Marin Mersenne, the French monk, but he also had ties of friendship in Oxford, specifically with the group of physicians around William Petty.[46] The list also contains a significant number of physicians; physicians would form the largest minority group in the society by the end of the first decade and beyond. Physicians' interests were not restricted to subjects related to medicine: later journal entries giving details of experiments conducted reveal that physicians were interested in a range of

[44] Hunter, *Science and Society*, pp. 65 – 67, p. 69.
[45] Boyle mentions the 'invisible college' in a few letters written in 1646 and 1647, including in one addressed to Samuel Hartlib. See letters to Isaac Marcombes, Reverend Francis Tallents and Samuel Hartlib on the *Electronic Enlightenment* website http://www.e-enlightenment.com.idpproxy.reading.ac.uk/index.html , accessed 02/08/2017.
[46] For details about intellectual communities in England and Europe in the 1640s and 1650s, see for example, Charles Webster, *The Great Instauration: Science, Medicine and Reform 1626 – 1660* (London, 1975), Chapter 2; Hunter, *Science and Society*, Chapter 3; see also Robert G Frank Jr, *Harvey and the Oxford Physiologists: Scientific Ideas and Social Interaction* (Berkeley, CA, 1980).

natural phenomena. There are numerous examples of enquiries not directly related to medicine conducted by some of the Society's physicians. For example, William Petty was most famously engaged in his invention of a double-hulled ship and produced a history of cloth making. Dr Christopher Merrett conducted experiments on freezing, and Dr Jonathan Goddard was involved in a wide range of experiments and enquiries investigating the properties of quicksilver (mercury). [47] These kinds of men made ideal candidates for inclusion in the new club: the founders sought men whose interest in the natural world extended beyond acquiring the knowledge needed for their professions, although later Thomas Sprat wrote of the Royal Society's desire to attract a different type of fellow. This will be discussed in Chapter 4.

Choosing such men was enormously important to the efforts of the founders for building a new club. These were men who had proven credentials of interest in the Society's proposed activities and had themselves conducted a range of experiments and enquiries either privately or through the previous groups. Their involvement was a result of prolonged interest in being part of such groups, demonstrating a willingness to commit themselves long term to the activities of an association of this sort. For example, for John Wilkins, men such as Seth Ward came particularly recommended as he had been a close friend and contemporary of Wilkins at Oxford University, where Ward had been Savilian Professor of Astronomy.[48] John Evelyn was known to Wilkins and Christopher Wren, having been introduced to both during a visit to Oxford University in 1654; Evelyn recorded in his diary his delight in the various mechanical devices that Wilkins showed him, as well as the piece of dyed marble presented to him by Christopher Wren.[49] The point here is that personal knowledge of these men was vital for the formation of the first membership. Given that the choice of prospective fellows of the new club was based on personal knowledge and known interests, to delineate between fellows as 'major men' and 'lesser men' as Hunter has done, is surely anachronistic. An added complication was the danger of choosing men who were not personally known and so could not be vetted in

[47] Reports of these activities and many others were presented in various meetings of the Society, and can be found for example in Birch, *History*, Vol. I, pp. 55, 174, 189 – 192, 350 – 364, et al.
[48] Barbara Shapiro, *John Wilkins 1614 – 1672: An Intellectual Biography* (Berkeley, 1969), pp. 5, 58.
[49] Evelyn, *Diary*, pp. 231 – 232.

any way, especially when the potential for objection from the king had to be considered. While Charles had honoured his desire to pursue no-one but the regicides on his restoration, it would have been wise at this early stage in the establishment of the new society to make as few waves over the membership as possible. It is not known whether Moray made Charles aware of the list that had been drawn up; however, no-one on the list would have been likely to cause Charles any unease or discontent. As has already been discussed, pragmatism was the order of the day. The important point is that these were men who truly were united by a common interest and a common purpose: to create a new organisation which would allow them a forum to indulge their enthusiasm for experiments and the pursuit of natural knowledge.

There is one aspect of the decisions on fellowship in the minutes for the meeting of 12 December which is problematic to modern eyes for what it implied about the motives of the founding fellows. It reads: "It was then voted, that no person should be admitted into the society, without scrutiny, except such as were of, or above, the degree of baron." [50] On the face of it this seems to be social elitism, the conferring of privileges on some, not based on merit, but based on their elevated social status. This however needs to be understood in the context of the role of patronage in clubs of this nature. At this point the Society was essentially a private club. As a private, and especially a brand-new organisation, the one way in which it could gain instant prestige and credibility would be to encourage the membership of the social elite. As mentioned in the previous section, the presence of such men added prestige because the members of the aristocracy and gentry were society's leaders; as such their presence in a club was a signal to others that the club was an approved one, since the highest echelons of society – not least the king himself – consented to be a part of it. As Shapin and Schaffer put it, 'He who as the most, and the most powerful, allies wins.' [51] Peter Clark noted that the inclusion of the social elite in new voluntary associations and societies became vital particularly in the period prior to the civil war, because of the retarded growth of wealthy urban mercantile and professional groups, who would have otherwise become patrons of such new associations themselves.[52] After the civil war, members of the clerical and medical professions were

[50] Birch, *History*, Vol. I, p. 5.
[51] Shapin and Schaffer, *Leviathan and the Air-Pump*, p. 342.
[52] Clark, *British Clubs and Societies*, pp. 46 – 49.

not able to exert much influence. The clergy of the established church lost their livings, and physicians were regarded as having an unfair monopoly over medical provision; [53] and in the period immediately after the Restoration, both professions had not yet regained their former stature. The social elite on the other hand, were influential at court, and courtly influence was a highly valued commodity. Additionally, the potential for regular gifts or even bequests was a real one, both to the Society as a whole, or to individuals whose interests coincided with a patron's own. Patronage of this sort was a fact of life in this period. A patron with an interest in a person or organisation and their activities could potentially provide particularly funds or other forms of support. Physicians and clergymen could hope to advance in their professions through patronage, which would in turn give them the time and money to continue their experimental researches. John Wilkins for instance, advanced in his clerical career after the Restoration, thanks to the patronage of the Duke of Buckingham and the recommendation of king Charles himself. [54] Bequests and gifts could – and later did - pay for scientific equipment, employees' salaries, additions to the Society's library and repository, lectureships, or even be put towards the purchase of permanent premises. From a purely practical point of view, the inclusion of the social elite made perfect organisational sense.

The founders were equally pragmatic in their approach to membership of other specific groups:

> And it having been suggested at the committee appointed at the preceding meeting, that the college of physicians would afford convenient accommodation for the assemblies of the society, upon supposition, that it were granted and accepted of, it was thought reasonable, that any of the fellows of the said college, if they should desire it, be admitted likewise as supernumeraries, upon condition of submitting to the laws of the society, both as to the payment on their admission and the weekly allowance, and the particular works or talks, that should be allotted to them.

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[53] Harold Cook used the case of William Trigge to illustrate the changed attitude to physicians during the Interregnum. See Harold Cook, *The Decline of the Old Medical Regime in Stuart London* (Ithaca, NY, 1986), pp. 129 – 131.

[54] Barbara Shapiro, *John Wilkins 1614 – 1672, An Intellectual Biography* (Berkeley, 1969), pp. 176 – 177.

> It was also agreed, that the public professors of mathematics, physic, and natural philosophy of both universities, should have the same privilege with the college of physicians, on the same condition of paying the admission fee, and contributing their weekly allowance and assistance, when their occasions permit them to be in London.[55]

Given that the new association had not found any permanent premises, the option to meet at the College of Physicians was a sound idea. The College had a chemical laboratory and an anatomical theatre, as well as other meeting rooms, making it an ideal venue for the new group. For the Society, it was a matter of reciprocity: they would borrow the College's rooms, and in return the College's fellows would get membership of the club. The automatic membership did still mean though that potential Fellows would be required to pay the same fees and make the same kind of investigative commitment as any other fellows. In this, the founders were nothing but practical; they wanted to ensure that every member of the Society contributed equally. This also applied to the professors at the universities; they too would be obliged to contribute as the other members would be expected to. Even here though, the founders had early on recognised that for the professors of the universities, their ability to attend meetings was restricted by their ability to be in London; even so, the university men would not be exempt from paying their fees. The Society's reliance on election and subscription fees for its income made this imperative.

It has been suggested that the founding fellows did not make sufficient effort to solicit the fellowship of men from the lower social classes who, by nature of their occupations, would have been ideal fellows of the fledgling institution. These would include for instance, apothecaries and instrument makers.[56] This does not however, consider the circumstances of members of the trades, or their potential interest in the Royal Society and its activities. For example, at first sight, the Royal Society did not necessarily have anything to offer members of the trades in terms of the benefits of

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[55] Birch, *History*, Vol. I, pp. 5 – 6.

[56] Lotte Mulligan and Glenn Mulligan, "Reconstructing Restoration Science: Styles of Leadership and Social Composition of the Early Royal Society", *Social Studies of Science*, Vol. 11, No. 3 (August 1981), pp. 327 – 364; Hunter, *Science and Society*, 74 - 77. Chapter Four will discuss in detail the men the Society did want to include, as articulated by Thomas Sprat in his history of the Society.

institutional membership. Apothecaries for instance, were of necessity members of their own association, the Worshipful Company of Apothecaries. There was little incentive for them to become members of an unknown and untried organisation such as the Royal Society. On the other hand, as the Society became more established, it became increasingly reliant on the skilled artisans and craftsmen who manufactured a range of technical instruments, such as microscopes and telescopes. These craftsmen in turn benefited financially from their increased sales which the endorsement of their skills by the Society. This mutual benefit encouraged craftsmen to wish to become associated with the Royal Society, but not necessarily as fellows. [57]

In addition, the cost of becoming a fellow was steep one, especially for tradesmen and craftsmen; the election fee of twenty shillings – which later rose to forty shillings – plus a weekly subscription of a shilling per week, would have represented a significant proportion of a tradesman's income. The Society was concerned to help fellows who found themselves in financial difficulty or could not otherwise afford to pay the subscription fee. At a council meeting on 5 November 1667, John Wilkins proposed, and the council agreed, that

> Mr Collins might be declared exempt from the payment of admission-money and the weekly payments, he having but a small revenue, and being capable and willing to do the society very good service. [58]

The difficulty for the Royal Society in deciding to exempt some fellows from payment, was that the Society's only income at this time was derived from the payment of subscription and election fees. This was supplemented with occasional gifts; however, the fees represented the Society's only reliable source of income. The Society's accounts showed that besides the salaries paid to Henry Oldenburg and Robert Hooke, the Society's expenditure included payments to other employees, purchases of equipment and materials for Hooke's experiments. The difficulty of getting fellows to pay their subscription fees was a perennial one for the Society: the minutes of the very first meeting

[57] Larry Stewart, "Science, Instruments, and Guilds in Early-Modern Britain", *Early Science and Medicine*, Vol. 10, No. 3, Openness and Secrecy in Early Modern Science (2005), pp. 392 – 410, esp. pp. 398 – 402.
[58] Birch, *History*, Vol. II, p. 206.

of the Society's council includes a resolution to send notices requesting payment to fellows who had not paid their fees. There is even a suggestion that the work of the curators was materially hampered because the Society was not able to pay them a sufficient or reliable income. Ultimately, the Society simply did not have the capital or income to function without the contributions of fellows. [59]

The election of Collins and the decision to excuse him from paying fees because of the 'service' that he would be able to perform for the new society illustrates the practical considerations which the founders considered when choosing members. They made decisions about recruitment based on what kinds of members would be best placed to carry out the kinds of activities planned by the Society. The Society needed men who could contribute to its activities immediately, even before the Society had obtained funding or its own premises. The facilitated inclusion of Fellows of the College of Physicians and university professors had practical advantages for the Society, beyond the use of the College's rooms. Both groups had access to facilities and they had the intellectual credentials which would allow them to conduct the kinds of experiments and investigations that the Society wanted to promote. The presence of so many physicians and professors on the list of forty men demonstrates the interest amongst these groups. Dr Francis Glisson was a Fellow of the College and had already published an influential work on rickets. Christopher Wren held the chair in astronomy at Gresham College, and later the Savilian chair of astronomy at Oxford. The Society could thus take advantage of the fact that many men in these groups were already engaged in experimental activity which would mean that the Society could take immediate advantage of their work. In addition, the university scholars could work much in the same way as Wilkins did when he was warden of Wadham College, Oxford, and then master of Trinity College, Cambridge. Wilkins has been credited with being particularly influential in developing an interest in his students in natural knowledge,[60] and the founders may well have considered that the professors who became members of their Society could act as ambassadors for the Society amongst their students, thus encouraging a younger generation of members joining the Society, and thereby ensuring its continued existence. The influx of younger

[59] Birch, *History*, Vol. I, p. 237; R K Bluhm, "Remarks on the Royal Society's Finances, 1660 – 1768", *Notes and Records of the Royal Society of London*, Vol. 13, No. 2 (Nov 1958), pp. 92 – 94.
[60] Shapiro, *John Wilkins*, esp. chapter 5.

men would mean that the Society would continue to build on the knowledge which the current generation of members would be producing. This further highlights the practicality of their approach in so many other aspects of the organisation of the Society, including their approach to membership.

Broadening the Society's social base would have been difficult, given that there was also the issue of 'craft secrecy'. For many craftsmen, the secrets of their trades were related to their incomes: ownership of specific and individual craft techniques could give the craftsmen an edge on his or her competitors. To give up that knowledge to the fellows of the Royal Society – which they would have had to as part of the Society's history of trades programme – would not have encouraged craftsmen to join the Society. Larry Stewart has highlighted the at times difficult relationship with London's trade guilds. This tension may have contributed to the Society's abandonment of its history of trades programme. The Royal Society's attempts to write detailed 'histories' of the work practices of the various trades needed the cooperation and openness of craftsmen and tradesmen about their work, which many of them were unwilling to provide. [61]

Just as significant is the very real possibility that tradesmen, yeomen and craftsmen would simply not have been interested in joining such an organisation. The Royal Society was a learned leisure club, and leisure interests in this period were very much influenced by a person's social status. Peter Burke has identified 'two cultural traditions' of the seventeenth century: the 'great tradition' derived from the scholastic education of schools and universities and which contributed to the renaissance and the scientific revolution and affected only 'the educated minority'. In contrast there was the 'little tradition' which comprised the entertainments of ordinary people, and which included folktales and songs, mystery plays and farces, and broadsides and chap-books. There was some two-way traffic in participation in leisure activities, such that the elites would engage in activities of the 'little tradition' but ordinary people would not participate in the 'great tradition'. [62] Even where the social elites and ordinary folk engaged in the

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[61] On craft secrecy see Pamela O Long, *Openness, Secrecy, Authorship, Technical Arts and the Culture of Knowledge from Antiquity to the Renaissance* (Baltimore, 2004). Larry Stewart, "Science, Instruments, and Guilds in Early-Modern Britain", pp. 392 – 410.

[62] Cited by Barry Reay, ed., *Popular Culture in Seventeenth-Century England* (London, 1988), pp. 13 – 14.

same leisure activities, they still did not participate equally. For instance, in horse racing the horses tended to be owned by the elites; and in cock-fighting the elites sat close to the ring which the poorer sort sat nearer to the back. [63]

In any case, many tradesmen and merchants were simply not interested in the pursuit of natural knowledge because they did not have the interest or educational background to fully engage in it as practised by the Royal Society. Their ability to create and refine complex instruments such as microscopes or telescopes did not presuppose a disposition to interest in the uses to which such instruments would be put. John Collins' comments on his election to the Royal Society – the same Mr Collins who was mentioned above who was exempted from payment of the fees - is depicted by Michael Hunter as indicative of the social exclusiveness of the Society: Hunter suggested that Collins' reference to being a 'mean person' elected for his knowledge of mathematics, indicated that 'others of similar status and lesser intellectual achievement were debarred from membership altogether'. [64] Collins' attitude is more indicative of the difference in participation in leisure activities described by Barry Reay above. Men like Collins would not normally expect or be expected to participate in the 'great tradition' of leisure pursuits. An anecdote from Samuel Pepys' diary further illustrates this: Pepys recorded in his diary his frustration with a Mr Reeves, an optical glass lens maker, when Pepys tried to discuss optics with him.

> It vexed me to understand no more from Reeves and his glasses touching the nature and reason of the several refractions of the several figured glasses, he understanding the acting part, but not one bit the theory, nor make any body understand it, which is a strange dullness, methinks. [65]

Tradesmen, craftsmen and artisans were more than happy to be associated with the Royal Society, if only for the potential for sales of their goods to individual fellows; however, they did not need to pay to become fellows of the Society to do this. There is also of course, the cost of fellowship. The initial cost of election was twenty shillings, rising to

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[63] Reay, *Popular Culture in Seventeenth-Century England*, pp. 15 – 16.
[64] Hunter, *Science and Society*, pp. 72 – 73.
[65] Samuel Pepys, *The Diary of Samuel Pepys*, ed. Steven Algieri (Kindle edition, 2011; from original publication London, 1879), entry 19 August 1666.

forty shillings by the end of the decade. Fellows were also obliged to pay one shilling per week subscription fee. This was a not inconsiderable sum for working men in this period. Barry Reay noted that in London in particular, there were opportunities for the lower classes to engage in the leisure interests of their social superiors. For example, printers were craftsmen with some book-learning who acted as intermediaries between learned and popular culture; and servants of the elites could absorb learned culture by reading their masters' books and listening to their conversations. [66] Nonetheless, the cost of membership and limited opportunities to engage with and conduct experiments and observations would have made it difficult for ordinary people to participate in a club like the Royal Society. Ultimately, it must be accepted that the founding fellows needed to make decisions about membership related solely to the requirements of the new club and the reality of the circumstance within which they needed to operate.

2.3 A Vision for a College

The care which the founders of the Society devoted to the organisational elements and membership of their new club raises more interesting questions about their vision for the future of their Society, and the ultimate purpose they envisaged that their Society would serve. The founders were clear that they wished ultimately to build a college devoted to the study of nature. But what would this college look like? Three men wrote texts detailing their visions for a college devoted to experimental learning which will be considered here: William Petty, John Evelyn and Abraham Cowley. Petty was a founder member and Evelyn an original fellow; Cowley though, although his name was included in the original list of forty, never became a fellow of the Society. He was however at Oxford studying medicine in the 1650s and was a friend of Evelyn's. Thomas Sprat was his literary executor, and Cowley contributed an ode to the Society in Sprat's *History of the Royal Society*. These men's works vary in the detail, but they reveal that despite their conviction of the value of such a college, their ideas reveal much about the political and intellectual context within which different ideas about the differences between private and public

[66] Reay, *Popular Culture in Seventeenth-Century England*, pp. 52 – 53.

enterprise, and the value to England as a nation of funding organisations which aimed to reform knowledge and learning throughout the country.

This section will compare these men's visions and analyse how they correspond to the practical efforts of the founders of the Society to establish their organisation and build towards a vision for the future. For the founding of a club was not the final goal for the founding fellows; the record of the very first meeting of the Society shows that for the founding fellows, the true aim was a college devoted to all aspects of the study of nature, England's own 'Solomon's House'. Their organisational efforts were all directed to the end of a larger scale public institution, an enterprise similar to a modern research institute. In the first meeting, it was recorded that in that first meeting 'something was offered about a design of founding a college for the promoting of physico-mathematical experimental learning'. It is interesting that in the historiography of the Society, the goal of founding a college is not treated as central to the Society's existence. Chapter 4 will contain a more detailed discussion of this issue.[67]

The founding fellows were influenced by the ideas in Sir Francis Bacon's works *The New Atlantis* (1627), and *Novum Organum* (1620). This is evident in visual form in John Evelyn's design for the frontispiece of Thomas Sprat's 1667 *History of the Royal Society*, where Bacon is given prominent place. Bacon's concept of a 'Salomon's House' in *The New Atlantis* was central to the models of colleges considered here. Written around 1623 and published in 1627 a year after his death, Francis Bacon described a hitherto unknown land discovered by explorers in the South Sea. These travellers were allowed by its inhabitants to disembark on the island and proceeded to explore this new land. As they travelled about the country, various residents of the country explained to them their approach to life, religion, politics, law and learning. Amongst the many institutions the travellers encountered was the organisation devoted to learning, known as 'Salomon's House', after the biblical King Solomon, famous and revered for his wisdom. In this Solomon's House, all aspects of the study of nature were pursued. These included observations and experiments involving all types of natural phenomena and natural objects in nature, and including such subjects as astronomy, anatomy and botany. It also included the human

[67] Birch, *History*, Vol. I, p. 3.

arts and crafts by which natural objects were manipulated by humans for their use, such as the concoction of medicines, the construction of instruments for a variety of purposes, and food preparation such as bread making. A vast variety of buildings, lands and persons were devoted to the various tasks of the House. One very important aspect of the work was the necessity to send a select group of persons abroad to visit other lands to gather knowledge to be brought back to inform the work of the House. Acclaim was accorded to those who devised new inventions or made new discoveries. These men were immortalised in special galleries; one devoted to the inventors, and the other to their inventions, and the inventors themselves were given "a *Liberal* and *Honourable* Reward".[68] This Solomon's House was devised on a vast scale and was a utopian temple to the pursuit of knowledge.

Both Evelyn and Cowley were influenced by the model of 'Solomon's House' as the basis of their visions for a college. The contrasting models for a college however, illustrate a juxtaposition of Evelyn's private retreat with limited public exposure, versus Cowley's fundamentally public institution with a public purpose. In a letter to Robert Boyle dated 3 September 1659, Evelyn described his ideas for a 'design' for a society of gentlemen,

> whose geniuses are greatly suitable, and who desire nothing more than to give a good example, preserve science, and cultivate themselves, join together in society, and resolve upon some orders and oeconomy, to be mutually observed, such as shall best become the end of their union, if, I cannot say, without a kind of singularity, because the thing is new: yet such, at least, as shall be free from pedantry, and affectation.[69]

Further into the letter, Evelyn described the layout of the 'society', which would require the purchase of "thirty or forty acres of land" and included buildings which would be "very nobly furnished" and included a library, drawing room, refectory, gallery and chapel. The living space for the members, described as "apartments or cells", would comprise a bedchamber, outer room, closet and small garden, "somewhat after the manner of the Carthusians". There would also be a laboratory and a repository for rarities, as well as an

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[68] Right Honourable Francis, Lord Verulam, Viscount St Alban, *New Atlantis. A Work unfinished* (London, 1627), pp. 26 - 34.
[69] John Evelyn to the Hon. Robert Boyle, *Diary*, p. 116.

aviary, 'physic garden' and an orchard.[70] Details in the letter about costs indicate that he was aware of the monetary dispensations which would need to be made, and he suggests that the members themselves bear the cost of the society, including the cost of servants.

The language of Evelyn's letter, and his description of the society is highly reminiscent of a private and almost monastic retreat. His mention of the Carthusians, the reference to the members' 'cells', as well as his description of the meals to be consumed, the order of the day and the rules imposed on the members, all reflect an inclination towards a monastic life. Towards the end of the letter Evelyn refers to the retreat of Saint Hierome and others to "sweet recesses and societies in the East" following the invasions of the Goths. It is only near the end of the letter that Evelyn refers to the actual purpose of the society:

> Every person of the Society shall render some public account of his studies weekly if thought fit, and especially shall be recommended the promotion of experimental knowledge, as the principal end of the institution.[71]

Clearly for Evelyn, this was a vision of a highly personal and near-religious retreat from society, even though he declares that the institution had a public benefit. It also seems to reflect Evelyn's desire to combine the humanist learned tradition of respect for ancient learning with the embrace of the new experimental philosophy of Bacon, all as part of the responsibility of gentlemen for public service. [72] From the tone and content of the letter, John Evelyn felt keenly, as a devout Anglican and committed royalist, the upheaval and destruction of the civil war and Interregnum. He suffered extensive material losses, and lamented the dismantling of the established church, preferring to risk worshipping in secret, rather than conform to one of the dissenting religions. He therefore longed for an oasis which would remove him from those dark times. He admitted that if he had not felt it his duty to provide for his dependents, he would have devoted his fortune to funding such a design himself.[73] It is not known whether Evelyn saw himself in the college which he pledged 50, 000 bricks to build near the end of the decade; Cowley's model – which

[70] Evelyn to Boyle, *Diary*, pp. 117 – 118.
[71] Evelyn to Boyle, *Diary*, p. 119.
[72] Joseph M Levine, *Between the Ancients and the Moderns: Baroque Culture in Restoration England* (New Haven, 1999), pp. 23 – 26.
[73] Evelyn to Boyle, *Diary*, p. 116.

was later written of by Sprat as being the one the Society preferred – was a very different entity. [74]

Published in 1660, Abraham Cowley presented a picture of a very different enterprise. Far from a monastic retreat, Cowley envisaged what today would be considered a kind of research institute with educational facilities, perhaps even a modern scientific university. His college would be organised on a much more 'professional' basis, in that all people involved in the college, apart from the chancellor or president and the governors, would be employed by the college and receive a salary. His plan involved educational as well as research facilities, with provision made for a school for the education of about two hundred boys. Cowley's college would be equipped with the same sort of facilities as Evelyn's, although Cowley envisioned that his college would be located no more than three miles from London; Evelyn suggested no more than twenty-five miles from the City. The college would have a much more public role than that of Evelyn; he emphasises much more the public good which such a college would bring. The sixteen paid professors of the college would be "bound to study and teach all sorts of Natural, Experimental Philosophy...", and present public lectures on a variety of subjects, as well as publishing at three-year intervals "an account in Print, in proper and ancient Latine, of the fruits of their triennial Industry.".[75] Interestingly, these public duties were not in the Society's charters, arguably to the Society's disadvantage; this will be discussed in more detail in the next chapter. Cowley emphasised much more the importance of collective effort in the advancement of knowledge. He wrote that a single person, working alone in private would have a smaller chance of producing correct knowledge, than several men working together. Similarly, like Bacon, it was important for several of the professors to "be always travelling beyond Seas":

> That the four Professors Itinerant be assigned to the four parts of the World, *Europe*, *Asia*, *Afrique*, and *America*, there to reside three years at least, and to

[74] Sprat, *History*, pp. 59 – 60.
[75] Abraham Cowley, *A Proposition for the Advancement of Experimental Philosophy* (London, 1661), pp. 31 – 32, 38 - 39.

> give constant account of all things that belong to the Learning, and especially Natural Experimental Philosophy of those parts.[76]

One of the most striking differences between Cowley's and Evelyn's plans was the matter of funding. Evelyn's was very much a private enterprise funded by private individuals, whereas Cowley was most emphatic in stating that his college would and should be funded by the government. Cowley emphasises this in his preface:

> *it is humbly proposed to his Sacred Majesty, his most Honourable Parliament, and Privy Council, and to all such of his Subjects as are willing and able to contribute any thing towards the advancement of real and useful learning, that by their Authority, Encouragement, Patronage, and Bounty, a* Philosophical Colledge *may be erected, after this ensuing, or some such like Model*.[77]

While acknowledging the contribution which could be made by others, Cowley's expectation was that the primary financial responsibility for the establishment of such a college belonged to the king and parliament. Later, Thomas Sprat in his *History* suggested that Cowley may have been naive in his expectation for the funding of the college, writing that Cowley's plan was largely "practicable", except that he imputed a greater level of generosity in men than actually existed, in terms of "the *Largness of the Revenue*, with which he would have his College at first indow'd..." .[78] This reflects what Alan Houston and Steve Pincus have suggested was one of the changes in the attitude to the monarchy: "English men and women increasingly saw the state as an essential tool or resource for the fulfilment of their needs."[79] Evelyn foresaw no need for involvement of the monarch in his society: he was writing long before there was any possibility of a return of the monarchy. It would be interesting to consider how his plans for a college may have been different if there had been a monarch on the throne. In contrast, Cowley saw the king's role as vitally important. This may have been a nod to Charles II as a demonstration of Cowley's welcome for the return of the monarchy, as well as veiled appeal to Charles and

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[76] Cowley, *A Proposition*, pp. 29 – 30.
[77] Cowley, *A Proposition*, pp. 12 – 13.
[78] Sprat, *History*, p. 59.
[79] Alan Houston and Steve Pincus, eds., *A Nation Transformed: England after the Restoration* (Cambridge, 2001), Introduction, p. 12.

parliament for funding. In addition, Cowley provides more detailed information about the actual cost of his college, with a breakdown of the salaries to be paid to all of the staff, as well as costs for the buildings, grounds and equipment required. Unlike Evelyn, though, Cowley makes no attempt to calculate the cost of purchasing the necessary land, nor of construction of the buildings or the laying out of the grounds. Perhaps, being a landowner, Evelyn was able to think much more easily in those terms than Cowley, who earned his living as a physician as well as a poet.

The influence of Francis Bacon's ideas is clearly very strong in these two visions for a college. Neither man though, had any illusions that it would be possible to re-create Bacon's Solomon's House. Evelyn said, "we are not to hope for a mathematicall college, much less, a Solomon's house", and Cowley, that "we do not design this after the Model of *Solomons* House in my Lord *Bacon* (which is a Project for Experiments that can never be Experimented)".[80] Both men understood that such a college was not possible. The cost would be prohibitive, and the time to construct suitable premises and to recruit appropriate members would mean that it would take years for the college to become productive. However, the principles of the experimental philosophy could be realised on a much smaller scale, and there was value to the nation and mankind in pursuing it. Details of the experiments and other activities to be conducted in Bacon's Solomon's House are described in their plans, but more limited in scope, as are the facilities such as gardens, aviaries and ponds, as well as laboratories, libraries, and buildings dedicated to astronomy and mathematics. In this respect, Bacon's influence can be seen not only in Evelyn and Cowley, but also in the nature of the activities conducted by the society in its early years. The emphasis was on conducting experiments and observations on a broad range of natural philosophical topics, and the minutes of meetings reflect this.

William Petty's plan for a college was written much earlier than those of Evelyn and Cowley, and in circumstances in England which were very different. Petty's membership of the republican Rota Club in the 1650s may explain the ways in which his model of a college differed from the others. In the first instance, Petty's model was published earlier than both Evelyn's and Cowley's: in 1647, he wrote *The Advice of W.P.*

[80] Evelyn to Boyle, *Diary*, p. 116; Cowley, *A Proposition*, p. 28.

to Mr. Samuel Hartlib For the Advancement of some particular Parts of Learning. Petty's plan was formed because of the reforms which he saw were being advanced by Hartlib. Like Cowley's college, Petty had a plan for an organisation which was for two colleges and a school, thus combining research with education. Petty's association with Hartlib is demonstrated in the utilitarian nature of the organisations which he proposed, and indeed his design fitted in with Hartlib's own designs for a reformation of learning at this time. Petty stated in the dedicatory epistle that he had been inspired by Hartlib's proposal for "an Office of Publick addresse".[81]

This 'Office' was proposed by Samuel Hartlib in *Considerations Trending To the Happy Accomplishment of Englands Reformation in Church and State* (1647). Hartlib's 'Office of Addresse' was dedicated to utilitarian projects to generally improve human lives through improvements in trade, agriculture and the sharing of knowledge. These are also areas of interest for the early fellows of the Royal Society, as shown in their History of Trades programme, and their committee devoted to enquiries in agriculture and forestry. In this respect the concept of 'improvement' is a strong source of motivation both for Hartlib, Petty and the later Royal Society. Both Paul Slack and Paul Warde highlight the Baconian inspiration for seventeenth century ideas about improvement, specifically in terms of the rejection of old classical ideas and the embrace of notions tied to human beings' God-given right to exploit the natural world through mastery of it. [82] Paul Warde described Hartlib's circle and his ideas for the reform of education as being related to the improvement of knowledge and the exchange of ideas, although for Hartlib the focus was specifically on technological improvements to agriculture. [83] Paul Slack further argued that the Royal Society was greatly influenced by both the Hartlib circle and William Petty, 'the most versatile member of the circle'. The Hartlib circle passed on to the Society ambition for 'the simultaneous pursuit of economic betterment and a Baconian advancement of learning', and Petty brought 'a new kind of political economy, one which embraced the

[81] William Petty, *The Advice of W.P. to Mr. Samuel Hartlib For The Advancement of some particular Parts of Learning* (London, 1647), pp. sigA3r – sigA3v.
[82] Paul Slack, *The Invention of Improvement: Information and Material Progress in Seventeenth-Century England* (Oxford, 2015); Paul Warde, "The Idea of Improvement, c. 1520 – 1700", in *Custom, Improvement and the Landscape in Early Modern Britain*, ed. Richard Hoyle (Farnham, 2011).
[83] Warde, "The Idea of Improvement", p. 138.

whole wealth of the nation and not just its balance of trade.' [84] Charles Webster also drew close similarities between the Royal Society and Hartlib's 'Agency for the Advancement of Universal Learning'. However, Webster suggests that the major difference between the two organisations lay in their social roles. The Agency was designed by Hartlib to be very much an organ of the state, with state funding and a humanitarian and utopian function geared towards fulfilling its public responsibility. The Royal Society on the other hand, having no state income and therefore being free from 'state regulation', meant that the Society also had 'independence of operation'. [85] However, it will be shown that the Royal Society would have preferred state funding, because it could then be assured of a reliable income.

Paul Slack has pointed out that William Petty's development of his 'political economy' – the process of collecting data on the country's material progress - was influenced by his own specific ideas of improvement, which remained consistent throughout his life. Petty saw England's material progress as being related to reforms and new developments in agriculture, husbandry and technology, which would progress not just prosperity, but all human development. [86] This combined with his personal background as that the son of a clothier and a trained physician, meant that the colleges he proposed would focus on the trades and medicine. Students at the school would all be taught some form of manufacture, regardless of social status. Petty also planned for a "Colledge of Trades-men" which would include at least one person from of each of the trades, who would work to improve their trades. From this, "all Trades will miraculously prosper, and New Inventions would be more frequent", and there would even be "new fashions of Clothes and household-stuffe".[87] This would also facilitate the writing of a History of Trades, as advocated by Francis Bacon. Like Evelyn's and Cowley's plans, Petty's college bears a strong resemblance to Bacon's Solomon's House but on a much smaller scale and devoted primarily to the trades. In addition, Petty proposed the establishment of a "Nosocomium Academicum or an Hospitall", which was effectively a teaching hospital, to include not only physicians, but also surgeons, apothecaries and nurses. Like

[84] Slack, *Invention of Improvement*, p. 91.
[85] Webster, *The Great Instauration*, p. 97.
[86] Slack, *Invention of Improvement*, pp. 127 – 128.
[87] Petty, *The Advice of W. P.*, pp. 6 – 7.

Cowley, Petty's college was designed for a public role and for public good, very much like Hartlib's "office of Publick addresse".[88]

In Petty's model, education took a central role, with the acquisition of practical skills being of equal importance as intellectual ones. He saw the children of gentlemen to benefit particularly from an education involving some form of art or craft (although a place in the school would be available to any child regardless of the ability to pay). Petty felt that the children of gentlemen would thus be encouraged to become involved in conducting experiments – with their own hands, not just employing someone else to do the work for them – and they would be also more likely to conduct them better "than an ordinary workman". [89] This idea of involving the children of gentlemen in experiments is one which was echoed by Sprat in his *History* as a means of encouraging gentlemen to support the work of the Society by not only contributing their experimental and observational efforts, but also their money. [90] Physicians would also benefit from time spent at his *Nosocomium Academicum*. The presence there of surgeons and apothecaries would mean that physicians would be able to expand their knowledge of medicine to include the skills that these other groups would be able to impart, thus broadening the physicians' own range of skills beyond so-called 'intellectual' medicine. The physician should thus be trained in knowledge of "Phaenomena of Nature". He would also be trained to instruct and be instructed by the surgeons and apothecaries who would operate under him, in order to facilitate the production of a broad "Systeme of Physick and the most approved Medicinall Aphorismes". [91] Another practical product of the college for the trades would be the history of trades which would be produced. The practical purpose of this history would be that it would be a kind of repository of best practice, with detailed descriptions of the processes and practices of all trades, as well as a description of all inventions. This history would ensure that men would not waste time repeating work that had been done by previous practitioners; it would allow men to advance more quickly in the trades by avoiding the more tedious parts of learning. It would also do away with the purveyors of false or incorrect knowledge in the whole range of crafts and professions:

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[88] Petty, *The Advice of W.P.*, sig.A3r.
[89] Petty, *The Advice of W.P.*, p. 6.
[90] Sprat, *History*, pp. 67 – 70.
[91] Petty, *The Advice of W.P.*, p. 12 - 13.

correct, up-to-date knowledge would be available to all who wished to pursue it and the texts could even encourage men to properly identify the professions or crafts to pursue which their skills or talents indicated that they could be fitted for.[92]

Also, like Cowley and Evelyn, funding for the college was a major element in the development of Petty's plans. He understood there was a need for the men with money to be put into contact with the men with the ideas and skills to advance knowledge and make new discoveries. In his dedication to Hartlib Petty admits that he had conceived of his plan earlier but had put aside his designs because of the "vast summes" needed and the unwillingness of men to contribute.[93] Similarly,

> one man wants a small summe of mony, to carry on some designe, that requires it, and there is perhaps another, who has twice as much ready to bestow on the same designe, but these two having no Meanes ever to heare the one of the other, the good Work intended and desired by both parties doth utterly perish and come to nothing.[94]

This sentiment was echoed by Sprat in his *History*, another indication of the shared ideas of the new club's earliest members. [95] Again, in his description of the establishment of the *Nosocomium*, Petty acknowledged that an old existing hospital would have to be used, since the cost of building such an institution from scratch would be so expensive as to "deter men even from the most noble and necessary Attempts".[96] Over and again, Petty emphasised that lack of funds is a fundamental hindrance to the advancement of learning and knowledge. For this reason, he made the economic case for investment to improve the education of men in the trades and of physicians. Of course, Petty may have been biased here: as an aspiring physician, he would have been keen to see any development which would have increased his income. However, the emphasis on economics and the potential of the *Nosocomium* to serve the public good fits perfectly with the improvement advocated by Hartlib.

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[92] Petty, *The Advice of W.P.*, pp. 18 - 23
[93] Petty, *The Advice of W.P.*, sigA3r – sigA3v.
[94] Petty, *The Advice of W.P.*, p. 2.
[95] Sprat, *History*, p. 35.
[96] Petty, *The Advice of W.P.*, p. 9.

Like Cowley, the inclusion of the right sort of personnel was vital to the success of Petty's colleges. Petty emphasised the need for men who are fully committed to learning and the advancement of knowledge, such as is reflected in the founding fellows' list of forty. This can be seen to influence the conduct of the founders and early fellows of the Royal Society: they wanted to build a permanent community of natural historians and natural philosophers wholly committed to the pursuit of natural knowledge. This concept reflects the definition of a 'community', from the 1671 edition of a dictionary by Edward Phillips – which contained contributions from Evelyn, Boyle, Hooke, Francis Glisson and Christopher Merrett - was simply "injoying in common, or mutual participation".[97] The 1696 edition was more expansive, and added:

> A Society of Men Inhabiting in the same place. Pious Foundations, for the support of several Persons under a regular manner of Life, are called Communities. Hospitals, Colleges, Companies or Guilds of Tradesmen are called Communities.[98]

As Phil Withington has pointed out, communities in the form of clubs, societies, companies, corporations and other types of cooperative institutions were an integral part of early modern society. These communities were important forms of sociability, support and cooperation: 'across the social spectrum it was through the active participation in company that charity, credit, neighbourliness, and networks of mutual support were created and accessed.' [99] What Petty and Cowley's models – and the later Royal Society – embodied was a combination of the prospect of individual benefit with a goal of public duty for public good. As such, the Royal Society from its inception reflected sociological ideas and concepts which extended beyond the narrower focus on natural knowledge.

The significance of these ideas of a place for the pursuit of natural knowledge should not be underestimated. As Steven Shapin has shown, the space within which

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[97] Edward Phillips, *The New World of Words, or, A general English dictionary containing the proper significations and etymologies of all words derived from other languages* (London, 1671). The 1663 edition of this dictionary cited earlier in this thesis also contains this definition.
[98] Edward Phillips, *The New World of Words, or, A general English dictionary containing the proper significations and etymologies of all words derived from other languages* (London, 1696).
[99] Phil Withington, *Society in Early Modern England: The Vernacular Origins of Some Powerful Ideas* (Cambridge, 2010), p. 179.

reliable and objective knowledge was produced was directly related to the *nature* of that space. According to Shapin, for experimental natural philosophers of seventeenth-century, the problem of knowledge which had been produced in previous times was that it was produced in private spaces by solitary individuals working in private laboratories or studies. These were settings which were not likely to produce reliable knowledge. On the other hand, 'spaces appropriate to the new experimental program were to be public and easy of access'. [100] In the models for colleges described above, men like Petty and Cowley envisaged a space for the conduct of experiments and observations which was more public than a private home, but less so than for instance the apothecary's and instrument maker's shops, rooms of college fellows, or coffeehouses, where such work was often undertaken in the mid- to late seventeenth century. [101] So, these models for colleges are therefore not simply suitably-equipped spaces for the conduct of experiments; they were also designed to produce reliable knowledge produced in a semi-public place, which both physically and epistemologically created boundaries and discipline for a community of natural philosophers. [102]

Incidentally, none of these models for a college resemble the place of the Society's founding: Gresham College. The College was established in 1597 from a bequest in the will of the mercer Sir Thomas Gresham and was administered by a joint committee called the Joint Grand Gresham Committee, overseen by the Corporation of the City of London and the Mercers' Company. Gresham's will made provision for a college to be staffed by seven resident lecturers, later called professors who would be awarded an annual salary of £50. These professors would each deliver one free public lecture per week during term-time, in Latin and in English. Professorships were given for seven subjects: divinity, astronomy, music, geometry law, physic and rhetoric. [103] The founding fellows' ties to Gresham extended beyond merely the location of the new society's meetings. Many then current, past and future Gresham professors also became fellows of the Royal Society. These

[100] Steven Shapin, "The House of Experiment in Seventeenth-Century England", *Isis*, Vol. 79, No. 3, A Special Issue on Artifact and Experiment (September 1988), pp. 377 – 378.
[101] Shapin, "House of Experiment", p. 378.
[102] Shapin, "House of Experiment", p. 373. The importance of a public space to the Royal Society will be discussed in Chapter Four.
[103] Harold Hartley and Cyril Hinshelwood, "Gresham College and the Royal Society", *Notes and Records of the Royal Society of London*, Vol. 16, No. 1, The Tercentenary Celebrations (April 1961), pp. 127 – 128.

included Laurence Rooke, Sir Christopher Wren, William Petty, Jonathan Goddard and Robert Hooke. The fellows of the Society would later intervene in the appointment of professors to the College's lectureships and would seem to have been involved in some of the College's administrative affairs. [104] It will also be seen in the next section that groups which came together at Gresham College in the 1640s and 1650s provided the lasting ties which culminated in the founding of the Royal Society. Further, it has been suggested that the Royal Society and Gresham College enjoyed a mutually beneficial relationship. The Society received free accommodation in the College's buildings, and the College could enjoy the reflected prestige of housing the Society whose fellows included many distinguished individuals. [105]

Gresham College though, does not seem to have been a model for a college which the Royal Society's founders and early fellows cared to adopt. Despite its name, Gresham College was not an educational institution such as Oxford or Cambridge universities were. It took no students and awarded no degrees. It operated more as a charitable foundation, acting to provide free educational content to the people of London, through public lectures. As has been shown, the Royal Society had no interest in taking students, or of providing anything like a formal educational programme. [106] It is also the case that the Society never had a role in providing public presentations of their research and discoveries. This may have been because the they had no wish to duplicate the lectures which their own fellows were already being paid to present. Also, the aims of the new society extended far beyond what Gresham College was designed to provide. The founding fellows wished to create a more ambitious research facility, of which the public lectures provided by the Gresham professors was only a part. However, the buildings of the College contained facilities which were like the kind of accommodation which Evelyn, Cowley and Petty included in their own models. The building – Thomas Gresham's former home, was designed like a university college, with a building built around a central quadrangle. It housed numerous meeting rooms and space for a laboratory and even a

[104] Ian Adamson "The Royal Society and Gresham College 1660 – 1711", *Notes and Records of the Royal Society of London*, Vol, 33, No. 1 (August 1978), pp. 3 – 4.
[105] Hartley and Hinshelwood, "Gresham College and the Royal Society", p. 133.
[106] The Royal Society's relationship with Gresham College will be discussed in more detail in Chapter 4.

small observatory; these were facilities which the new club made increasing – and rent free - use of during its tenure there. [107] Sir Thomas Gresham's endowment may have been the most influential aspect of Gresham College's foundation which the new society may have been most influenced by. To find such a wealthy patron who would be able to finance their entire enterprise, including providing buildings and land, would be an ideal means of securing the society's future.

These visions for colleges demonstrate that the founding fellows of the Royal Society had absorbed concepts about individual contributions for the greater public good, and the institutional means by which this could be accomplished. Their models for colleges were rooted in pragmatic and practical concerns about how a college dedicated to the study of nature could be designed to serve the public by improving knowledge and technology. Men like Petty and Cowley saw the need to encourage state funding for such enterprises to ensure the college's ability to deliver the kinds of improvements needed to further the material and intellectual wealth of the nation. The organisation could only survive if a community was created and allowed to develop through the inclusion of suitably qualified people, chosen for their overriding dedication to the goal of general improvement.

2.4 Learning the Lessons of the Past

While the Royal Society was the first publicly incorporated institution devoted to natural knowledge, it was at that time only the latest incarnation of other clubs and groups devoted to such activities. From the middle of the 1640s onwards, English learned men had been coming together in formal and informal groups to discourse, share knowledge and conduct experiments in the interests of promoting natural knowledge. The founders of the new organisation had all been associated with one or more of these clubs and groups, and this influenced their approach to the establishment of their new club. They considered factors which had affected the longevity of the previous clubs and groups, and the framework which the founders adopted for their new club demonstrates the steps they took to ensure that the new society would not suffer the same fate. In this

[107] Hartley and Hinshelwood, "Gresham College and the Royal Society", pp. 127, 131 – 132.

way, the founders could try to ensure that their society would become established enough to exist into beyond their own lifetimes.

The origins of the Royal Society have been a matter for debate from the seventeenth century to the twentieth century. Sprat in his *History* wrote that the origins of the society lay in the Oxford Philosophical Club of the 1650s, while the mathematician John Wallis claimed its origins to have been the group meeting in the 1640s at Gresham College. Thomas Birch in his *History* suggests that both groups were the society's originators. In the twentieth century, Margery Purver devoted her work on the Royal Society to proving that the Oxford group was the direct predecessor of the Society. This was later refuted in detail by Charles Webster, who argued that the Society's roots were stronger, both physically and ideologically, in the group which met at Gresham College. Mordechai Feingold returned to the question in "The Origins of the Royal Society Revisited" and essentially concluded that both locations could lay claim to the Royal Society's origins. The main difference between contemporary and modern accounts is that modern historians have primarily been focused on the intellectual origins of the society, whereas contemporary commentators tended to be concerned with the physical origins in the form of participants and location. This chapter however, shares the contemporary focus, because the intellectual origins in this context are less relevant than the practical concerns of founding and establishing a learned club or society in this period.

There were four groups and clubs which have been identified as being the predecessors of the Royal Society.[108] There was the informal group known as the 1645 Group or the Gresham College group, which met in London in rooms in Gresham College. This was largely composed of professors at Gresham College, but also included others who were known to the men of the group. Writing in 1678, John Wallis described this group as being composed of John Wilkins, Dr Jonathan Goddard, Dr George Ent, Dr Francis Glisson, Dr Charles Scarburgh and Dr Christopher Merrett. According to Wallis, they

[108] Margery Purver, *The Royal Society: Concept and Creation* (London, 1967); Charles Webster, "The Origins of the Royal Society", *History of Science*, Vol. 6 (Jan. 1967), pp. 106 – 128; Mordechai Feingold, "The Origins of the Royal Society Revisited", in *The Practice of Reform in Health, Medicine and Science*, eds. M Pelling and S Mandelbrote (Ashgate, 2005), Chapter 9.

> met weekly, (sometimes at Dr. *Goddards* Lodgings, sometimes at the *Mitre in Wood-Street* hard by) at a certain day and hour, under a certain Penalty, and a weekly Contribution for the Charge of Experiments, with certain Rules agreed upon amongst us.[109]

The men discoursed on a range of subjects including astronomy, anatomy, and geometry. They also made a deliberate decision to avoid "all Discourses of Divinity, of State-Affairs, and of News, (other than what concern'd our business of Philosophy)".[110] It is probably this group which Robert Boyle referred to in his correspondence as the 'invisible college', although this is not certain, since he makes specific reference to the utilitarian nature of their knowledge.[111] The group eventually disbanded sometime in 1648 or 1649 (Wallis was unclear), as various members of it – including Wallis – were dispersed to Oxford during the civil war, some in the company of Charles I, while those left in London continued to meet. This group then formed the nucleus of the Oxford Philosophical Club, which met weekly at the lodgings of William Petty, although it appears that the group was greatly expanded from its previous incarnation at Gresham. It now included Seth Ward, Dr Ralph Bathurst and Dr Thomas Willis, "and many others of the most inquisitive Persons in *Oxford*".[112] The 'many others' would appear to have included some of the physicians and students who were in Oxford as part of the group of physiologists around William Harvey in the 1640s,[113] as well as others who shared the future Charles II's exile in France. This group appears to have been organised in much the same way as the Gresham group. After Petty's departure for Ireland, the group continued to meet in Wilkins' lodgings at Wadham College, and drew in some of Wilkins' students there, including Thomas Sprat. When Wilkins left Oxford to become master of Trinity College, Cambridge, Wallis recorded that

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[109] John Wallis, *A Defence of the Royal Society, And the Philosophical Transactions, Particularly those of July, 1670. In Answer to the Cavils of Dr. William Holder* (London, 1678), p. 7. Wallis wrote a similar but less detailed account of this group in his autobiography reproduced in Christoph J Scriba, "The Autobiography of John Wallis, F.R.S.", *Notes and Records of the Royal Society of London*, Vol. 25, No. 1 (June 1970), pp. 26 – 27.
[110] Wallis, *A Defence of the Royal Society*, p. 7.
[111] Robert Boyle, "Robert Boyle to Isaac Marcombes: Thursday, 1 November 1646". *Electronic Enlightenment Scholarly Edition of Correspondence*, ed. Robert McNamee et al. Vers. 3.0. University of Oxford 2016, Web 17 May 2016. http://www.e-enlightenment.com.idproxy.reading.ac.uk/item/boylroPC0010036d1c/cite
[112] Wallis, *A Defence of the Royal Society*, p. 8.
[113] See Robert G Frank, Jr., *Harvey and the Oxford Physiologists*.

the group continued their meetings at the lodgings of Robert Boyle, until news of the Restoration drew many to return to London. Another group which is seen as a precursor to the Royal Society was the circle around Samuel Hartlib, also at Oxford in the 1640s. This 'Hartlib Circle' was though, more of a community of correspondents with Hartlib as the conduit. Through him a diverse group of men shared and received knowledge on a wide range of topics, including chemistry, medicine, engineering, colonisation and agronomy.[114]

The problem with all these groups was that while some lasted longer than others, all eventually ceased to exist. The Oxford Philosophical Club did not disband with the departure of many of its members for London, but its provincial location made it difficult for many London-based men to continue to be involved in it. The founding fellows of the Royal Society were clearly anxious to ensure that this would not be the fate of their new association, and they strove to combat the factors which could have caused their organisation to fail. Interestingly, the experience of learned clubs and academies in France was very similar. Many groups disbanded because of the defection of members, the removal of the support of a patron, or, most crucially, a lack of funds. [115] The fellows of the Royal Society could already see that the purpose of the club itself was not sufficient to ensure its longevity. Politics was also a major factor in the existence all these groups. As Wallis' account demonstrated, both the Gresham and Oxford groups suffered because of the changing political climate of the period. First, the civil war and the regicide meant that some either lost or gained positions which led them to move to Oxford, or, with the Restoration, led them back to London. Some men went abroad, or, like Petty, were sent to Ireland. The group around Harvey dispersed to some extent when Harvey, who was physician-in-ordinary to Charles I, returned to London after the surrender of Oxford in 1646. Hartlib's circle also disbanded after the Restoration in 1660, since Hartlib, who was so closely associated with the Protectorate, was unable to continue as he had done under Cromwell. These groups were therefore constantly forming and then disbanding as the vagaries of politics and the necessities of pursuing personal careers demanded. The founding fellows' preoccupation with devising detailed statutes and rules for their new

[114] M. Greengrass, "Hartlib, Samuel".
[115] Roger Hahn, *The Anatomy of a Scientific Institution: The Paris Academy of Sciences*, *1666 – 1803* (Berkeley, 1971), pp. 6 – 7.

club was an attempt to avoid dissolution of the organisation due to political change. It was an attempt to achieve permanence.

There were other problems for these early groups. One was the lack of a permanent physical base. The previous groups had all met in various lodgings and taverns, but at no point did they have a singular location where meetings could be held, and experiments conducted; they simply had to make do. Sometimes they were fortunate in using premises that had advantages: for instance, Petty's lodgings in Oxford were particularly useful because he lodged in an apothecary's house, and therefore had access to drugs and the associated facilities. Often though, the meeting place was chosen simply as a matter of convenience: it was close to where the members were. The difficulty with this was that the facilities were not always adequate, and anyone who was not reasonably close would find it more difficult to attend. Certainly, it would have been difficult to maintain a group or community identity when there was no place which the members always associated with the organisation. The need for a focus location is evident in the plans of Evelyn and Petty for some form of college in this period and accorded with the founding fellows' plans for a college as detailed earlier. The other problem for these precursor groups was the waning of interest. Evidence for this comes from Wallis' account of the Oxford group:

> Our meetings there, were very numerous, and very considerable. For, beside the diligence of Persons, studiously Inquisitive, the Novelty of the Design made many resort thither; who, when it ceased to be new, began to grow more remiss, or did pursue such Inquiries at Home.[116]

According to Wallis' account, some people simply lost interest in this form of group activity and preferred instead to continue solitarily. This may have been in part due to the lack of facilities; some people may have had better equipment or premises elsewhere which would have better facilitated the conduct of experiments. Others simply may not have wanted to share, because of concerns about priority: men wanted to ensure that they received due credit for their work. In later years the management of priority disputes became a recurring problem for the Society's administrators. A bitter early dispute

[116] Wallis, *A Defence of the Royal Society*, p. 8.

occurred between Robert Hooke and Christian Huygens over the design of a spring balance watch, with the most famous dispute of them all being the protracted dispute over the invention of calculus between Sir Isaac Newton and Wilhelm Leibniz. [117] Ultimately the problem was that these clubs could only exist so long as their members were fully involved in their activities.

So what steps did the founders take to try to avoid the pitfalls which had faced previous groups? In terms of political winds of change, there was perhaps little they could do, other than what they did: seek royal support for their enterprise in the form of a charter. Like other learned organisations and institutions such as the universities or the College of Physicians, the Society, in obtaining a charter, could ensure that even if the personnel changed because of the favour or otherwise of the state, the organisation itself would remain. It would have a legal existence and identity which would not be erased because some of its members were no longer a part of it. There was therefore, the need for a physical location. The Society was fortunate in being able to meet regularly at Gresham College, and if necessary, they could also have asked to meet at the College of Physicians. However, finding a place to meet in the long term was a preoccupation of the founders from the outset. At the first meeting, the founders agreed to meet in Lawrence Rooke's rooms at Gresham in term time, or in the rooms of William Balle in the vacations.[118] Given the similarity to the meeting locations of previous groups, this was hardly ideal. At the meeting of the Society on 12 December a committee consisting of Brouncker, Moray, Neile, Matthew Wren, Goddard and Christopher Wren was requested "to consult about a convenient place for the weekly meeting of the Society."[119] This committee suggested that meetings could be held at the College of Physicians; however, the minutes of the 19th December record that it was decided to hold meetings at Gresham College for the foreseeable future.[120] The problem with using Gresham as a semi-permanent base was that the Society became associated with Gresham College. In *Natural and Political Observations Mentioned in a following Index and made upon the Bills of*

[117] Rob Iliffe, "In the Warehouse: Privacy, Property and Priority in the Early Royal Society", *History of Science*, Vol. 301, No. 1 (1992), pp. 29 – 68.
[118] Birch, *History*, Vol. I, p. 3.
[119] Birch, *History*, Vol. I, p. 5.
[120] Birch, *History*, Vol. I, p. 7.

Mortality, John Graunt referred to the Society in his dedication to Moray as "the Royal Society of *Philosophers* meeting at *Gresham College*", clearly associating the Society with the place. Having a single location of its own would have enabled the Society to engender a sense of permanence and stability both in the mind of the Society's fellows, and in the collective mind of the public. This problem only became more acute late in the decade when the Society began in earnest to raise money to build their own college.

Crucial to success was of course, establishing a broad and consistent membership. To protect against the waning of interest described by Wallis, the founders took steps to ensure that new members were bound by as strong a declaration of commitment as they possibly could be. At their second meeting on 5 December the founders signed their names to the following subscription:

> We, whose names are underwritten, do consent and agree, that we will meet together weekly, (if not hindered by necessary occasions) to consult and debate concerning the promoting of experimental learning: and that each of us will allow one shilling weekly towards the defraying of occasional charges: provided, that if any one, or more, of us shall think it fit at any time to withdraw, he, or they, shall, after notice thereof given to the company at a meeting, be freed from this obligation for the future.[121]

This subscription is very suggestive. The payment of fees, and the obligation to attend are prominent, although on the matter of attendance, it was recognised that the founders were men who had other commitments which could keep them away from the Society's meetings. The difficulty for the Royal Society is though, that as a voluntary association they could do little to enforce the Society's rules other than threaten expulsion. However, the nature of the activities the fellows were engaged in were such that membership of the Society was not necessary for them to do them. In other words, in many ways, the Society needed the fellows more than many of the fellows needed the Society. The Society relied on the cooperation of its members to an extent which was not the case, for instance, for the Royal College of Physicians. Thus, the subscription which fellows signed was more of

[121] Birch, *History*, Vol. I, p. 5.

an emotional and intellectual tie, than a material or legal one. It aimed to create a sense of obligation in fellows which was crucial to the Society's survival.

The need for a subscription was considered by the founders to be necessary, a concern expressed by Henry Oldenburg in a letter to Robert Boyle dated 24 November 1664. In the letter, Oldenburg said that

> this Society would prove a mighty and important Body, if they had but any competent stock to carry on their desseins and if all ye members thereof could but be induced to contribute every one their part and talent for the growth, and health and welfare of their owne body.[122]

For Oldenburg, the Society's future stature was tied both to its material prosperity and the active engagement of its Fellows. In Birch's *History*, there is reprinted an additional 'obligation' agreed by the Society's council on 27 May 1663, which enjoins the fellows more specifically to serve the interests of the Society:

> We, who have hereunto subscribed, do hereby promise each for himself, that we will endeavour to promote the good of the Royal Society of London for improving natural knowledge; and to pursue the ends, for which the same was founded: That we will be present at the meetings of the society, as often as conveniently we can, especially at the anniversary elections, and upon extraordinary occasions: And that we will observe the statutes and orders of the said society: Provided, that whensoever any of us shall signify to the president under his hand, that he desireth to withdraw from the society, he shall be free from this obligation for the future.[123]

The Society's method of choosing fellows – men were first sponsored for fellowship by another fellow and were then elected by agreement of the rest of the fellowship – helped to develop an air of exclusivity or privilege. A person could not simply join; they had to be asked, unless of course you were a member of the nobility. However, this could have helped to increase the currency of membership; it was more valuable because not everyone could partake of it.

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[122] Oldenburg, *Correspondence*, Vol. II, p. 320.
[123] Birch, *History*, Vol. I, p. 249.

The potential pitfalls faced by the Royal Society in acquiring and retaining members of their association reflect the fact that the Royal Society was a trailblazer in the formation of voluntary associations in this period. Peter Clark has demonstrated that the Royal Society was one of very few voluntary associations formed in the period up to the revolution of 1688. The Society itself was an example of a newly burgeoning form of urban sociability which accompanied the expansion of urban centres in England such as London, Northampton and Bath. This urban expansion was accompanied by the increased presence of wealthier members of the professions, learned men who would welcome clubs and societies which provided different forms of leisure activities in a new social setting. Hence the rise of voluntary associations such as the Royal Society:

> Offspring of a mixed marriage of foreign and domestic models and influences, promoted by an army of prosperous drink retailers, and patronized by the growing ranks of gentry and other elite groups in towns, the new-style voluntary association was on the way to becoming an important vehicle for public discourse.[124]

These new associations were of necessity experimenting with forms of organisation, recruitment and administration, so while the founders of the Royal Society had the lessons of previous clubs to learn from, they were in fact breaking new ground in providing a form of sociability which was more open to a broader membership than previous groups had been.

Finally, the journals of the minutes indicate that a great deal of meeting time and thought was devoted to devising an increasing number of rules and statutes for governing the new Society. The founders early on used committees to establish rules related to virtually every aspect of the government of the organisation and for the conduct of the fellows. Many of these statutes were later incorporated into the Society's charters. They created statutes for everything from the conduct of elections, to the quora needed for the passing of decisions, to the hierarchy of authority. This was in addition to decisions made, naturally, regarding the subjects of experiments and the assignment of avenues of investigation for individual members. The introduction of a form of bureaucracy to the

[124] Clark, *British Clubs and Societies*, p. 59, pp. 142 – 152.

Society gave a sense of solidity and permanence to the organisation. At the outset the founders appointed a person to the chair (Wilkins), a treasurer (Balle), and a register (Croune). Further at the meeting of 12 December, the founders recorded the statue naming specific positions in the Society:

> That the standing officers of the society be three, a president or director, a treasurer, and a register:
>
> That there be likewise two servants belonging to the society, an amanuensis, and an operator.[125]

The minutes also record detailed regulations for the duties of the named officers, particularly the treasurer and register. It would be far more difficult for an organisation with such extensive rules and statutes to simply wither away. The formality of the statutes imparted an additional sense of corporate purpose. As Michael Hunter has suggested, that the Society's detailed statutes and elaborate record-keeping was related was part of the Society's desire to establish a clear public role for their organisation. [126]

The founders and early fellows of the Society drew on their experiences of previous groups and clubs to make sensible and practical decisions about the conduct of their new organisation. In this respect they were, perhaps, reflecting sentiments that were current amongst some in England after the Restoration: a desire to learn from past mistakes, such as those which led to the outbreak of civil war, and to put into place mechanisms which would ensure that such events never happened again. They knew that the noble pursuit of natural knowledge was not enough to ensure the longevity of any group they devised. Political change, changing locations and fluctuating membership were factors that needed to be considered when making decisions about how the new association was to be organised and to function. The older groups demonstrated the necessity felt in the learned community for such a club; however, it was necessary to develop rules and statutes which would ensure that the club formed would be able to survive in the long term. Rules which placed a greater emphasis on the responsibilities of

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[125] Birch, *History*, Vol. I, p. 6.
[126] Michael Hunter, *Establishing the New Science: The Experience of the Early Royal Society* (Woodbridge, Suffolk, 1989), p. 4.

the members to the group were vital to help maintain a steady membership. Statutes governing organisation and the decision-making processes would also help to add permanence to the new organisation. These were not guarantees of success, but they do serve to illustrate how concerned the founders were to create an organisation which would exist – perhaps – into perpetuity. For the founding fellows, understanding the value of the pursuit of natural knowledge was not enough; their appreciation of that value entailed the management of the practical necessities which would allow that pursuit to bear useful fruit.

Conclusion

When the founders of the Royal Society convened their inaugural meeting on 28 November 1660, they knew exactly what they wanted to do: they wanted to create a club for the "promoting of experimental philosophy." [127] Their differing visions for a college were inspired by the writings of Sir Francis Bacon, whose 'Solomon's House' was the utopian ideal which they knew they could not realistically aspire to, but the principles of which they hoped to emulate. The object of many of their subsequent meetings was working out how they were going to achieve this. Their goal was to create an institution devoted to the study of nature which would survive into posterity, long after the present founders were themselves gone. They set about this task with a pragmatism and practicality which reflected their understanding of the political and social realities which they had to face, and having absorbed ideas of improvement, community and sociability which informed the structure and ethos of their organisation. The inclusion of men who were fully committed to working for the good of their community, this new society, was crucial to the society's success. This and the emphasis placed on the creation of formal structures and statutes were designed to create an aura of stability and permanence in the minds of the members and the public. This chapter has demonstrated that the founding of the Royal Society has significance beyond its importance to the history of early modern English 'science'. It shows that this new club both formed a part of, and sought to exploit aspects of, the political, social and cultural fabric of Restoration English society.

[127] Birch, *History*, Vol. I, p. 3.

Ultimately, the decision to obtain a charter was the most decisive factor in defining the future identity and operation of the new Society. A charter could secure the Society's existence and give it a stature which would be enhanced by a membership list which would include not only the king, but also many members of the social and religious elite. Looking forward to the years immediately following the incorporation of the Society, it becomes clear that the charters brought many advantages to the Society, including privileges and an official public identity. The charters also however, created other challenges for the Society which needed to be addressed for it to function effectively, and to continue to strive towards its ideal. These charters reflected the political realities faced by Charles in the early years of his restoration and influenced the terms of the document under which the Society was legally obliged to function. The following chapter will reveal the implications of the exact terms of the charters, and their impact on the conduct of the Royal Society.

CHAPTER THREE - Help or Hindrance? The Charters of the Royal Society

> Before the next meeting of the society a charter passed on the 15th of July 1662, for the incorporation of the society under the title of the Royal Society...[1]

Thus, the journal book of the Royal Society recorded receipt of its first charter from Charles II. It received a further and more detailed charter on 15 March 1663 and another on 8 April 1669. Apart from an update to their charter in 2012, these charters have been the basis of the Society's incorporation to this day. The events leading up to the awarding of the charters were straightforward. Birch recorded that on 18 September 1661, Sir Robert Moray read to the Society the petition for a charter and it was resolved that it be delivered to the king 'in the name of the society.' Robert Moray kept the Society updated about the progress of the charter.[2] Finally on 9 July 1662 it was reported that the docket for the letters patent for the charter had been signed by the Sir Heneage Finch the Solicitor General, and the charter was thus officially passed, making the Royal Society the world's first publicly incorporated organisation devoted to the improvement and production of natural knowledge and the mechanical arts. The process from the petition being made to the king to the final granting of the charter was protracted one, and the president and council all went to the palace at Whitehall to express their gratitude:

> The Council and the Fellows of the Royal Society went in a body to White-hall to acknowledge his Majesty's royal grace in granting our charter, and vouchsafing to be himself our Founder; when the President made an eloquent speech, to which his Majesty gave a gracious reply, and we all kiss'd his hand.[3]

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[1] Thomas Birch, *The History of the Royal Society of London, for Improving of Natural Knowledge, From Its First Rise*, Vol. I (London, 1756), p. 88.
[2] Birch, *History*, Vol. I, p. 45, p. 50.
[3] John Evelyn, *The Diary of John Evelyn, Esq., F.R.S. From 1641 to 1705.6, with Memoir*, ed. William Bray, Esq. (London, 1895), p. 288.

The charter of 1662 established the official name of the Society, which had first been coined by John Evelyn.[4] The text of the charter established certain rights, privileges and duties for the Society, as well as establishing certain administrative structures for the organisation, thus making permanent and legally binding the Society's organisational structure which had previously been informal and voluntary. The charter thus formally created the position of president and a council of twenty men, all of whom were to be drawn from the Society's fellows. The roles of several officers of the Society were also created, namely a treasurer, secretaries, a clerk, and sergeants-at-mace. The charter granted the Society certain privileges which were common to other organisations in this period, such as the right to purchase lands and to sue or be sued, including a Common Seal to be used in their transactions. In addition, the charter granted the Society the right to hold meetings in London, an imprimatur, and the right to the bodies of executed persons for anatomical activities - a privilege shared by the Corporation of Surgeons and the College of Physicians – and the right to correspond with foreign individuals or organisations. They were also granted the right to build a college within which the Society could meet and conduct its affairs.

The second charter of 1663 was fundamentally the same as the first charter but contained some additions and a great deal more detail about the statutory requirements for the administration of the Society. The Society's full name was a notable addition, being defined more fully than the first charter as 'the Royal Society of London for Improving Natural Knowledge'. The officers of the Society were more clearly enumerated: one treasurer, two secretaries, one or more clerks and two sergeants-at-mace, with the addition of two or more curators of experiments. The charter also provided for the appointment of a deputy for the president to perform his duties in his absence.

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[4] Evelyn, *Diary*, p. 281. The text of the Society's three charters used here are the English translations from the original Latin on the Royal Society website https://royalsociety.org/~/media/Royal_Society_Content/about-us/history/Charter1_English.pdf?la=en-GB, https://royalsociety.org/~/media/Royal_Society_Content/about-us/history/Charter2_English.pdf?la=en-GB, https://royalsociety.org/~/media/Royal_Society_Content/about-us/history/Charter3_English.pdf?la=en-GB.

The third and final charter of this period, issued in 1669, largely confirmed the terms of the previous charters, with some key additions. After another petition by the Society, it was granted the parcel of land and buildings between Westminster and Chelsea and was able to receive any rents associated with the lands. The Society now had the power to appoint two or more deputies to the president, although it was specified that the president and his deputies were required to take the Oath of Allegiance and the Oath of Supremacy to hold that office. The charter also amends the terms of the previous charter in that it allowed the Society to meet in any 'convenient place within our Realm of England', no longer just within the City of London or for ten miles round.[5]

In one sense, the Royal Society's award of a royal charter was a major achievement. The organisation was barley three years old and had yet to produce many significant discoveries. However, these charters are worthy of closer attention than they are usually subjected to by historians of the Society. The charters certainly transformed the organisation into a public institution, and for the first time established official recognition of the public role of the pursuit of natural knowledge. As such, the charters are an important milestone in the history of seventeenth century 'science'. Attention has been paid to the grant of an imprimatur and the appointment of the first curator of experiments: the imprimatur because of the texts the Society began to publish, for example John Evelyn's *Sylva* and Robert Hooke's *Micrographia*;[6] and the role of curator of experiments because it established Robert Hooke as the first 'professional scientist'. However, a deeper appreciation of the charters within the social and political context of the Restoration, reveals that these documents were by no means as straightforwardly helpful to the Society as they have been perceived. They cannot be said to be a demonstration of Charles II's appreciation of and commitment to the pursuit of natural knowledge as a genuine means to further the good of the country. When considered in conjunction with the institutional context of the period for instance, it becomes clear that the Royal Society was in a far weaker position to take equal place alongside other learned institutions in England, such as the universities of Oxford and Cambridge and the Royal

[5] Third Charter, p. 9.
[6] John Evelyn, *Sylva, or a Discourse of Forest-Trees, and the Propagation of Timber* (London, 1664); Robert Hooke, *Micrographia: or Some Physiological Descriptions of Minute Bodies Made By Magnifying Glasses with Observations and Inquiries thereupon* (London, 1665).

College of Physicians. The charters were arguably largely ineffective in furthering the Society's goal of founding a college which was to be the institutional focus for natural philosophy in England, and this was not just because the charters did not award the Society state funding.

This chapter will demonstrate that the weaknesses in the Royal Society's charters can be traced to the increasingly tense political situation in the early Restoration. It will show that they were one of Charles II's first attempts to use charters as a means of political control, designed to ensure that voluntary associations like the Royal Society would not be able to operate unchecked. The chapter will demonstrate that, as a result, the Society's charters were not as helpful in promoting the founding fellows' goals as they would have wished, despite the prestige that the award of such a charter would give. In fact, the Royal Society will be seen to have been hamstrung by some of the terms of the charters; this will be shown in a discussion of how the Society operated at a practical level. Finally, the chapter will show how the charters placed the Royal Society in an uncomfortable position with other learned institutions, both in terms of its institutional status, and its approach to improvement. What will be seen is that the Royal Society benefited to an extent from having a charter, but in many ways the charters proved to be more hindrance than help.

3.1 Charles II and the Charters

i. Who was involved?

The original petition for a charter was devised by fellows of the Royal Society, but information about the original petition is sketchy. According to the minutes, the petition seems to have been the responsibility of Sir Robert Moray, although there may have been input from other fellows, and there is no record of who prepared the final text of the petition. The petition would necessarily have contained privileges which were most advantageous to the operation of the Society. There would have been input from Charles, and from Edward Hyde, Earl of Clarendon, the advisor most closely associated with the Society. The Society tended to appoint committees for many such matters related to the administration of the Society or for specific areas of research, but there seems no record

of any such committee existing, which is interesting given how significant a step this was. [7] The journal book for the period only records that a petition was prepared and submitted. [8] However, the journal books covering the year 1667 give details of the preparation of the petition for the Society's third charter, and this may have been the procedure followed for the first charter petition. During a council meeting held on 17 January 1667, it was recorded that the council has approved the details of the 'supplemental charter'. Then on 25 April 1667, specific clauses were agreed to be inserted into the petition in preparation for its presentation to Charles by the president "and such others of the council, as the president should take with him." In addition, the Secretary of State Lord Arlington was "desired to prepare and have ready a warrant concerning the particulars of the said petition for his Majesty's signing". This suggests that the process involved the Society devising a petition for a charter for the king to approve, with further preparation being undertaken by a senior member of the government. It is not unlikely that a similar process was undertaken for the Society's first and second charters. [9]

Clarendon's involvement is implied in the dedication made by John Evelyn in his translation of a text by Gabriel Naudé. As well as expressing his gratitude for Clarendon's support, Evelyn praised him for his appreciation of the value of the Society's aims:

> God has enlighten'd your great Mind, with a fervour so much becoming it in the promoting and encouraging of the ROYAL SOCIETY, which is in one word, to have dared a nobler thing, than has been done these fifty *Ages* and more ...[10]

Clarendon would have been intent on promoting Charles' best interests as monarch, and he would have been alert to any privileges which could potentially present a difficulty for Charles' rule. Also, although Charles was not always known for his attentiveness, there is no reason to doubt that he did take his role as king seriously enough to pay closer attention to the charters being issued in his name. The Royal Society's charters were therefore tripartite documents, a product of the involvement of

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[7] For instance, see Birch, *History*, Vol. I, pp. 5, 7, 12, 15, 17, 18, 20, 22, 25, 45.
[8] Birch, *History*, Vol. I, p. 45.
[9] Birch, *History*, Vol. II, pp. 141, 168.
[10] Gabriel Naudé, *Instructions Concerning Erecting of a Library: Presented to My Lord the President De Mesme*, trans. by John Evelyn (1661), p. sigA3r.

the Society, the king and Clarendon. Understanding the nature of these men's involvement helps to explain the charters that were awarded as a result.

ii Why Award a Charter?

Before querying why Charles II wished to grant the Royal Society a charter, it is worth considering why the Society wished to get a charter in the first place. It may have been motivated by what Michael Hunter has said was the Society's 'wish to play a corporate role in the advancement of learning'. [11] The Society wished to become the centre of a nationwide programme devoted to experiment and the recording of all forms of natural knowledge. They wished not only to disseminate natural knowledge, but also to become the centre for the creation of new knowledge. [12] Charles Webster has suggested that the impetus to formally organise the group and seek status as a national institution came from new members of the Gresham group which had resumed its meetings in 1659. This included men such as John Wilkins, Robert Moray and William Petty. [13] The Society was certainly determined to found a college, not just a voluntary society, and a charter would not only help to make this possible, but it also held out the possibility of providing the organisation with some kind of funding from Charles himself as the Society's patron. Some form of reliable and regular source of funding was on the minds of the fellows near the time of the award of the Society's second charter. At minutes of the council meetings held in February 1663/4, questions were asked about the possibility of getting some form of paid responsibility from Charles:

> Sir Robert Moray moved, that every one of the Council might think on ways to raise a revenue for carrying on the design and work of the Society.
>
> Dr. Whistler suggested several things for that purpose; *viz*. that his majesty might be spoken to, that in every new grant something might be stipulated for the use of the Society: That if any thing should be found, that at present yielded no revenue to the

[11] Michael Hunter, *Science and Society in Restoration England* (Cambridge, 1981), p. 37.
[12] Hunter, *Science and Society*, pp. 37 – 38.
[13] Charles Webster, *The Great Instauration: Science, Medicine and Reform 1626 – 1660* (London, 1975), pp. 95 – 96.

> king, the grant of it might fall to the Society: And that upon all philosophical books printed in England some imposition might be laid for the benefit of the Society.
>
> Sir Paul Neile moved, that the king might be spoken to, to confer such offices of the courts of justice, or the custom-house, as were in his majesty's grant, upon some of the members of the Society, for the use of the whole. [14]

It is interesting here that the fellows clearly pinned their hopes for funding very much on Charles, and not on parliament. It is also interesting that they had some awareness of Charles' financial limitations. They had hopes of paid positions or grants from other sources under Charles' control, not actual cash from Charles himself. In terms of the original charter then, money and a corporate role seem to have been the main motivation behind the fellows' desire for a charter. An analysis of what a corporate role could entail, and how a charter might help, will be discussed later in the chapter.

So why did Charles II make the decision to award a charter to the Royal Society in the first place? The difficulty in trying to understand his motives lies in the fact that Charles II was, by the consensus of historians, an inconsistent and even inscrutable character, by turns lazy and conscientious, kind and often cruel, fond of carnal pleasures, but also capable of prolonged conversations on serious subjects. Understanding why he undertook this course of action is therefore at times problematic. [15] It has already been shown that Charles' interest did not seem to be particularly deep. Perhaps Charles genuinely saw the value of the aims and work of the Society for the public good; however, given his questionable behaviour towards the Society and its fellows this does not actually seem to be very plausible. For instance, Samuel Pepys recorded in his diary that Charles made fun of William Petty and the work of Robert Boyle, saying that the Society had done nothing and had been 'spending time only in weighing of ayre'.[16] Charles was even reported to have called the fellows his 'fools'. Count Lorenzo Magalotti, on a diplomatic mission to England on behalf of Prince Leopold de' Medici, visited the king in order to

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[14] Birch, *History*, Vol. I, pp. 377, 379.
[15] Just a few examples of historians on Charles II's character: John Miller, *Charles II* (London, 1991), pp. 30 – 32; J R Jones, ed., *The Restored Monarchy 1660 – 1688* (Totowa, NJ, 1979), pp. 10 – 11; George Southcombe and Grant Tapsell, *Restoration Politics, Religion, and Culture: Britain and Ireland, 1660 – 1714* (Basingstoke, 2010), pp. 71 – 73.
[16] Samuel Pepys, *The Diary of Samuel Pepys*, ed. Steven Algieri (Kindle edition, 2011; from original publication London, 1879), February 1, 1663/4.

present him with a copy of the *Saggi di naturali esperienze* (1667). Magalotti wrote to Prince Leopold that he was very disappointed with Charles' attitude towards the fellows of the Society, having expected him to have held the fellows in higher regard than he appeared to have done. While the transcription of Magalotti's letter is debatable – Charles may have referred to the fellows as ferrets rather than fools; nonetheless the letter makes clear that Charles was hardly complimentary of the Royal Society, which did not at all impress Magalotti. [17] Steven Shapin and Simon Schaffer have suggested another interesting reason why Charles may not have been as fully committed to the Society as he could have been. For Shapin and Schaffer, Charles' closeness to and affection for Thomas Hobbes may have been behind the monarch's possible scepticism of the value of the Society. In their analysis of the often-heated debate between Hobbes and Robert Boyle over their 'conflicting strategies for generating natural knowledge', Shapin and Schaffer suggest that Hobbes' disapprobation of the validity of experimentalism may have had some influence on Charles' attitude to the Society. Thus, 'the closeness of the King's association with the great dogmatist must have constituted a considerable threat to the experimentalists of the Royal Society.' This closeness between the two men may have jeopardised the Society's hopes for material support from Charles, and reports of the king laughing at the Society would not have reassured the fellows.[18]

Crucially none of the charters included any actual funding for the Royal Society, either from Charles himself, or from the state. The third charter conferred on the Society the lands and buildings near Chelsea, but no actual cash. Indeed, the award proved problematic for the Society: the college buildings were in a poor state of repair and there were several lawsuits brought by various people who laid claim so parts of the lands. The Society passed a resolution to sell the lands back to Charles and invest the money in the East India Company. The sale of the lands back to the king was eventually agreed for £1,300, a sum which was never paid.[19] So the fellows' concerns for obtaining funding from

[17] W E Knowles Middleton, "What Did Charles II Call the Fellows of the Royal Society?", *Notes and Records of the Royal Society of London*, Vol. 32, No. 1 (July 1977), pp. 13 – 16.
[18] Steven Shapin and Simon Schaffer, *Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life* (Princeton, 2011), pp. 131 – 135, esp. 134.
[19] Dorothy Stimson, *Scientists and Amateurs: A History of the Royal Society* (New York, 1948), p. 104; Charles Richard Weld, *A History of Royal Society with Memoirs of the Presidents. Compiled from Authentic Documents*, Vol. 1 (London, 1848), p. 279.

or through Charles mentioned above were a reaction not only to the Society's financial situation, but also the terms of the first charter, in which funding of any kind was conspicuously absent.

One of the reasons why Charles may have awarded the charter may lie in Charles' own character: in fact, "Le roi, s'amuse".[20] Charles was merely indulging his fancy. Charles' interest in the Society amounted to little more than a leisure interest in the study of nature, as noted in Chapter Two. Given what was known of Charles' character, it may well have amused him in an idle moment to reward the Society in this way. The Marquis of Halifax's, *A Character of King Charles the Second: and Political, Moral and Miscellaneous Thoughts and Reflections* paints an interesting picture of Charles' character. As a long-serving member of the privy council during both Charles' and James II's reign, Savile had ample opportunity to observe Charles' character at close quarters, even though his relationship with Charles was not always an easy one. Savile's account was not a hostile depiction of the king and was at times even indulgent. He portrayed the king as very much given to pleasure, and apt to reward those – such as his mistresses – who gave him pleasure. Savile also noted that Charles very much desired 'ease', preferring to avoid any kind of difficulty. As such he was inclined to acquiesce to a petitioner's request, simply to get rid of them. [21] It is amusing to think that Sir Robert Moray's success with Charles on behalf of the Royal Society may have been more due to his persistence and irritation value, than the merits of the Society's petition.

Clarendon wrote in his memoirs that Charles had a love of novelty and an irreverence for tradition which may also have made him look favourably on this fledgling organisation.

> The King had in his Nature so little Reverence or Esteem for Antiquity, and did in Truth so much contemn old Orders, Forms and Institutions, that the Objections of Novelty rather advanced than obstructed any Proposition. He

[20] "Le roi, s'amuse" is the title of a play by Victor Hugo, originally published in 1832.
[21] George Savile, Marquis of Halifax's, *A Character of King Charles the Second: and Political, Moral and Miscellaneous Thoughts and Reflections* (London, 1848), esp. pp. 7 - 56. Also Paul Seaward, 'Charles II (1630–1685)', *Oxford Dictionary of National Biography*, Oxford, 2004; online edn, May 2011, www.oxforddnb.com.idpproxy.reading.ac.uk/view/article/5144 , accessed 24 Aug 2017.

> was a great Lover of new Inventions, and thought them the Effects of Wit and Spirit, and fit to control the superstitious Observation of the Dictates of our Ancestors...[22]

In addition, Charles may also have decided to award the charter as a means of personally rewarding some of his most loyal subjects. Sir Robert Moray, who was the Society's chief spokesman and go-between with the king, had also been a loyal royalist during the civil war and Interregnum, sharing the king's exile on the continent, in Cologne, then Bruges. Between 1659 and 1660, Moray also worked to secure support for Charles among the French Protestants before returning to London after the coronation.[23] John Evelyn had also remained staunchly loyal to the monarchy and had often discussed a variety of natural subjects in the king's presence. Both men were very much in Charles' company at court and was therefore best placed to promote the Society's cause.

Charles may also have been motivated by a desire for personal glory and to appear benevolent to his subjects. In both the first and second charters, Charles makes clear at the outset that he sought not only to act in the best interests of learning, but in the interests of the country as a whole:

> We have long and fully resolved with Ourself to extend not only the boundaries of the Empire, but also the very arts and sciences. Therefore we look with favour upon all forms of learning, but with particular grace we encourage philosophical studies, especially those which by actual experiments attempt either to shape out a new philosophy or to perfect the old. In order, therefore, that such studies, which have not hitherto been sufficiently brilliant in any part of the world, may shine conspicuously amongst our people, and that at length the whole world of letters may always recognize us not only as the Defender of the Faith, but also as the universal lover and patron of every kind of truth.[24]

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[22] Edward Hyde, *The Life of Edward Earl of Clarendon, Lord High Chancellor of England and Chancellor of the University of Oxford,* Vol. II (Oxford, 1760), p. 199.
[23] David Allan, 'Moray, Sir Robert (1608/9? – 1673)', *Oxford Dictionary of National Biography* (Oxford, 2004; online edition. 2007).
[24] Second Charter, p. 1. Unless otherwise stated, quotations will be made from the second or third charters, rather than the first charter. The second charter was issued less than a year after the first

Evidence from Henry Oldenburg's correspondence later in the decade, suggests that Charles was indeed seen by many abroad as deserving of praise and esteem for incorporating the Royal Society as a public institution. In a letter to Henry Oldenburg written in 1666, Italian Francisco Travagino wrote

> In my native Italy, famous Sir, we have heard of the manifest greatness of your Royal Society's name, laws, and design; and thence we have argued that your king (under whose auspices it thrives) is now indeed restored in good earnest both to his kingdom and to his regal splendour; for only the Muses were lacking among you to complete that restoration.[25]

Paul Slack has suggested that Charles could be viewed as 'a patron of social and environmental reform and national improvement in the 1660s', given his interest in fisheries and the navy;[26] his support for a charter for the Royal Society would certainly seem to fit in with this idea of Charles as improver. In any case, given that already by the end of 1661 the lustre had already begun to fade from Charles' reign and especially his court, an opportunity to cultivate a favourable image was one which could not be passed up. Both John Evelyn and Samuel Pepys recorded in their diaries the deficiencies that had become apparent in Charles' court. Evelyn recorded on 6 January 1662 his disapproval and dismay at the gaming taking place at court:

> This evening, according to costome, his Majesty open'd the revels of that night by throwing the dice himself in the privy chamber, where was a table set on purpose, and lost his 100*l*. (The yeare before he won 1500*l*.) The ladies also plaied very deepe. I came away when the Duke of Ormond had won about 1000*l*. and left them still at *passage*, *cards*, &c. At other tables, both there and at the Groomporter's, observing the wicked folly and monstrous excesse of passion amongst some loosers; sorry I am that such a wretched costome as

charter, and is a more detailed and refined document, with greater definition of the rights, duties and privileges of the Society, which more adequately reflects that the Society was to be and how it was to operate. Apart from specific parts of the third charter, the second charter was the document which primarily governed the Society in this period.

[25] Henry Oldenburg, *The Correspondence of Henry Oldenburg, Vol. III 1666 – 1667*, ed. and trans. by A Rupert Hall and Marie Boas Hall (Madison, WI, 1966), p. 300.

[26] Paul Slack, *The Invention of Improvement: Information and Material Progress in Seventeenth-Century England* (Oxford, 2015), p. 115.

> play to that excesse should be countenanc'd in a Court which ought to be an example of virtue to the rest of the kingdome.[27]

Samuel Pepys wrote of discontent in London in 1662. On 31 May he wrote

> The Act of Uniformity is lately printed, which, it is thought, will make mad work among the Presbyterian ministers. People of all sides are very much discontented; some thinking themselves used, contrary to promise, too hardly; and the other, that they are not rewarded so much as they expected by the King. God keep us all.[28]

The acts which formed part of the 'Clarendon Code' – the Corporation Act (1661), the Act of Uniformity (1662), the Conventicle Act (1662) and the Five-Mile Act (1665) – were the basis of an increasingly harsh approach taken by the Cavalier parliament against the nonconformists. These acts served to undermine Charles' sentiments expressed in his Declaration of Breda issued in April 1660. It was therefore in Charles' interests to portray a benevolent image of himself and his reign to a populace which was daily becoming more and more disillusioned with the Restoration monarchy. [29] and highlights further the importance of understanding the political context within which Charles – and the Royal Society - was operating. Support for the Royal Society was politically and ideologically a sensible move. The Society consisted of a diverse group of people, spanning the political and religious divides, including many who had previously supported the Cromwellian protectorate. To show support for an organisation which managed to operate successfully and without obvious discord, despite its diverse membership, sent a signal to the public that Charles' overriding aim, despite the Clarendon Code, was to continue to promote the unity of the people of his newly restored kingdom. The Society was a symbol of what could be achieved if people were willing to set aside their religious or political differences in favour of a common purpose. In contrast, Christopher Hill recounted a rumour circulating in the early months of the Restoration explaining Charles' support for the Royal Society. According to the Reverend John Ward,

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[27] Evelyn, *Diary*, pp. 281 – 282.
[28] Samuel Pepys, *Diary*, 31 May 1662.
[29] Tim Harris, *Restoration: Charles II and His Kingdoms 1660 – 1685* (London, 2006), pp. 68 – 70, 78 – 79; Miller, *Charles II*, pp. 72 – 73.

> the King initiated the Royal Society in opposition to the Rota Club, where Harrington 'and such strange fellows as he ... talked about a Commonwealth'; Charles 'not thinking fit to put down the other by open contradiction'.[30]

This idea seems implausible, given that the Rota Club was wound up some months before Charles returned to England, and around six months before the founding meeting in November 1660. Nonetheless, the growing undercurrent of unease in the country, and the understandable concerns of Charles and his ministers would have made the Royal Society a welcome symbol of unity.

Mario Biagioli has written that Charles had a 'hands off' approach to the Royal Society, and on the surface that would appear to be the case.[31] The French Academie Royale des Sciences, founded in 1666, was a very different organisation, with the Academie, its fellows and its activities under the direct control of Louis XIV's minister Jean Baptiste Colbert.[32] Charles on the other hand, had very little involvement in the Society's activities apart from the occasions described in Chapter Two. However, the charters meant that Charles – and Clarendon - prevented the Society from operating entirely without supervision or restriction. The terms of the Royal Society's charters suggest that the award of a charter was means of keeping control of such a diverse group and stop it being hijacked by those who wished the monarchy harm. Charles had adopted this tactic in renewing the charters of the borough as a means of purging the boroughs of councillors who could not be relied upon – or refused – to quell religious consent. This eventually led to Parliament passing a corporation bill – the Corporation Act 1661 - part of the Clarendon Code, which among other things, required all members of borough corporations to swear oaths of allegiance and supremacy, to take the Anglican communion, and who could be removed from their offices by commissioners. [33] The Royal Society's charters allowed Charles to maintain an image of benevolence while ensuring

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[30] Christopher Hill, *The Experience of Defeat: Milton and Some Contemporaries* (Middlesex, 1985), p. 191.
[31] Mario Biagiloi, "Etiquette, Interdependence, and Sociability in Seventeenth-Century Science", *Critical Inquiry*, Vol. 22, No. 2 (Winter 1996), pp. 93 – 238.
[32] On the French Academie and a comparison to the Royal Society, see Roger Hahn, *The Anatomy of A Scientific Institution: The Paris Academy of Sciences, 1666 – 1803* (Berkeley, 1971), esp. Chapters 1 and 2.
[33] Miller, *Charles II*, pp. 72 – 74; Harris, *Restoration*, p. 53.

that supervision and restrictions were subtly included in the text of the charter. One very significant element of supervisory control that Charles exerted over the Society was in his choice of Edward Hyde, the Earl of Clarendon to oversee the Society for his lifetime:

> if any abuses or differences hereafter shall arise and happen concerning the government or other matters or affairs of the aforesaid Royal Society, whereby any injury or hindrance may be done to the constitution, stability, and progress of the studies, or to the matters and affairs, of the same; then ... we do authorize, nominate, assign, and appoint our aforesaid very well-beloved and very trusty Cousin and Councillor Edward, Earl of Clarendon, our Chancellor of our Realm of England, by himself during his life...

On Clarendon's death, the charter decreed that

> the Archbishop of Canterbury, the Chancellor or Keeper of the Great Seal of England, the Treasurer of England, the Keeper of the Privy Seal, the Bishop of London, and the two Principal Secretaries for the time being, or any four or more of them, to reconcile, compose, and adjust the same differences and abuses.[34]

Clarendon's position, as well as his apparent personal interest in the Society, made his appointment to supervise the Society's governance understandable: in his diary, John Evelyn portrayed Clarendon as sympathetic to the Society, but his appointment also sent a clear signal that Charles intended to maintain specific if indirect control over the organisation. It was an indication of the seriousness with which Charles viewed the Royal Society's ability to operate. After Clarendon's death, supervision for the Society would be transferred to whoever succeeded him as chancellor along with two of the most senior clergymen in England and in London, and senior state officials, effectively sharing supervision between the religious and secular authorities in England. Responsibility for the supervision of the Royal Society would rest with the positions not the person: after all, even trusted advisors could fall out of favour.

[34] First Charter, p. 11; Second Charter p. 13.

Charles set limits over the Society's operation and over its choice of fellows and those acting on the Society's behalf. Meetings of the Society were to be held in the City of London or ten miles round. Confining the Society's meetings to London made it easier to supervise the Society and to keep an eye on the Fellows' activities. The Venner uprising in January 1660/1 confirmed Charles and his advisors fears of the potential for unrest. For four days Venner and his fellow Fifth Monarchist rioters caused disruption and some deaths in the heart of London. The unrest was contained because armed forces could shut the city gates making it easier to round up the offenders. Out in the provinces in the countryside however, it would have been much more difficult for demonstrators to be apprehended or for news of potential unrest to reach the ears of Charles or his ministers. Also, Charles' troop numbers were far too few to mount an effective presence throughout the country. The Farnley Wood Plot in Yorkshire in October 1663 is an example of one such provincial plot; it also demonstrated how unscrupulous plotters could manipulate lower ranked men into forming a rebellion. Unfortunately for Charles, local militias were not always willing or able to deal effectively with uprisings. [35]

Although the Farnley Wood plot postdates the Society's second charter, nonetheless it is an example of one of the perils of allowing people to meet: seemingly innocent meetings could potentially be used to stir opposition to the government and the monarchy. It was only in the Society's third charter of 1669 that Charles seems to have felt sufficiently secure in the benignity of the Royal Society that he allowed it to meet anywhere 'within our Realm of England'. [36] At this point he could have reasonably decided that the Society did not pose a threat to the stability of his reign. Thomas Sprat's *History* reiterated frequently the Society's support for and gratitude to Charles, and has been seen, the Society's own activities provoked in Charles more amusement than fear. The full implications of this restriction on the location of the Society's meetings will be explored later.

As a corollary of the fear of plots, Charles also exerted indirect control over the Society's membership. It has already been mentioned that the only man Charles ever

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[35] Andrew Hopper, "The Farnley Wood Plot and the Memory of the Civil Wars in Yorkshire", *The Historical Journal*, Vol. 45, No. 2 (June 2002), pp. 281 – 303; Harris, *Restoration*, pp. 64 – 67.
[36] Third Charter, p. 9.

recommended for fellowship of the Society was John Graunt. The text of the first and second charters established clear criteria for the type of men who should be elected to the Society. They should be men

> whom, the more eminently they are distinguished for the study of every kind of learning and good letters, the more ardently they desire to promote the honour, studies, and advantage of this Society, the more they are noted for integrity of life, uprightness of character and piety, and excel in fidelity and affection of mind towards us, our Crown, and dignity, the more we wish them to be especially deemed fitting and worthy of being admitted into the number of the Fellows of the same Society.[37]

Not only should these men be supporters of learning and willing to promote the Society – as one would expect – potential fellows must also be loyal to the king and the monarchy. Republicans and other opponents of the restoration of the monarchy would not be welcome, and their presence in the Society would have potentially serious consequences for the Royal Society.

This form of control over the Society's fellowship was manifested in the form of oaths. To take the position of an officer of the Royal Society, Viscount Brouncker, as first president of the Society, was required to be sworn into office by the Earl of Clarendon with the following oath:

> I, William, Viscount Brouncker, do promise to deal faithfully and honestly in all things belonging to the trust committed to me as President of this Royal Society of London for improving Natural Knowledge, during my employment in that capacity. So help me God![38]

Fellows elected as members of the Council, those appointed to the offices of deputy president, treasurer, secretary, sergeant-at-mace, and curators of experiments would also be required to swear a corporal oath administered by the president, further ensuring that all of those involved in the administration of the Society were legally bound by their

[37] Second Charter, p. 4. Subsequently elected presidents were not sworn in by Clarendon, but by a quorum of the Council.
[38] Second Charter, p. 4.

service to the organisation, and by extension, to the king. It has been shown that the taking of oaths by officers of incorporated institutions and particularly borough administrations was common; however, there was a significant change was made in the oaths required in the third charter which sharply reflects the political and religious realities of 1669. In this charter, the following stipulation was made:

> the President of the Society aforesaid for the time being, and his Deputies, before he or any of them be admitted to the execution of that office, shall take, and each of them shall take, as well the corporal oath, commonly called the Oath of Allegiance, as the corporal oath, commonly called the Oath of Supremacy, upon the holy Gospels of God, before the Council of the same Society, or seven or more of them...[39]

This oath had become a requirement for the president and his deputies because of the Corporation Act of 1661 described above, although this requirement was not present in the first two charters. [40] Despite Charles' lack of enthusiasm for some of the acts that comprised the Clarendon Code, the Corporation Act was one which he approved of, and the Society had to be bound by it, precisely because of the diverse nature of its membership. Given that, as has been shown, the fellows pinned their hopes for the success of their enterprise on Charles, they would not have been likely to object. In this way, Charles could ensure that those in charge of the organisation would be held accountable for the actions of the Society as a whole. Charles' desire to promote religious unity as well as his own secret Catholic leanings meant that he would have wanted to ensure that members of all religious groups would still have access to membership of public institutions such as the Royal Society, even if they would not be able to serve as officers of the institution.

Even the grant of an imprimatur came with strings attached. On his Restoration, Charles ensured the revival of the licensing laws which had largely lapsed during the civil war and Interregnum were brought back into effect, with the passing of the Licensing Act

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[39] Third Charter, p. 11.

[40] For a discussion of the use of oaths see Edward Vallance, *Revolutionary England and the National Covenant: State Oaths, Protestantism and the Political Nation, 1553 – 1682* (Woodbridge, 2006). Also, David Martin Jones, *Conscience and Allegiance in Seventeenth Century England: The Political Significance of Oaths and Engagements* (Rochester, NY, 1999).

in 1662. As a result, all 'Typographers or Printers, and Chalcographers or Engravers' appointed by the Royal Society to print Society materials also needed to swear a corporal oath in front of the president and the Council. In granting the Society the right to print, Charles was placing a great deal of trust in the Society not to print material which would undermine the monarchy or the government. This legislation made it a requirement that all published works had to be licensed by a secretary of state, bishop or other person of similar stature. The penalties for publishing unlicensed texts could be severe.[41] The swearing of an oath was yet another caveat to this privilege which ensured a measure of indirect state control over the Society, and which ensured that the Society's administrators were constantly made aware of their legal obligations. This awareness is reflected in the minutes of the Society's Council which first met in on 13 May 1663 (see below). There are other references to legality contained in the minutes, which indicates the continuing concern of the Council to ensure that the Society abided by the terms of its charters. Shapin and Schaffer have written that the experience of conflict during the civil war and Interregnum had shown that knowledge had been and could still be a source of sectarian conflict which had threatened the established church and the monarchy. Knowledge made public, such as that which could be disseminated through exercise of the Society's imprimatur, could not be allowed to threaten existing authorities. [42] With an untried organisation such as the Royal Society, in in this Restoration climate of unease, Charles could have imposed these restrictions on the Society as a means of control in case the Society was infiltrated by those who intended harm to public peace. The enormity of the trust Charles placed in the Royal Society in granting an imprimatur cannot not understated.

Despite his reputation, Charles could at times display considerable political acumen, and he was capable of subtlety and dissimulation to suit his ends. His experiences of the regicide and exile left a lasting impression on him and he was determined not to share his father's fate. The charters display confidence and trust in the organisation, while still incorporating measures of control, and reserving the crown's ability to sanction the Society for any wrongdoing. In this way the charters reflect the precarious nature of

[41] Miller, *Charles II*, p. 72.
[42] Shapin and Schaffer, *Leviathan and the Air-Pump*, pp. 284 – 285.

contemporary politics. The following section will illustrate how the terms of the charters affected the Royal Society in practice.

3.2 The Charters in Practice

The award of the first charter was a valuable coup for the fellows of the Royal Society. As a brand-new organisation in London, it was recognition by the king himself of the value and importance of their enterprise. The charter nominally elevated the Society from the status of mere club to a public institution with a far wider public importance. This increased importance derived from direct monarchical support was supplemented by Charles' statement to the fellows that in granting the charter he asked that he be named as one of the first fellows:

> Sir Robert Moray acquainted the society, that he and Sir Paul Neile had kissed the king's hand, in the society's name; and he was desired by them to return their most humble thanks to his majesty for the reference, which he was pleased to grant of their petition; and for the favour and honour done them, of offering himself to be entered one of their society.[43]

This kind of support would have the effect of encouraging others to become associated with the new Society. After a sharp increase in elections to the Society in 1661 – a result of the election of men from the list of forty persons drawn up in the second meeting of the Society - the Society experienced a spike in elections in 1663, 1664 and 1665 after the award of the charters.[44] The award also had the potential to attract wealthy patrons to the Society, a consideration which became more important later since the charter failed to include any funding. The charters also meant that the Society's profile was considerably raised at court and the inclusion of many of the social and political elite in the lists of fellows would ensure that the Society would be able to generate wider support for its activities, and hopefully facilitate state funding. However, the politically-inspired terms of the charters served as no guarantee of the stability and effectiveness of the Royal Society.

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[43] Birch, *History*, Vol. I, p. 50.
[44] Michael Hunter, "The Social Basis and Changing Fortunes of an Early Scientific Institution: An Analysis of the Membership of the Royal Society, 1660 – 1685", *Notes and Records of the Royal Society of London*, Vol. 31, No. 1 (July 1976), pp. 9 – 114, esp. p. 26.

The lack of funding was a major drawback for the Royal Society. It seriously hindered the Society's goal of founding a college and hampered their ability to take advantage of the privileges, such as the imprimatur. This meant that the Society was much less effective than it could have been. It has been suggested that being funded by the fellows rather than by the state was an advantage to the Society and even sought by them: in this way the Society 'avoided entanglement with national policy' and thus was 'freed from state regulation'. [45] This seems unlikely, given the difficulties the Society had in getting regular payments of subscription fees from fellows, and their ongoing concerns about their financial situation. Webster does point out though that this lack of state funding also meant an 'absence of public responsibility' which may have undermined the effectiveness of the Society's 'Baconian programme'. [46] The issue of the Society's lack of public responsibility will be discussed later in the chapter.

Michael Hunter has suggested that the Royal Society deliberately chose to be in the City of London, and that this choice made good sense. A base in London certainly held many advantages for the Society: it was close to the seat of power at Whitehall, which meant being close to potential patrons and influential courtiers. The City held a high concentration of wealthy men and members of the professions – especially physicians - who might be interested in becoming fellows. It also held a concentration of skilled technical craftsmen engaged in designing and constructing mathematical and astronomical instruments; they included lens grinders, metal workers and carpenters. London was also the centre of operations for the book trade, because of the Stationers' Company's monopoly, as well as being the location of facilities such as libraries and botanical gardens.[47] The City also had a very large literate population, and the population expanded enormously, all providing the new society with a substantial potential

[45] Webster, *Great Instauration*, p. 97.
[46] Webster, *The Great Instauration*, p. 97.
[47] Hunter, *Science and Society*, Chapter 3, esp. pp. 68 – 70.

membership. [48] Restoration London was 'the most important commercial, manufacturing, administrative and social centre in the nation.' [49]

However, Charles' restriction of the Society's meetings to London posed several unanticipated problems for the Society in its earliest years. Firstly, the location meant that potential fellows living in the provinces would have found it extremely difficult, even impossible to attend meetings on a regular basis. In the seventeenth century a journey from for example Oxford to London could be a matter of days, not a journey to be undertaken lightly. Given that many of the fellows were physicians, clergymen or university scholars, it would be very difficult for such men to leave their practices, parishes or colleges for an extended period on a regular basis; physicians for instance needed to establish and maintain a medical practice to be successful in the profession. Frequent absences would mean that their patients would simply take their business elsewhere. Men employed in the professions may well have been keen to join the Society but would have been prevented by purely practical considerations. It would also have been difficult for them to justify paying a weekly subscription of a shilling per week, given that they would not have been able to attend weekly meetings in any case. In January 1674/5, John Wallis wrote to Henry Oldenburg from Oxford of the reluctance of the then Vice-Chancellor of the university Ralph Bathurst to continue to pay the shilling per week subscription for the Society. According to Wallis, when presented with the bond for the total yearly amount of 52 shillings, both he and another fellow Henry Clerke, president of Magdalen College, Oxford, complained of paying the full amount, given that they were able to attend Society meetings only infrequently, compared to others who were able to attend all the time. [50] The Council of the Society did occasionally allow a fellow to suspend payment of his subscription fees**,** for instance if he was absent from the country for an extended period. A Dr Cope for instance was exempt from payments until 'after his

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[48] Tim Harris, *London Crowds in the Reign of Charles II: Propaganda and Politics from the Restoration Until the Exclusion Crisis* (Cambridge, 1987), p. 27; Paul Griffiths and Mark S R Jenner, eds., *Londinopolis: Essays in the Cultural and Social History of Early Modern London* (Manchester, 2000), p. 3.

[49] Peter Borsay, "The Restoration Town", in *The Reigns of Charles II and James VII & II*, ed. Lionel K J Glassey (Basingstoke, 1997), p. 178.

[50] Wallis to Henry Oldenburg, 21 January 1674/5, in John Wallis, *The Correspondence of John Wallis, Vol. IV (1672 – April 1675)*, eds. Philip Beeley, Christoph J Scriba (Oxford, 2014), pp. 466 – 467.

return'.[51] The Society could not afford to do this too frequently however; subscription fees were the Society's only source of regular income. Robert Boyle, on the other hand, although he was very active in the Society, spent a great deal of his time in Oxford. However, he was wealthy enough to be able to maintain his own lodgings in London, and in fact often stayed with his sister Lady Ranelagh when he was in the City. John Evelyn too was able to maintain a property in London as well as his estates at Sayes Court and later Wootton. Men with wealth and leisure had the advantage over other fellows in that they could spend their time and their money as they pleased and were free to attend meetings of the Society whenever they wished, unlike their professional counterparts.

Quentin Skinner noted that many notable natural philosophers never became fellows of the Society. Amongst the men cited by Skinner in this regard, two lived in Oxford, another in Edinburgh, and another, physician Thomas Browne, lived in Norwich. Skinner does acknowledge that many of these men corresponded with fellows of the Society and/or contributed work to either be read at meetings or for incorporation in the *Philosophical* Transactions. However, their absence from the Society's lists does not necessarily indicate a lack of interest in their activities or a disapprobation of the organisation. It may simply have been that the pressure of working in one of the professions and living at a considerable distance from London that explained their absence from the society's membership.[52]

Another problem for the Society of being restricted to London was the disruption caused the outbreak of plague in 1665 and the Great Fire of 1666 which had a devastating impact on the inhabitants of London. The period also marked a difficult time for the Society. Minutes of the Council meeting related the following:

> It was ordered, that the president be desired to move it at the next meeting of the society, that, by reason of the present contagion, it would be convenient to intermit their publick meetings, until the sickness cease, and the president with the advice of the council summon them to meet again.[53]

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[51] Royal Society Council Minutes, 7 September 1663.
[52] Quentin Skinner, "Thomas Hobbes and the Nature of the Early Royal Society", *The Historical Journal*, Vol. 12, No. 2 (1969), pp. 217 – 239, esp. 235 – 238.
[53] Birch, *History*, Vol. II, p. 57.

Henry Oldenburg, who remained in London for much of the period of the outbreak, was concerned for the fate of the Society's papers which were in his keeping. Writing to Robert Boyle in July 1665, he explained his concern:

> I am not a little perplexed concerning the Bookes and Papers belonging to the Society, that are all in my Custody. All I can think to doe in this case, is, to make a liste of them all, and to put them up by themselves in a boxe, and seale them, together with a superscription; that so, in case the Lord should visit me, as soon I find myself not well, it may be ready to be immediately sent away out of mine to a sound house, et sic deinceps.[54]

The Great Fire of the following year created similar problems for the Society. In a letter again to Robert Boyle, Oldenburg wrote that not only had the meetings been disrupted, but also the publication of the *Philosophical Transactions*:

> I doubt, I shall find it very difficult to continue the printing of the Transactions; Martyn And Allestry being undone with the rest of the Stationers at Paul's Churchyard, and all their books burnt ... besides, that the Citty lying desolate now, it will be very hard to vend them at the present.[55]

In addition, the Society's regular meeting place Gresham College had been damaged by the fire and then been co-opted for governmental use, leaving the Royal Society with nowhere to meet. An idea was put forward that the Royal Society and the College of Physicians – whose buildings had been destroyed in the fire – could share the cost of erecting new shared premises designed to function as a meeting place for both organisations. Christopher Merrett, fellow of both the Royal Society and the College of Physicians, described how he and another fellow of the Society Daniel Colwall had approached the College on behalf of the Society, with this proposal. Merrett wrote that it had initially been received favourably by the College, but was eventually rejected, as it was judged that the College should maintain a separate location and therefore identity

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[54] Oldenburg, *Correspondence*, *Vol. II 1663 – 1665*, p. 430.
[55] Oldenburg, *Correspondence*, *Vol. III 1666 - 1667*, p. 226. Martyn and Allestry were the Society's appointed printers, so the disruption caused by the fire would have also affected the publication of the Society's texts.

from the Royal Society. Unfortunately, this plan to naught.[56] Fortunately for the Society, after the devastation of the fire and the government occupation of Gresham College, Arundel House was made available for meetings by its owner Henry Howard, later Duke of Norfolk. The Society's council recognised however that this could only be a very temporary solution. In a letter to Boyle, Oldenburg described just how vulnerable he felt the Royal Society to be:

> I must needs say, we grow more remisse and careless, yn I am willing to exspatiate upon. Yet this I must say, to a person yt I am sure hath a concern for our prosperity, yt nothing is done with ye king for us; yt our meetings are very thin; and yt our committees fall to ye ground, because it is not possible, to bring people together...[57]

In addition to the disruption caused by plague and fire, the Society also had to deal with the seasonal exodus of people from London during the summer months. At the meeting of 6 August 1668,

> It was resolved, that the meetings of the society should be intermitted for some time, many of the members being at this season of the year in the country; and that the president should be desired to send about a summons, when he should be informed, that there was a competent number of fellows in town again.[58]

These disruptions made it more difficult for the Society to continue with its experimental activities. Obviously neither Charles nor the Society could have predicted the outbreak of plague or fire; nonetheless the restriction to London meant that the Royal Society was not able to preserve the conduct of its activities despite the changing circumstances in the City. No doubt it was partly in recognition of the practical difficulties of operating solely from London, that it was proposed at a meeting of the Society's council on 17 January 1667 that 'the authority of meeting within London, or ten miles of it, may be inlarged to all England.'[59]

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[56] Christopher Merrett, *A Short Reply to the Postscript, &c. of H.S.* (London, 1670), pp. 2 -3.
[57] Oldenburg, *Correspondence*, *Vol. II*, *1663 - 1665*, p. 235.
[58] Birch, *History*, Vol. II, p. 313.
[59] Birch, *History*, Vol. II, p. 142.

The impact of these dual disasters encouraged many people to leave London permanently for provincial urban centres, particularly after the outbreak of plague. [60] The development of opportunities for learned leisure interests in the provinces was greatly facilitated by what Peter Borsay called the 'Urban Renaissance'. Urban centres experienced a sustained period of economic growth in the years after the Restoration, with people of the 'middling sort' enjoying a significant growth in income. Provincial urban centres became increasingly attractive places for the 'middling sort' who enjoyed urban leisure pursuits which included a growing number of learned clubs and societies, including those dedicated to the study of nature, particularly horticulture. The rise of facilities previously enjoyed mainly in London, such as a thriving book trade and a market for specialist instruments as well as exotic curiosities, made provincial towns far more attractive to persons who wished to leave London for healthier climes.[61]

The Oxford Philosophical Club for example, one of the precursors of the Royal Society, continued to thrive in Oxford long after the exodus to London of many of its members. Later in the century the Dublin and Edinburgh Philosophical Societies were also founded, and actively sought to forge links with the Royal Society. Other less formal groups also sprang up in provincial towns such as Norwich, York and Exeter.[62] There was value to the Royal Society in this provincial interest: the Society's restriction to London meant that it could not capitalise on the potential to develop a network of satellite groups in the provinces; alternatively they could have adopted a system of affiliation with the provincial clubs and societies, with distant fellows could attend Royal Society meetings held in distant provincial centres. There was already an interest in urban societies and clubs in receiving visiting lecturers to their meetings. According to Borsay, by the early eighteenth century, societies could call on 'the services of professional itinerant lecturers', who regularly made the circuit of provincial capitals, shire towns and resorts. Particularly relevant here is Ian W Archer's discussion of the social networks in Restoration London as seen through Samuel Pepys' diary. Archer notes that Pepys' interactions with, for example, the Fellows of the Royal Society was very much emblematic of the development

[60] Peter Borsay, "The Restoration Town", p. 74.
[61] Peter Borsay, *The English Urban Renaissance: Culture and Society in the Provincial Town 1660 – 1770* (Oxford, 1989), esp. Chapters 5, 8 – 10.
[62] Hunter, *Science and Society*, pp. 81 – 82.

of a 'metropolitan identity'. [63] This identity was characterised by the people of the 'middling sort', the definition of which has not been agreed by historians, but which characterises many of the people who were fellows of the Royal Society, or who were interested in the Society's activities. [64] Not being able to 'take the show on the road' therefore posed real difficulties for the Royal Society.

Given the reinstatement by Charles of stricter licensing laws on print material, the award of an imprimatur was a particularly valuable benefit. It not only demonstrated the king's confidence and trust in the Society, it also gave the Society an opportunity to promote itself and its activities without direct censorship. The Society could commission the production of texts without having to submit to the usual process of having publications approved by a bishop or state official. The Society's council was aware of the opportunity for promotion through its publications by a specific requirement of any who published work under the Society's imprimatur:

> 'It was ordered, that all those of the society, who should print any books of a philosophical nature by order of the society, be desired to own themselves in the title page fellows of the society.'[65]

The Society published several texts under its imprimatur in its first decade including Evelyn's *Sylva*, Hooke's *Micrographia*, Thomas Sprat's *History of the Royal* Society (1667), and a re-issue of John Graunt's *Natural and Political Observations Mentioned in a following Index, and made upon the Bills of Mortality* (London, 1665). The earliest texts contained a note proclaiming that the works had been ordered by the Society. Evelyn's *Sylva* for instance, states that the text had been printed '*By the* Council *of the* ROYAL SOCIETY of London for Improving of Natural Knowledge', and further that it had been published 'by express Order of the Royal Society'.[66] These texts were purchased and freely shared amongst learned men both at home and abroad, especially when they were

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[63] Borsay, *English Urban Renaissance*, p. 137; Ian W Archer, "Social networks in Restoration London: the evidence of Samuel Pepys' diary", in Alexandra Shepard & Phil Withington, eds., *Communities in early modern England* (Manchester, 2000), pp. 76 – 94, esp. pp. 83 – 90.
[64] On the middling sort in London, see Peter Earle, "The Middling Sort in London", in *The Middling Sort of People: Culture, Society and Politics in England 1550 – 1800* (Basingstoke, 1994), pp. 141 – 158, esp. pp. 156 – 157.
[65] Birch, *History*, Vol. I, p. 389.
[66] Evelyn, *Sylva*, p. sigA1v.

translated into Latin, as many of Henry Oldenburg's letters show. Hooke's *Micrographia* was particularly successful, being likened to 'the seventeenth-century equivalent to a coffee-table book'.[67] The illustrations revealed to readers the hidden wonders to be seen through the microscope. Samuel Pepys, who had himself recently purchased a microscope, was fascinated with the text:

> 'Before I went to bed I sat up till two o'clock in my chamber reading of Mr. Hooke's Microscopicall Observations, the most ingenious book that I ever read in my life.'[68]

The text also had the potential to draw in those who may have had only a passing interest in the study of nature, or even no interest at all. The books also served to counter the damaging ridicule of the Society by Charles as described above. They demonstrated that the Royal Society was producing useful knowledge – Evelyn's *Sylva* was designed to address the issue of the replacement of trees cut down during the civil war – as well as providing entertainment in *Micrographia*; not to mention the promotional function of Sprat's *History*. Overall, they show that the Society's Council made calculated use of their imprimatur from the outset.[69] Moreover, it was ordered by the Council that all fellows who published texts, whether they were under the Society's imprimatur or not, had to include the letters 'F.R.S' or state fully that the author was a Fellow of the Royal Society, thereby further the promoting the Society as an institution.

The publication that became the Royal Society's greatest success in its early years was Oldenburg's *Philosophical Transactions.* First published independently by Oldenburg, they were described by him in the dedicatory epistle of the first issue as 'Rude Collections, which are onely the Gleanings of my private diversions in broken hours'.[70] While largely under the control of Oldenburg, the members of the Council nominally had editorial control of the journal since the journal was published under the Society's imprimatur, as the minutes of the Council meeting of 1 March 1664/5 indicate:

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[67] Lisa Jardine, *Ingenious Pursuits: Building the Scientific Revolution* (New York, 1999), p. 42.
[68] Pepys, *Diary*, 21 January 1664/5.
[69] The Council's choice of publications will be discussed in Chapter Four with the analysis of Sprat's *History*.
[70] Henry Oldenburg, Epistle Dedicatory, *Philosophical Transactions* (1665 – 1678), Vol. 1, (1665 – 1666).

> That the *Philosophical Transactions*, to be composed by Mr. Oldenburg, be printed the first Monday of every month, if he have sufficient matter for it; and that that tract be licensed by the council of the society, being first reviewed by some of the members of the same; and that the president be desired not to license the first papers thereof, being written in four sheets in folio, to be printed by John Martyn and James Allestry, printers to the society.[71]

Despite it being Oldenburg's personal enterprise, many who read or knew of the journal assumed that it was a Society publication, an error which Oldenburg felt compelled to correct in 1666.[72] Despite this, Oldenburg's association with the Royal Society as one of its secretaries helped to propel the success of the journal and enhanced the reputation of the Society amongst learned men abroad. The first appearance of the journal was even acknowledged by the French journal which had preceded it by two months, the *Journal des Sçavans*.[73] Publication of the *Philosophical Transactions* had several advantages for the Society. It was initially under no expense for its publication; Oldenburg initially financed the printing of the journal himself and expected to make money from the publication. The Royal Society did not take over responsibility for the publication of the *Transactions* until the mid-eighteenth century. Until then the publication was the personal financial responsibility of the secretary of the Society, assuming he was prepared to accept it. [74] It was also a quick way for the Society to distribute news of the activities of its fellows to a wide audience, without the time and possible expense involved in producing full-length books. Having Oldenburg on hand as a secretary and fellow meant that knowledge produced by the Society through experiments, observations and other activities could be distributed much more quickly to a much wider audience. Naturally, the entirety of the contents of the journal was not devoted to the work of the Royal Society; Oldenburg had too wide a foreign correspondence network for that. However, having regular personal contact with Oldenburg enabled the Society to broadcast news of its work with far greater

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[71] Birch, *History*, Vol. II, p. 18.
[72] E N de C Andrade, "The Birth and Early Days of the Philosophical Transactions", *Notes and Records of the Royal Society of London*, Vol. 20, No. 1 (June 1963), pp. 9 – 27, esp. pp. 13 – 14.
[73] Andrade, "The Birth and Early Days of the Philosophical Transactions", p. 14.
[74] Andrade, "The Birth and Early Days of the Philosophical Transactions", p. 12; R K Bluhm, "Remarks on the Royal Society's Finances, 1660 – 1768", *Notes and Records of the Royal Society of London*, Vol. 13, No. 2 (November 1958), pp. 82 – 103, esp. p. 102.

immediacy than foreign natural philosophers who had to rely on sometimes delayed delivery of correspondence.

The Society could not however exercise its imprimatur without awareness of its legal responsibility, given as has been mentioned, the trust that Charles placed in them not to publish any text which could pose a threat to the monarchy or the church. Concerns about the legal implications of commissioning the printing of Society texts were raised during meetings of the Society's council. Questions were raised about the Society's legal obligations under their charter, such as whether it was allowed under the terms of its charter to employ a stationer rather than a printer to print Society texts. On consultation, Brouncker reported from the Council to a meeting of the Society on 28 October 1663 that

> because the stationers and printers are of one and the same company, and may, by the confession of both sides, practise both trades promiscuously, the Society might choose a stationer for their printer, without any violation to their charter, which gives them power to choose printers.[75]

On 14 December 1663, the Council was again concerned about legal matters relating to their imprimatur, and they decided to make use of two particularly qualified fellows: Dudley Palmer and Andrew Ellis who was a deputy postmaster.

> Ordered, that Mr. Palmer consult Mr. Ellis, whether the Charter of the Society speaks fully enough to impose the Council for granting Licence to their Printers, to print such books as shall be committed to them by the Society concerning their Design and work.[76]

The text in question was the plan to commission Thomas Sprat to write a history of the Society. At the following week's meeting of the Council, Palmer was able to report that their printers could indeed print such a book; it was resolved though that any such texts would be subject to the scrutiny and approval of two members of the Council:

> It was resolved, that no book be printed by order of the council, which hath not been perused and considered by two of the council, who shall report, that

[75] Birch, *History*, Vol. II, p. 321.
[76] Birch, *History*, Vol. I, p. 344. It made sense for the Council to consult particularly Dudley Palmer on legal matters, as he was a lawyer; Andrew Ellis was a deputy postmaster.

> such book contains nothing but what is suitable to the design and work of the society.[77]

Their concern in this matter is understandable. The charter did not specifically state the exact nature of the texts that the Society could publish; the Society had 'faculty to print such things, matters, and affairs touching or concerning the aforesaid Royal Society'.[78] Clarification was certainly necessary to avoid any conflict with the terms of the charter or with the Earl of Clarendon. Clarendon was in the position of overseeing the right administration of the organisation; sympathetic as Clarendon was to the Society, the Council still would have been extremely foolish to contravene any aspect of their charter in this regard.

Even without the need to operate within the legal requirements of the charters, the process of publication in the seventeenth century was by no means always straightforward, due in part to the power of the Stationers' Company which exercised a virtual monopoly over the publication trade in England. The Stationers' Company acted very much like a cartel of publishers, which employed printers and bookbinders to produce texts. Authors would approach these publishers who would often make their own decisions about the financial viability of producing certain texts: if the publisher did not believe that a book would return a decent profit over the cost of production, they would refuse to have the text printed. The only alternative for the author would be to fund their printing themselves. This was particularly the case for works which included expensive additions such as charts, engravings, and oversized pull-out pages. In exercising its imprimatur, the Royal Society theoretically bypassed the monopoly of the Stationers by engaging the printers John Martyn and James Allestry to oversee the printing, binding and sale of Society texts, binding them to the Society's service with a formal commission drawn up by Dudley Palmer and Andrew Ellis. However, this did not guarantee that Martyn and Allestry would always follow the Society's instructions for publication.[79]

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[77] Birch, *History*, Vol. I, p. 347.
[78] Second Charter, p. 11.
[79] For a detailed discussion of the Royal Society's relationship with their printers as well as the text of the Society's commission, see Charles A Rivington, "Early Printers to the Royal Society 1663 – 1708", *Notes and Records of the Royal Society of London*, Vol. 39, No. 1 (Sept. 1984), pp. 1 – 27.

John Martyn had an especially difficult relationship with Henry Oldenburg over the publication of *Philosophical Transactions*. John Beale also had cause to complain about Martyn's approach to publication.[80] Some of the difficulties that the Royal Society encountered in its dealings with Martyn included not only his disinclination to publish work which he considered too expensive to produce and therefore turn a profit, but also a tendency to publish texts under the Society's imprimatur, but without the express permission of the Society's Council, with potentially damaging results.[81] The Society would simply not have been able to afford to print an image-heavy text such as *Micrographia*, at this time, which meant a reliance on Martyn and Allestry to agree to the Society's requests. In 1685, the council agreed to directly fund the publication of Francis Willughby's *De Historia Piscium*. It was not a success: the total cost of publication was nearly £390, but the Society's revenue from sales of the text was only £63 18s 7d. [82]

It has been suggested that the Society had a guaranteed market for their texts in the form of the Society's fellowship;[83] however, despite the greatly increased numbers of fellows listed by the end of 1664, most of these men were only slightly active in the Society, and others not active at all, and were frequently being chased by the Council for arrears in their subscriptions. It therefore could not be guaranteed that men who were reluctant to pay their one shilling per week subscription would be prepared to pay substantially more for a text. In a broader context of the general book market in London, while literacy rates were high, the cost of books of the sort published by the Royal Society would have been a major outlay for many in the crafts and labouring classes. At sixteen shillings, Wilkins' work on a universal language was many times more than a days' wages for many craftsmen.[84] Of the texts that the Society did publish in its first decade, the most successful was Hooke's *Micrographia*. With its detailed engravings and drawings, as well as the pull-out drawing of a gnat, the *Micrographia* would have been an expensive text to

[80] Rivington, "Early Printers to the Royal Society", pp. 7 – 9.
[81] R Lewis. "The Publication of John Wilkins' 'Essay' (1668): Some Contextual Considerations", *Notes and Records of the Royal Society of London*, Vol. 56, No. 2 (May 2002), pp. 133 – 146, esp. 134 – 137.
[82] Bluhm, "Remarks on the Royal Society's Finances", pp. 85, 98 – 99.
[83] Noah Moxham, "An experimental 'Life' for an experimental life: Richard Waller's biography of Robert Hooke (1705)", *British Journal for the History of Science*, Vol. 49, No. 1 (March 2016), pp. 27 – 51, esp. pp. 38 – 39.
[84] Peter Borsay, *English Urban Renaissance*, p. 291.

produce, as well as to purchase. It must also be noted that the outbreak of the fire in 1666 did not only disrupt the Society's meetings: the fire also destroyed much of Martyn and Allestry's stock, including copies of parts of *Philosophical* Transactions, leaving Oldenburg with the difficult task of organising the printing of the affected parts of the journal.[85] Leisure spending after the fire – which is what purchase of books like *Micrographia* would have been regarded as – must surely have decreased in the immediate aftermath of the fire. John Evelyn, in his vivid description of the fire and its aftermath in his diary, recounted how '200,000 people of all ranks and degrees' were frantically engaged in trying to save their valuables, or were mourning their losses.[86] It is difficult to believe that people in such distress would have been concerned with the purchase of such texts as the Society would have been able to produce.

As has been shown in the previous chapter, the founders of the Royal Society took the issue of fellowship seriously. After the award of the charters however, for the first time there was a legal definition of qualification for fellowship. The charter's description of suitable fellows has been discussed in the previous section, and this definition was both vague enough and precise enough to give the Society a basis upon which to judge the suitability of potential fellows for election. Candidates had to be 'distinguished for the study of every kind of learning and good letters' but they did not need to have directed their study solely towards natural knowledge. They had to be known for their integrity and good character, but this could include any person who had a generally good reputation and was not known for or convicted of any wrongdoing. Similarly, fellows had to be known for their piety, but in the first two charters at least, they did not have to have any specific religious affiliation, which left the Society free to elect any suitable fellow. The Corporation Act though still required all officers of the Society – the president and members of the council – to take Anglican communion. This does not seem to have caused any difficulty for the Society however. In any case, the Royal Society was free to elect fellows who were not only potentially of value to the organisation in some way – whether through their experimental activities or through their patronage – but they were also free to exclude anyone whose fellowship could be in anyway problematic, particularly those to

[85] Rivington, "Early Printers to the Royal Society", p. 6.
[86] Evelyn, *Diary*, p. 318, 320, 321.

whom Charles might have objected. Thomas Hobbes was one such difficult person. While Hobbes was also a mathematician and learned man of note, he was best known for *Leviathan* (1651), as well as for his argumentative nature. His reputation had suffered some damage after the publication of *Leviathan*, in which, amongst other things, he controversially asserted that religion was a tool of rulers to control the populace and seemed to suggest that God was a corporeal being. This had led to Hobbes being accused of atheism, and in the heightened religious climate of the period, anything which hinted of religious heterodoxy was anathema. [87] In any case, Hobbes had a particularly argumentative nature and a stubbornness of opinions which made him unpopular with other fellows, particularly John Wallis and Robert Boyle, and it has been suggested that Hobbes' disputes with these men had been instrumental in Hobbes not being invited to become a fellow of the Society. [88]

The specific requirement in the charters that fellows had to 'excel in fidelity and affection towards us, our Crown, and dignity' could however pose a potential problem for the Society. Many in England did not necessarily welcome the restoration of Charles to the throne, although they were largely resigned to it. To join an organisation which required fidelity to the crown may well have been a step too far for some, regardless of their interest in the Society's activities. While this did not stop men from engaging with the Society, it would not have helped the Society to boost its fellowship numbers. This is not to say that the Society attempted to restrict their fellowship only to royalists; after all, many who had supported the parliamentarian side or had been members of nonconformist sects had either declared for the king or conformed to the established church. Both William Petty and John Wilkins are examples of men who had done this. J R Jacob has suggested that the Society and its fellows had, in its commitment to experimental philosophy, a political and religious mission which was to promote civic obedience, religious unity and a capitalist ideology.[89] However, this assumes that the

[87] Michael Hunter, "The Problem of 'Atheism' in Early Modern England", *Transactions of the Royal Historical Society*, Fifth Series, Vol. 35 (1985), pp. 135 – 157.
[88] Quentin Skinner, "Thomas Hobbes"; see also Shapin and Shaffer's *Leviathan and the Air Pump Hobbes, Boyle, and The Experimental Life* (Princeton, NJ, 2011), which highlights the political dimensions of the dispute between Hobbes and Boyle.
[89] J R Jacob, "Restoration, Reformation and the Origins of the Royal Society", *History of Science*, Vol. 13 (1975), pp. 155 – 176.

Society had any kind of agenda or ideology. With such a diverse religious, political and social fellowship, labels such as Jones uses are anachronistic and do little to encapsulate the variety of backgrounds and opinions that existed in the Society. John Wilkins for instance, was a strong defender of latitudinarianism even though as a puritan he chose to conform to the established church; John Evelyn on the other hand, was a committed Anglican who risked arrest to attend a secret Anglican service. Yet both these men were bound in their service to the Royal Society, and there is no evidence that their relations were based on anything other than mutual respect. Ultimately, the goal was to secure the future of the Royal Society by avoiding any action which could offend their patron.

One of the most useful of privileges received by the Royal Society was the ability to correspond freely with a variety of persons at home and abroad:

> the aforesaid President, Council and Fellows of the aforesaid Royal Society ... may and shall have from time to time full power and authority, by letters or epistles under the hand of the aforesaid President or his Deputy, in the presence of the Council, ... and in the name of the Royal Society, to enjoy mutual intelligence and affairs with all and all manner of strangers and foreigners, whether private or collegiate, corporate or politic, without any molestation, interruption, or disturbance whatsoever; Provided nevertheless, that this our indulgence, so granted as it is aforesaid, be not extended to further use than the particular benefit and interest of the aforesaid Royal Society in matters or things philosophical, mathematical, or mechanical.[90]

This privilege allowed the Society to maintain and develop contact with the wider vibrant intellectual community of the Republic of Letters on the continent, centred in the Dutch Republic, France and Italy, as the charter stated, 'for the improvement of the experiments, arts, and sciences'. The Republic of Letters was a network of correspondents based all over Western Europe and as far afield as North America. Henry Oldenburg, by virtue of his very large cohort of correspondents, established the Royal Society as a hub in the Republic of Letters, with the secretary of the Society acting as an information conduit for

[90] Second Charter, pp. 12 – 13.

disseminating knowledge.[91] Many of the fellows – besides Henry Oldenburg – also had contacts on the continent, developed during the Interregnum, when many found it necessary or useful to be out of England during this period, and they maintained their contacts after the Restoration. Membership of the Society gave the fellows new stature with their correspondents, given that they were fellows of the first publicly incorporated organisation of this type. The minutes of meetings in the first decade record numerous examples of the sharing of correspondence from a wide range of sources, and fellows would often be instructed to send certain replies to their correspondents. Sometimes, fellows would ask and be given permission to reply, especially in circumstances when the correspondent in question was a foreigner of high rank in his own country. On 8 May 1661, letter was read to the Society from Prince Leopold, brother of the Grand Duke of Tuscany. A formal committee was formed to begin and manage a correspondence with the prince. On 15 May, it was confirmed that the Society had permission to maintain the correspondence:

> Sir Robert Moray having had occasion to acquaint the king with prince Leopold's letter to the society, had his majesty's consent to return an answer to it.[92]

Oldenburg's correspondence was extremely valuable to the Society, not only because his *Philosophical Transactions* was created from his exchange of letters with a variety of learned men, but also because his correspondence promoted the Society's activities. At almost every opportunity, and particularly when he acquired a new correspondent, Oldenburg would make sure to explain what the Royal Society's aims were, and to enlist the help of not only the correspondent, but also – since these kinds of letters were meant to be shared – of any other interested person whom his correspondent might read his

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[91] Second Charter, p. 12. There is extensive literature on the Republic of letters. One of the most comprehensive is Anne Goldgar, *Impolite Learning: Conduct and Community in the Republic of Letters, 1680 – 1750* (New Haven, 1995). See also for example, H Bots and F Waquet, eds., *Commericum Litterarium. Forms of Communication in the Republic of Letters 1600 – 1750* (Amsterdam, 1994); Lorraine Daston, "The Ideal and Reality of the Republic of Letters in the Enlightenment", *Science in Context*, Vol. 4 (1991), pp. 367 – 386;Vanessa Smith and Richard Yeo, "Friendship in early Modern Philosophy and Science", *Parergon*, Vol. 26, No. 2 (2009);M Ultee, "The Republic of Letters: Learned Correspondence 1680 – 1720", *Seventeenth Century*, Vol. 2, No. 1 (January 1987), pp. 95 – 112; Saskia Stegeman, *Patronage and Service in the Republic of Letters. The Network of Theodorus Janssonius van Almeloveen (1687 – 1754)* (Amesterdam, 2005).
[92] Birch, *History*, Vol. I, pp. 22 – 23.

letters to. Oldenburg was extremely proficient at networking, and he served the Society well in this capacity. Oldenburg's position as secretary of the Royal Society both made him a sought-after correspondent, and it provided him with the opportunity to become the Society's semi-official spokesman for the Society. The following letter is an excellent example of the way in which Oldenburg promoted the activities of the Royal Society to scholars and philosophers overseas, as well as securing their support in advancing the Society's work, and is worth transcribing in full. It was dated 10 May 1666 and written to 'Mr. Lambecius, Councillor and Historiographer of his Imperial Majesty, at Vienna':

> Famous Sir,
>
> As the Royal Scientific Society, founded by his Britannic Majesty in this city and by him endowed with ample privileges, has learned from a letter written some time ago by the most excellent Mr. Henry Howard of Norfold [to his noble brother] that you, out of your singular regard for them and their studies, eagerly desired to initiate a correspondence with them through which the development of both the sciences and the useful arts might be promoted, they at once instructed me to inform you that they had welcomed your remarkable display of goodwill towards them and gladly embraced your proffered kindly services. For they consider, no doubt rightly, that the boundless variety of Nature is inexhaustible, so that the study of it is not a task for one or two nations only. And so it is necessary to unite the ingenuity, industry, and effort of all peoples and for this solemn union to endure through many ages, [if we long to penetrate into knowledge of its mystery.] Therefore our first endeavour is to encourage wise individuals wherever they may be, and whole nations, to prepare this Sparta and to enlarge the cultivation of these studies. And as you, thoughtful Sir, also may please to add your contribution we cannot but praise your intention generously and promise you our prompt assistance. We shall be deeply grateful for news of whatever is noteworthy in physics, mathematics, and chemistry (for indeed we are less interested in other matters) and we shall, we hope, make a like return to you. And as you and I share the bond of nationality I wish to assure you that I hold myself so bound by this that I will pass over no occasion of deserving well of you. Farewell, and think well of
>
> Yours most zealously,
>
> *Henry Oldenburg*[93]

[93] Oldenburg, *Correspondence, Vol. III 1666 - 1667*, pp. 120 – 121.

However, an incident in 1667 demonstrated to the Royal Society's fellows that oversight of their fellows' activities was indeed present. The ability to correspond freely had its limits, as Henry Oldenburg discovered. In the summer of 1667, Oldenburg was imprisoned in the Tower of London, not long before the end of the second Anglo-Dutch War, after the attack of the Dutch on the Medway, which resulted in the capture of the ship the *Royal Charles*. At the time of his imprisonment, England was in a period of heightened tension in the country, and in London in particular. In an entry dated 25 June 1667, Samuel Pepys recorded:

> I was told yesterday, that Mr. Oldenburg, our Secretary at Gresham College, is put into the Tower, for writing news to a virtuoso in France, with whom he constantly corresponds in philosophical matters; which makes it very unsafe at this time to write, or almost to do any thing.[94]

In a letter from Oldenburg, then imprisoned in the Tower of London, to Seth Ward, now Bishop of Exeter, Oldenburg wrote that he had been imprisoned because of a passage in a letter to a French correspondent in which he criticised the way the war was being conducted. Oldenburg protested his innocence, claiming that he had written the passage out of frustration for the damage being done to England by the poor conduct of the war, and the insolence of England's enemies.[95] Subsequent letters reveal that Oldenburg had previously tried to ensure that there should be no suspicion attached to his correspondence by voluntarily sending any letters which he received from abroad to the office of Lord Arlington, Charles' Secretary of State. In his desperation, Oldenburg even wrote a petition directly to Charles II pleading for his release, although the document was never sent.[96] Oldenburg was eventually released from the Tower on 26 August 1667, probably because of the signing of the Treaty of Breda on 31 July, which ended the war.

This episode was significant for the Royal Society in many ways. It demonstrated that there was a limit to the extent to which the Society could exercise its privileges, and that the charters could be used effectively against them to control its activities. Oldenburg

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[94] Pepys, *Diary*, 26 June 1667. For a fuller description of Oldenburg's imprisonment, see Douglas McKie, "The Arrest and Imprisonment of Henry Oldenburg", *Notes and Records of the Royal Society of London*, Vol. 6, No. 1 (Dec. 1948), pp. 28 – 47.
[95] Oldenburg, *Correspondence*, *Vol. III*, pp. 448 – 449.
[96] Oldenburg, *Correspondence*, *Vol. III*, pp. 452 – 453.

had assumed that if his correspondence was made available for scrutiny, he would be able to continue to correspond even with his nation's enemies if the contents of those letters were confined to philosophical matters. In reality, even innocent remarks could be misconstrued to the author's disadvantage. Oldenburg's actions in continuing to correspond with men on the continent could be regarded as naiveté; however, his correspondence before the onset of the military conflict had often contained general remarks about domestic political and religious affairs, and he would have had no reason to believe that, apart from some sensible precautions, the king would have had any reason to doubt his loyalty. Nonetheless, in strict accordance with the terms of the Society's charter, Oldenburg should not have written on matters outside of natural knowledge. Importantly, apart from a visit from John Evelyn, none of the fellows of the Society are known to have made any effort to secure Oldenburg's release by vouching for his loyalty to his king and the nation. This may have been because they too feared imprisonment, given that many of them also conducted correspondence with learned men in both France and the Dutch Republic. Crucially, Oldenburg's imprisonment was a clear sign to the Royal Society that members of the government were watching; this incident would have underlined for the Society that the king's public support for the organisation extended only so far. Clearly there were limits to the government's indulgence.

Also, a side effect of Oldenburg's imprisonment was the disruption to his correspondence. This had occurred, as he wrote to Robert Boyle, because some of his 'corresponding friends' even when he had made them aware that he had been released, were reluctant to resume their correspondence:

> wch makes me conjecture, that forrainers, especially in the neighboring parts, may be grown shy to reassume that commerce, they were wont to entertain with me, out of some tendernes and concern for my safety, wch they may judge may be endangered as well by their freenes of writing to me, as by mine of writing to ym.[97]

It was not until the beginning of December of that year that Oldenburg could report to Boyle that his correspondence had begun to increase, noting the receipt of letters and

[97] Oldenburg, *Correspondence*, *Vol. III 1666 - 1667*, pp. 473 – 474.

papers from Antwerp, Danzig, Sweden, Poland, the Bermudas, and Holland.[98] Given that Oldenburg's correspondence was the basis of his *Philosophical Transactions*, which by this point was so valuable to the Society, any disruption would have serious consequences for the Society's operation. The situation was exacerbated by recent problems with attendance at meetings. In the above letter Oldenburg remarked that the Society's annual St Andrew's Day meeting was 'never so great an one before', being attended by 'about threescore', despite a listed membership of over 300. [99] Thus, foreign and domestic correspondence was crucial to keeping the Society functioning to any degree, and Oldenburg's role as a conduit for this correspondence was central. This meant disruption to an important element of the Society's overall activities.

3.3 The Royal Society and the Institutions

With the award of its charters, the Royal Society took its place among the other principal learned institutions of the period: the universities of Oxford and Cambridge and the Royal College of Physicians. These organisations also operated under charters, albeit ones which were very different in nature to that of the Royal Society. While the other institutions' charters allowed them to operate under specific terms which gave them a clear public purpose, in contrast the charters of the Royal Society were vaguer and did not make clear exactly how this new organisation was meant to serve the public good. Both the award of a charter to the Royal Society and its espousal of the experimental philosophy – and corresponding rejection of Aristotelian scholasticism – created the potential for conflict between these institutions, a situation which the Royal Society's fellows took steps to mitigate. However, when the charters of the Society are compared to that of the College of Physicians – the institution that most closely resembled the Royal Society - the Society's charters did not in fact allow the organisation to operate on an equal basis with the College of Physicians as a learned institution.

This examination of the institutions will not include Gresham College, primarily because Gresham College was not a chartered organisation. It was primarily a public

[98] Oldenburg, *Correspondence*, *Vol. IV 1667 - 1668*, p. 6.
[99] Oldenburg, *Correspondence*, *Vol. IV 1667 – 1668*, p. 5.

educational establishment, but it took no students and awarded no degrees. It has been argued though that Gresham College very much relied on its relationship with the Royal Society and suffered a significant decline when the Society moved to its own premises in the early eighteenth century. [100] It is worth pointing out here that even though the Royal Society would appear to have operated in competition with other learned institutions of the period, there was considerable overlap in membership. Many members of the universities and fellows of the College of Physicians, not to mention professors of Gresham College, were also fellows of the Royal Society. This does not seem though, to have posed any kind of conflict of interests for members of the institutions. There does not seem for instance, to have been any kind of penalty for those who were members of say, the College of Physicians and the Royal Society.[101]

Historians such as Michael Hunter, Charles Webster and Margery Purver have assessed the nature of the conflict between the Royal Society and the universities and the College of Physicians. These historians have highlighted that the universities resented the Society's embrace of the experimental philosophy and their often-vocal rejection of the dogmatism and intellectual sterility of Aristotelian scholasticism and classical learning. The universities resented the Royal Society's claims to equal stature in the learned sphere and suspected that their charter was a precursor to undermining or removal of their own privileges, and suspected that the Society intended to take on an educational role and perhaps even award degrees. [102] Similarly, the College of Physicians was resentful of the Society's activities in medically-related subjects and of their apparently close relations with the College's medical rivals the Society of Apothecaries. John Fell, Dean of Oxford University, Robert South, Public Orator at Oxford University, the physicians Henry Stubbe

[100] Ian Adamson, "The Royal Society and Gresham College 1660 – 1711", in *Notes and Records of the Royal Society of London*, Vol. 33, No. 1 (August 1978), pp. 1 – 21.
[101] For a detailed analysis of the Society's fellows, see Michael Hunter, "The Social Basis and Changing Fortunes of an Early Scientific Institution: An Analysis of the Membership of the Royal Society, 1660 – 1685", *Notes and Records of the Royal Society of London*, Vol. 31, No. 1 (July 1976), pp. 77 – 114.
[102] Michael Hunter, *Science and Society*, Chapter 6; Charles Webster, "The Origins of the Royal Society", *History of Science*, Vol. 6 (1967), p. 114; Margery Purver, *The Royal Society: Concept and Creation* (London, 1967), p. 64.

and Baldwin Hamey and the cleric Meric Casaubon were the most vocal critics of the Royal Society.

However, the situation was in fact not as straightforward as that. While there were some members of the universities and fellows of the College of Physicians were resentful of the Royal Society and suspicious of its motives, this did not stop many members of both institutions from becoming fellows of the Society, and there does not seem to be any evidence to suggest that men who were members of the other institutions were penalised for also being fellows of the Royal Society. Similarly, the antagonism towards the Royal Society did not necessarily exist at an institutional level; attacks by individuals did not necessarily reflect what the institutions felt about the Society and its work. The College of Physicians seems to have kept the Royal Society at arms' length, but the leadership of the College did not necessarily encourage attacks on the Society. So, Baldwin Hamey acted as an individual in his support for Henry Stubbe's criticisms of the Society, not as a representative of the College of Physicians as a whole. [103] In any case, much of the resentment toward the Society may have been in response to the institutions' internal difficulties and concerns over other external threats which arose during the Interregnum. The universities were engaged in re-establishing control over appointments to positions within the universities after the removal of visitors imposed during the Interregnum, as well as trying to maintain their intellectual authority in the face of criticism which questioned the quality of the education that the universities provided, and accusations of operating as a monopoly in the training of clergymen.[104] The post-Restoration situation for the College of Physicians was even more acute. During the Interregnum it also had to defend itself against accusations of being a medical monopoly, including from the Society of Apothecaries who challenged the College for the right to practise medicine in London. In addition, the College's Protectorate -era charter stripped it of some of its regulatory

[103] George Clark, *A History of the Royal College of Physicians of London*, Vol. 1 (Oxford, 1964), p. 311.

[104] On the issue of visitors, specifically those imposed on the University of Oxford, see Blair Worden, "Cromwellian Oxford", and R A Beddard, "Restoration Oxford and the Remaking of the Protestant Establishment", both in *The History of the University of Oxford: Volume IV Seventeenth-Century Oxford* (Oxford, 1997), Chapters 15 and 17. On the criticisms of the universities during the Interregnum, see Barbara Shapiro, *John Wilkins 1614 – 1672: An Intellectual Biography* (Berkeley, 1969), pp. 97 – 111. On the universities as monopolies, see Christopher Hill, *The World Turned Upside Down: Radical Ideas During the English Revolution* (London, 1991), pp. 300 – 305.

powers, and the College experienced some difficulty in obtaining a new charter from the Cavalier Parliament after the Restoration. [105] On top of this, the College experienced severe internal division over its conservative commitment to traditional Galenic medicine and particularly opposition to the introduction of chemical remedies as part of disease treatment. This division resulted in the formation of the breakaway Society of Chemical Physicians, which lobbied parliament for an independent charter. The petition for a charter was unsuccessful but the episode revealed just how deep divisions within the College were. It certainly did not help relations between the College and the Royal Society that aristocratic support at court came not only from Charles II himself, but also from men who were also fellows of the Royal Society. [106] Regardless of the source of resentment, the very fact of the award of a charter to the Royal Society posed challenging questions of jurisdictional learned authority among the learned institutions.

As mentioned, the antagonism of some at the universities towards the Royal Society did not prevent other university men's involvement with the Society, or their embrace of its experimental philosophy. John Wilkins, John Wallis, Jonathan Goddard and Seth Ward were Royal Society fellows who were employed in various capacities at Oxford and Cambridge, and they often carried out a variety of experimental activities during their employment there. John Wilkins for instance, hosted a group of experimenters and other interested students in meetings held in his rooms at Wadham College, Oxford. The new knowledge being produced in the late sixteenth and early seventeenth centuries by experimentalists was increasingly finding its way onto the natural philosophical curricula of the universities of Oxford and Cambridge. Mordechai Feingold has shown that it was not the case that the universities rejected the 'new philosophy' of the experimentalists: educators at Oxford University for instance were actively engaged in the seventeenth century in imparting this new knowledge to students, alongside traditional Aristotelian natural philosophy, with Aristotelianism providing the broad teaching framework for

[105] Harold Cook, *The Decline of the Old Medical Regime in Stuart London* (Ithaca, NY, 1986), pp. 162 – 182; Marie Boas Hall, *Promoting Experimental Learning: Experiment and the Royal Society 1660 – 1727* (Cambridge, 1991), pp. 160 – 161; A Rupert Hall & Marie Boas Hall, eds., *The Correspondence of Henry Oldenburg, Vol. III 1666 – 1667*, pp. 429 – 430, footnote 12;
[106] Cook, *Decline of the Old Medical Regime*, pp. 145 – 155.

undergraduates' learning. [107] At both Oxford and Cambridge, mathematical and natural philosophical subjects were taught as part of a broad range of subjects which formed the undergraduate curriculum. However, the breadth of the curriculum meant that for most subjects, students were given primarily 'the broad outline and basic principles of each subject' and it led 'to early specialization being explicitly discouraged'. [108] However, teaching the new knowledge was not the same as producing the new knowledge. Men like Wilkins and Wallis conducted their activities as individuals, not under the auspices of the universities. As Steven Shapin pointed out, the role of university professors and masters was to transmit the traditional knowledge inherited from the past – and increasingly the new knowledge as well - to future generations of students, and while many of them conducted research which often challenged that traditional knowledge, their role of the professor or master was not considered to be central to that role. As Shapin wrote, 'Original research was not, so to speak, a role requirement.' [109] Oxford University had made efforts to establish itself as a kind of scientific research institution from the 1650s onwards, by buildings a physic garden, laboratories and observatories, as well successfully securing the endowment of the collection of manuscripts and rarities of Elias Ashmole. In 1653 Samuel Hartlib was informed that John Wilkins had contributed £200 towards the building of 'a college for experiments et mechanicks'; Seth Ward, who was also at Oxford at this time, also wrote of their design 'to erect a magneticall, mechanicall, and optick schoole'. [110] However, most of these initiatives were severely curtailed or abandoned entirely through lack of funding from either the university itself or external benefactors; indeed much of this activity was proposed and conducted in the 1660s, suggesting that the initial success of the Royal Society was a spur to university administrators such as John

[107] Mordechai Feingold, "The Mathematical Sciences and New Philosophies", in *The History of Oxford University: Volume IV Seventeenth-Century Oxford*, ed. Nicholas Tyacke (Oxford, 1997; Online edn. 2011; accessed 08/01/2018), pp. 364, 400 – 401.
[108] Feingold, "The Mathematical Sciences", pp. 366 – 367; John Gascoigne, "The Universities and the Scientific Revolution: The Case of Newton and Restoration Cambridge", *History of Science*, Vol. 23, No. 4 (1985), p. 395 – 396.
[109] Steven Shapin, "The Man of Science", in *Cambridge History of Science*, *Vol. 3: Early Modern Science* (Cambridge, 2008), pp. 182 – 185, esp. p. 184.
[110] Feingold, "The Mathematical Sciences", p. 436.

Fell to demonstrate the university's relevance in this new embrace of the experimental philosophy. [111]

The universities' remit therefore was primarily education, not research, and this is also reflected in their charters. Using the Great Charter of the University of Oxford as an example, Oxford was defined very much in terms of its rights, privileges and duties as an educational institution, and indeed the charter reveals the university's origins as a religious foundation with privileges which often placed it in conflict with the city of Oxford. Details of the charter relate to its privileges as a foundation relating to everything from rights to wine licensing to market rights to additional rights and exemptions awarded to scholars and privileged persons.[112] Statutes relating directly to teaching and learning defined what subjects were to be taught and often the specific content of the subjects, as well as governing rules for students' behaviour and other related administrative issues regarding the conduct of the colleges. [113] The most notable feature of the Oxford University's Great Charter was the establishment of the university press. Meanwhile, ate Cambridge, Gascoigne has noted that Cambridge University's regarded itself principally as a 'clerical seminary committed to reviving the doctrine and discipline of the Church of England after its time of troubles.' As such the university undergraduate curriculum prioritised subject disciplines which would help to consolidate the position of the established church. As a result, many of the influential members of the university concentrated their efforts on philosophical and historical studies. [114] The imposition of visitors on the universities during the Interregnum seems to have cast a long shadow on natural philosophical studies at Cambridge, although mathematics and physics continued to be taught, partially influenced no doubt by the arrival of John Wilkins who became master of Trinity College in 1659, and who attempted to establish a philosophical society of the kind which flourished during his time at Oxford. [115]

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[111] Feingold, "The Mathematical Sciences", pp. 435 – 442.
[112] Alan Crossley, "City and University", in *The History of the University of Oxford: Volume IV Seventeenth-Century Oxford*, ed. Nicholas Tyacke (Oxford, 1997; Online edn., 2011; accessed 10/01/2018), pp. 115 – 116.
[113] Feingold, "The Mathematical Sciences", pp. 380 – 381, 445 – 446, 449; Gascoigne, "The Universities and the Scientific Revolution", pp. 395 – 396.
[114] Gascoigne, "The Universities and the Scientific Revolution", pp. 420 - 421.
[115] Gascoigne, "The Universities and the Scientific Revolution", p. 418.

Ultimately, while Oxford and Cambridge's principal function was the education and training of young gentlemen and those wishing to become clergymen or physicians, the Royal Society's college was to be devoted purely to research. Thomas Sprat took great pains to reassure the universities that the Royal Society had no interest in treading on their territorial toes. Sprat was careful to make clear at the beginning of his *History* that while the Society wanted to adopt Abraham Cowley's model for a college, they wanted to do so without the educational element. Joseph Glanvill emphasised in his *Plus Ultra* (1668) that he did not want to dismiss Aristotelian learning in the universities entirely. Rather, Glanvill accepted that the statutes of the universities required that certain knowledge be taught; however, he asserted that the new knowledge being produced would supplement and enhance traditional learning, not replace it. [116] This was a purpose that the Society's experimental and observational activities could satisfy. Given what has been discussed above about the comparatively superficial teaching of natural philosophy at the universities, this was a fair point, although Glanvill's somewhat vehement style did not endear him to many who defended the universities' commitment to Aristotelianism. Both Sprat and Sir Francis Bacon also considered that the approach to natural knowledge at universities was too narrow, designed to only be part of the education of men entering the professions. In *Novum Organum*, Bacon wrote:

> … natural philosophy, even among those who have attended to it, has scarcely ever possessed, especially in these later times, a disengaged and whole man (unless it were some monk, studying in his cell, or some gentleman in his country house), but that it has been made merely a passage and bridge to something else. And so this great mother of the sciences has with strange indignity been degraded to the offices of a servant, having to attend on the business of medicine or mathematics… [117]

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[116] Joseph Glanvill, *Plus Ultra, or, The Progress and Advancement of Knowledge Since the Days of Aristotle* (London, 1668), pp. 126 – 128. See also Gascoigne, "The Universities and the Scientific Revolution", pp. 392 – 393.

[117] Francis Bacon, Baron of Verulam, Viscount St. Albans, *The New Organon and Related Writings*, ed. Fulton H Anderson (Upper Saddle River, NJ, 1960), Aphorism LXXX, p. 77.

Thomas Sprat developed this further, as part of his exhortation to gentlemen to become involved in the study of nature. He highlighted what he saw as the defects of young gentlemen's educations: their teachers

> …fill their Heads with difficult and *unintelligible Notions*, which neither afford them Pleasure in Learning, nor Profit in remembering them; they chiefly instruct them in such *Arts*, which are made for the beaten Tracks of Professions, and not for *Gentlemen.* Whereas their Minds should be charm'd by the allurements of *sweeter* and more *plausible Studies;* and for this purpose *Experiments* are the fittest. [118]

The Royal College of Physicians as an incorporated institution had much more in common with the Royal Society. The Royal College of Physicians was primarily responsible for the regulation of medical provision in London and the rest of the country, as well as for the licensing of physicians. [119] Like the universities, many fellows of the College of Physicians were also fellows of the Royal Society, for instance Christopher Merrett, Francis Glisson and Walter Charleton. Both conducted investigations in medically-related subjects, such as anatomy, physiology – human and other animals – and chemistry, although the College's embrace of experiment and investigation was comparatively recent. The College still supported the classical medicine of the humours of Galen and Hippocrates, but it also embraced the investigative work of William Harvey, as well as being influenced of the presidency of Francis Glisson, a fellow of the Royal Society who embraced the experimental philosophy and its application to medical treatment. As such, the College of Physicians came to be seen not just as a medical society, but more as a learned society. [120] Both had similarly organised administrative structures as designated by their charters [121]: the members of the organisations were designated as fellows, and the leader was designated president; any person holding a position of officer in the organisation had to

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[118] Sprat, *History*, p. 409.
[119] For more on the history of the Royal College of Physicians, see Clark, *History of the Royal College of Physicians*, Vol. 1; Cook, *Decline of the Old Medical Regime*; Webster, *Great Instauration*, pp. 308 – 323.
[120] Cook, *Decline of the Old Medical Regime*, pp. 107 – 113; Clark, *History of the Royal College of Physicians*, p. 309; Mary Lindemann, *Medicine and Society in Early Modern Europe*, 2nd ed. (Cambridge, 2010), p. 214.
[121] The text of the charter used here is the English translation of the charter in Charles Goodall, *The Royal College of Physicians of London Founded and Established by Law; As appears By Letters Patents, Acts of Parliament, adjudged Cases, &c.* (London, 1684), pp. 62 – 119.

be chosen from among the fellows. Both fellows and officers of the organisations once elected, could hold the position for life, unless they were removed by the leadership for the transgression of the organisation's rules and statutes. Decisions made by the organisation at any level had to be taken based on a quorum of fellows being present, of which the president or his deputy had to be one. Both organisations had the right to make whatever laws and statutes for the efficient operation of the organisation if they did not contravene or conflict with the laws of the land.

The College and the Society shared other similar terms and privileges. The College of Physicians could hold its meetings in the City of London or a location within seven miles of the City. The Royal Society was allowed the same, except within ten miles of the City. Both organisations could receive the bodies of executed persons for anatomical study. The College of Physicians also shared this privilege with the Company of Barber-Surgeons; however, the College was limited to acquiring no more than six bodies per year, on condition that the bodies be properly buried after use. The Society's charter stated that It also had this privilege 'in as ample manner and form, to all intents and purposed, as the President of the College of Physicians and the Company of Surgeons of our City of London … have used and enjoyed'. It should be noted that while the College of Physicians had been incorporated for nearly one hundred and fifty years before the Royal Society came into existence, both organisations were effectively starting afresh: the Royal Society was a brand new organisation, although its origins lay in groups dating back to the 1640s. The College of Physicians, despite having a history dating back to the reign of Henry VIII, was in a sense starting anew, since the charter which it received under the Protectorate had been made null and void on the restoration of the monarchy. The charter received by the College from parliament in 1664 represented a fresh start for the College under the new regime.

Despite the similarities of their charters, and even some similarities in activities, there was one major difference between the charters of the Society and College which set the Royal Society at a distinct disadvantage: while the charter of the College of Physicians established and underlined the College as a professional body, the Royal Society's charter did not. The College's charter set professional standards for both potential medical licensees and practising physicians, with appropriate sanctions for those who failed to

meet these standards. Physicians who wished to practice in England needed to undergo appropriate training at one of the English universities or at a university abroad and were required to be examined by the College to receive a license to practice medicine. Those who wished to become fellows of the College of Physicians – known as candidates – had also to be of good standing in the medical field, although, since the College limited its numbers, fellowship was usually obtained only on the death or retirement of an existing fellow. Under the Royal Society's charters, on the other hand natural philosophers, whether they were fellows of the Royal Society or not, required no license to conduct experiments or observations, or even to publish texts. This lack of professionalisation made a real difference to the public perception of the Society and its fellows, and the value of their activities. The issue of public perception is an important one. To be a physician was to be a member of a publicly recognised profession, and to have the letters F.R.C.P. after your name carried some weight in both the learned world of physic and in the perception of the public. To be an F.R.S. by no means carried the same weight for a natural philosopher in the seventeenth century, although there is a modern tendency to depict natural philosophers as being distinguished by their level of 'professionalism'. There was no such thing as a profession of natural philosophy nor was there a seventeenth-century equivalent of a 'professional scientist', but many historians have written about the fellows of the Royal Society as if there were such entities. [122] This is evidenced by the fact that natural philosophers were not distinguished in for instance their obituaries or funeral eulogies as being natural philosophers, but rather by their profession, occupation or social status.[123] The only exception to this was arguably Robert Hooke: he was much more of a professional at least in the modern sense: he was employed and paid by the Royal Society solely to conduct experiments and observations on the Society's behalf, much like a modern scientist employed by for instance a research institute. How then did the charter of the College of Physicians support it as a professional body and the Royal Society's did not?

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[122] Dorothy Stimson, *Scientists and Amateurs*, see esp. pp. 55, 56, 115. Michael Hunter, *Science and Society*, Chapter 3, esp. pp. 68 – 70; ibid, *Establishing the New Science: The Experience of the Early Royal Society* (Woodbridge, Suffolk: The Boydell Press, 1989), esp. pp. 28 – 29.
[123] Noah Moxham, "An experimental 'Life'". pp. 28 – 29.

In the first place, unlike the College, the Royal Society did not have a clearly defined and demonstrable purpose/role which served the public good. In the charter of the College, Charles describes the abuses being perpetrated on the public by 'unskillfull illiterate and unlicensed practizers of Physicke', who had been peddling ineffectual and sometimes dangerous medicines. Other 'subtil and crafty men wholly ignorant and unskilled in the faculties of Physicke' had brazenly been practising medicine in the City of London. Thus, the charter was granted to the College of Physicians

> to prevent in the future and that a due and seasonable reformation may bee had in all the premises and an apt proper and legall constitution and incorporation may be had and established of grave and learned Doctors and other able and experienced practisers of Physicke in and about our said Cittie of London indowed with powers and privileges convenient and requisite for the ends aforesaid...[124]

The College was therefore incorporated to protect the public from unlicensed medical practitioners and peddlers of drugs; in granting the College its 'greate liberties powers and privileges' the College would be able to punish such practitioners appropriately when caught. The charter goes on to further define the role of the College as the licensing authority for any who wished to practice medicine in the City of London and for seven miles around. Compare this with the charter of the Royal Society. Charles' aim in awarding the charter was to

> encourage philosophical studies, especially those which by actual experiments attempt either to shape out a new philosophy or to perfect the old. In order, therefore, that such studies, which have not hitherto been sufficiently brilliant in any part of the world, may shine conspicuously amongst our people, and that at length the whole world of letters may always recognize us not only as the Defender of the Faith, but also as the universal lover and patron of every kind of truth...[125]

Charles on the other hand, granter a vaguer charter to the 'President, Council, and Fellows of the Royal Society of London'

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[124] Goodall, *The Royal College of Physicians*, pp. 66 – 67.
[125] Second charter, p. 1.

> whose studies are to be applied to further promoting by the authority of experiments the sciences of natural things and of useful arts, to the glory of God the Creator, and the advantage of the human race...[126]

The Society's privileges were therefore granted to improve and promote natural knowledge and the useful arts through experiment.

The problem with the Society's charter is that while improvement was a concept that was familiar in the early modern period in England, the Society's charter did little to clarify just how the Society's experiments would support it. In this period, improvement encompassed the furthering of national prosperity, specifically by encouraging developments in agriculture, technology and learning, and on the face of it, the work of the Society would seem to encompass this. After all, as seen in Chapter Two, William Petty had advocated similar ideas in his model for a college. Indeed, the Royal Society set up for instance, several committees designed to systematically address their goal of improvement. At a meeting of the Society on March 30, 1664 a list was read of committees which were designed to organise the Society's activities into distinct areas for research. These committees included the georgical, mechanical and history of trades committees. As part of the georgical committee, questionnaires were sent out to landowners to gather information about agricultural and horticultural techniques. The response though was disappointing, most likely because the Society was not sufficiently well known to landowners and farmers for them to see the need to contribute that information. [127] In any case, the charter did not specify exactly which areas of knowledge would be addressed by the Society, in what way the fellows of the Society were specifically qualified to conduct these experiments, or how the public would know if they had been successful. The College of Physicians charter in contrast, makes it very clear what specific public need the College was incorporated to address, and its success could be measured in the good conduct of the practice of medicine, and the punishment of incompetent or unlicensed practitioners. With the Royal Society however, their charter does not make provision for the Society to be compelled to produce material evidence of

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[126] Second charter, p. 2.
[127] Birch, *History*, Vol. I, pp. 406 – 407; Paul Slack, *The Invention of Improvement: Information and Material Progress in Seventeenth-Century England* (Oxford, 2015), p. 114.

its efforts. It was not required to produce a set number of texts, or to compile regular reports to the Earl of Clarendon in his supervisory role over the Society's activities, nor did it have to produce any tangible, measurable improvement to the 'useful arts'. Sir Robert Moray reported to a meeting of the Society in 1662 that Charles II had suggested that 'no patent should pass for any philosophical or mechanical invention, but what was first put to the examination of the society.' [128] However, there is no further mention of Charles formally appointing the Society to this role, nor was such a provision incorporated in any of the Society's charters. There is no definition of the practical or intellectual outcomes expected of the Royal Society; the purpose of the Society was vaguely one which could improve the lives of the people of England and the whole world. What form that improvement was expected to take was not clearly defined in quantitative terms in the charters. This left the Royal Society in the difficult position of having to effectively make things up as they went along, of having to define for itself how to fulfil its public role. The Society's council had already proposed the organisation of the fellows' research activities into a variety of committees as detailed above. However, the Society really began this process of definition by commissioning Thomas Sprat to write a history of the Society. The text would demonstrate to the public the utilitarian value of their experiments and investigations in improving natural knowledge and technology. It also served as a marketing tool to raise money for the college which had been their goal at the outset. The college would allow the Society to create a physical location for their experimental programme and could allow them to create an organisation which could develop some form of an institutional partnership with the universities and the College of Physicians; that is however, if the other institutions would be willing to do so. [129]

As shown previously, the College of Physicians had a clear regulatory and supervisory role, with administrative leadership being undertaken by the College's president, censors and elect of the College. The College had powers to call persons to appear before it, to levy fines, to revoke licenses and imprison unlicensed practitioners. It was responsible for dealing with complaints against practitioners. As part of its licensing authority, it could examine physicians to ensure that their medical knowledge was of a

[128] Birch, *History*, Vol. I, p. 116.
[129] Sprat's *History* will be discussed in detail in the next chapter.

sufficient standard to be allowed to practice. Such powers were not available to the Royal Society. Granted the Society could not claim either the benefit of longevity and familiarity which the College enjoyed, but as has been shown, they could not also claim a clear remit which would allow for the creation of any kind of regulatory role. So, the Society was not able to license natural philosophers or experimenters, nor could it sanction those whose work was not of a sufficient standard, because there was no legal standard to measure them by. While medical practitioners, whether they be physicians, apothecaries or surgeons, were deemed to have received specific training which enabled them to practice, there was no specific training required for a person to engage in the study of nature. The standards set by the Society, for example, in terms of the repeatability of experiments or the style of language used in texts, were established by the president and council of the Society and were ones which the fellows and those contributing to the Society agreed to follow voluntarily, as part of membership of a voluntary association.

In any case, creating a regulatory role for the Society would have created something of an institutional nightmare for the government. The London trade guilds – the livery companies supervised activities of tradesmen in the city which included setting standards for goods and services for member tradesmen. Of relevance to the Royal Society were the instrument makers and other craftsmen engaged in making technical devices of all kinds, including lens grinders and clockmakers. It would have created jurisdictional confusion for the Royal Society to be given powers which for instance allowed them to regulate the production of scientific instruments such as telescopes and microscopes, especially given that its charter assigned them the responsibility of improving the 'mechanical arts'. In any case, many of these instrument makers were supervised by many different guilds, the Clockmaker's and Spectaclemakers' Guilds, as well the Cook's, Grocer's, Blacksmith's, and Joiner's Companies. These companies and guilds themselves struggled to maintain their authority over these many trades which contributed to the production of scientific instruments. [130] After all, Robert Hooke for example, was engaged in both inventing new devices of various kinds, as well as improving existing ones. It may be that Charles or Clarendon was aware of this complication; or more

[130] Larry Stewart, "Science, Instruments, and Guilds in Early-Modern Britain", *Early Science and Medicine*, Vol. 10, No. 3 (2005), pp. 405 – 406.

likely, the novelty of the Society as an incorporated institution was such that no-one fully comprehended just what role the Royal Society was going to play as an institution, not even the fellows of the Society themselves. The more general and broad nature of the Society's activities meant considerable overlap with those of the College of Physicians, and the livery companies and trade guilds. Without the authority of a clearly defined purpose and regulatory powers, the Royal Society could not operate on an equal basis with other incorporated bodies, and particularly with other learned institutions.

The supervisory functions incorporated in the College of Physicians are characterised by an element of compulsion. In addition to summoning licensed and unlicensed practitioners to appear before the College, and levying fines, the College also had the power to compel its own fellows to attend meetings of the College. This included not just the officers such as censors or the elect, but also ordinary fellows who were expected to attend regular and extraordinary meetings of the College, as well as annual lectures on surgery and anatomy, and could face fines or even expulsion for non-attendance. Harold Cook for instance, described the case of William Goddard who was expelled from the College for 'contumacy'. Goddard took to the courts to – unsuccessfully – regain his fellowship. [131] The Royal Society's ability to compel its fellows to attend was largely non-existent. Attendance at meetings as entirely voluntary, even for the president and the council, and there was nothing that the Society could do to enforce fellows' attendance. Attendance even at meetings of the Council, was often sparse; the numbers of fellows attending Council meetings rarely exceeded twelve during the 1660s, despite the full council numbering twenty-one fellows, including the president. Even after the award of the charter, the Society's Council accepted that its fellows would often simply have other business to conduct which would prevent them from attending. The subscription drawn up by a committee of the Society required fellows to regularly attend meetings, as far as they were able:

> We, who have hereunto Subscribed, do hereby promise each for himself, that we will endeavour to promote the Good of the Royal Society of London, for Improving Natural Knowledge; and to pursue the Ends for which the same was

[131] Cook, *Decline of the Old Medical Regime*, p. 135.

> founded. That we will be present at the Meeting of the Society, as often as we conveniently can, especially at Anniversary Elections, and upon extraordinary Occasion; ...[132]

The Society's lack of compulsion extended to extracting subscription fees from fellows, an increasingly intractable problem with which the Society continually struggled. One of the items of business at the very first meeting of the council in May 1663 was to set about collecting arrears of payments from fellows, less than three years after the Society's founding. The Society's only sanction against offending fellows was eventual expulsion; however, in its first decade the Society was more concerned to increase and maintain its fellowship, although they did institute new conditions for the election of fellows. Anyone proposing a person for fellowship was required to first make the person aware of the obligation to pay a 40 shilling joining fee, as well as the one shilling weekly subscription fee. The prospective fellow had to be willing to undertake this payment before the election process could proceed.[133] Unfortunately for the Royal Society, it had effectively to accommodate itself to the circumstances of the fellows, not the other way around.

The College of Physicians on the other hand could exert far more authority over its fellows although it was not immune to internal challenges to its intellectual medical authority. One of the most significant challenges to the intellectual authority of the College was the abortive breakaway group known as the Society of Chemical Physicians, led by physician Thomas O'Dowde, which petitioned for a separate charter in 1665. There were also divisions in this period occasioned by the rise of the experimental philosophy which characterised the work of the Royal Society, and which was championed by men such as Francis Glisson and Christopher Merrett, and who were also fellows of the Royal Society. Despite this the College retained its adherence to classical medicine. It did though make concessions to those physicians who supported the use of chemistry in medicine by setting up its own small chemical laboratory. [134] Nonetheless, the College's external

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[132] Birch, *History*, Vol. I, p. 249.
[133] This formed part of the statutes which were drawn up in 1663: Henry Lyons, *The Record of the Royal Society of London for the Promotion of Natural Knowledge*, 4th. ed. (London, 1940), p. 290.
[134] On the internal divisions in the College of Physicians in the Restoration period, see Cook, *Decline of the Old Medical Regime*, esp. Chapter Four; also Cook, "The Royal Society of Chemical

authority was matched by its internal authority; it will be shown that the Royal Society could claim neither.

Ultimately, the Royal Society's charter conferred public status in name only; in practice and in effect, the Royal Society remained a private club. It established no profession, it had no educational role, and it had no control over anyone's activities except the control that was voluntarily ceded to it by its members and the members of the wider intellectual community who were interested and, to whatever extent, engaged in the Society's activities. Fellows could attend or not as they pleased or were able. Even contributions to the work of the Society to a large extent were dictated by the interests of individual fellows, and not necessarily prescribed by the Society, even though the minutes show that fellows would be 'desired' to pursue enquiries in a variety of areas and report back in subsequent Society meeting. To lose fellowship was no different to losing membership of any other club or society. Non-fellows could still conduct experiments and observations and even have their work published without recourse to the Society. As such the Royal Society had no authoritative role in natural knowledge, or in learning in general. Conservatism and a mistrust of novelty were features of attitudes in England in the Restoration; without a strong charter to support it, the Royal Society was effectively left to carve out a place for itself amongst the other learned institutions. Unlike the College of Physicians, election to the Society's fellowship was coveted only by a few, and its activities were considered by many to not be a suitable pursuit for a gentleman. [135] Without the authority of jurisdiction, regulation or supervision incorporated in a professional body, the pursuit of natural knowledge remained a leisure pursuit, and the Royal Society remained a club for those who chose to spend their leisure time on experiments and observations.

Conclusion

Physicians, the New Philosophy, and the Restoration Court", *Bulletin of the History of Medicine*, Vol. 61, No. 1 (Spring 1987), pp. 61 – 77.

[135] Steven Shapin, " 'A Scholar and a Gentleman': The Problematic Identity of the Scientific Practitioner in Early Modern England", *History of Science*, Vol. 29, No. 3 (September 1991), pp. 279 – 327.

The charters of the Royal Society are recognised by historians of science as a milestone in the history of natural knowledge in England. They created a new kind of learned society, specifically supported by the state. What has not been recognised is just how these charters reflected the complex and increasingly tense political situation in England after the Restoration, and how Charles II sought to use charters to maintain control over public institutions. The restrictions placed on the Society's ability to operate, from its place of meeting to its fellowship placed the Society in a difficult position, giving it limited powers to make decisions which would help promote the success of their enterprise. So, while the award of a charter was a coup for the fellows, its terms represented a definite hindrance to the Society as well. The lack of a clearly defined remit and of any kind of authority, particularly when compared to other learned institutions, left the Society to define its public role for itself, leading to a weakening of its ability to gain stature as a learned organisation. As a result, the Society was left to define its public role for itself, which was in the end not entirely successful. The need to promote the Society, to raise funds which were not forthcoming from Charles, and to create a public role, led the Society to take further actions to secure its future. The decision was made to actively seek out financial support and boost fellowship and demonstrate to the public the purpose of their organisation, and how it would support the improvement of natural knowledge, and by extension, the prosperity of the nation.

CHAPTER FOUR - Selling the Society: Thomas Sprat's *History of the Royal Society*

With Courage and Success you the bold Work begin;
Your Cradle has not idle been:
None e'er but Hercules and you could be
At five Years Age worthy a History.[1]

As has been seen in the previous chapter, the Royal Society's charters were not entirely the benefit to the organisation that they could have been. The Royal Society was particularly concerned about two specific limitations of the charter: the lack of a clear definition of the Society's public role and the lack of money. It is for this reason that in April 1663, only a month after the award of their second charter, the Society elected Thomas Sprat to the fellowship. Sprat was elected not for his interest in natural philosophy but for his writing skills. Thomas Sprat was a young clergyman and protégé of John Wilkins and the Duke of Buckingham, who liked 'his attractive prose style'. According to Jackson Cope and Harold Jones, Sprat was 'never a scientist', whose election to the Society was 'expressly for the purpose of lending his pen to the Greshamite defense'. [2] It was at this point that the Society's founding fellows decided to act to compensate for some of the more pressing deficiencies of their charters. Typically of the Society, a committee was formed to oversee the composition and publication of a text to be written by Sprat to promote and market the Society, in an attempt to both raise money and raise awareness of the Society's public and learned purpose. The first edition of the text, which was eventually published in the summer of 1667, varied little from subsequent editions, including the third edition used here. The most significant

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[1] Abraham Cowley, "To the Royal Society", in Thomas Sprat, *History of the Royal Society of London for the Improving of Natural Knowledge*, 3rd ed. (London, 1722), sigB3v.
[2] Thomas Sprat, *History of the Royal Society*, eds. Jackson L Cope and Harold Whitmore Jones (St Louis, MI, 1958, 1966), p. ix, p. xiii. Also John Morgan, 'Sprat, Thomas (*bap.* 1635, *d.* 1713)', *Oxford Dictionary of National Biography*, Oxford University Press, 2004; online edn, Jan 2008. www.oxforddnb.com.idpproxy.reading.ac.uk/view/article/26173 accessed 28 Aug 2017.

changes included the modernisation of the spelling, and the omission of the famous frontispiece featuring the bust of Charles II and designed by John Evelyn. [3]

This is how Sprat began *The History of the Royal Society of London*:

> I shall here to the World, an Account of the *first Institution* of the *Royal Society*; and of the *Progress*, which they have already made. In hope that this learned and inquisitive Age, will either think their Indeavours worthy of its *Assistance*; or else will be thereby provok'd, to attempt some *greater Enterprize* (if any such can be found out) for the Benefit of human Life, by the Advancement of *Real Knowledge*.[4]

In the text, which was divided into three parts, Sprat outlined the past and present state of learning with reference to the study of nature, a history of the short life of the Society and details of their aims and achievements, and finally an answer to religious and learned objections to the Society's activities and experimental philosophy.

The *History of the Royal Society* was eventually published in the late summer or early autumn of 1667. The exact date of publication is not known and there are no entries in the minutes of the Society's meetings which signal the text's publication, since the Society met infrequently during the summer months, and not at all during August and September. The *History* was entered in the Stationer's Register on 25 July 1667, so the text would have been published sometime after that date. Certainly, on 10 October 1667 John Wilkins presented the *History* to the Society, 'and hearty thanks were ordered to the author for his singular respect to the society shewed in that book.'[5] There were apparently at least two impressions of the text but there were virtually no differences between the impressions.[6] The printers for the *History's* first edition were the printers to the Society, Martyn and Allestry. In a letter to the astronomer Johannes Hevelius, Henry Oldenburg expressed confidence that there would

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[3] Cope and Jones, eds., Thomas Sprat, *History of the Royal Society*, p. ix.
[4] Sprat, *History*, p. 1.
[5] Thomas Birch, *The History of the Royal Society of London for Improving of Natural Knowledge, From its First Rise*, Vol. II (London, 1756), p. 197.
[6] Jackson and Cope, eds., *History*, p. ix.

be subsequent French and Latin translations of the text.[7] John Wilkins proposed to the council on 1 February 1668/9 'a person proper for translating the *History of the Royal Society* into Latin'. It was agreed that the sum of £30 should be sufficient; however, it seems that the task of organising such a translation would be left to the printers, and there is no further record of the translation being undertaken.[8] A French translation of the *History* was completed by Dr James du Moulin in 1669/70, commissioned by the Society. In the minutes Oldenburg related that du Moulin had asked the Society to certify his translation. The Society duly awarded a certificate to du Moulin for the translation.[9] Subsequent to this, there were no other editions of Sprat's *History* published until 1702.

The aim of this chapter is to demonstrate that Thomas Sprat's *History of the Royal Society* was commissioned primarily as a promotional text, of which apology or justification was a necessary element. It will be shown that Steven Shapin's reference to Thomas Sprat as a 'publicist' for the Royal Society rather than 'apologist' is far more appropriate and relevant to the purpose of writing of the *History*. [10] This action represents the final act in the first phase of the Society's establishment and was taken as a reaction to the deficiencies of the Society's 1661 and 1664 charters: the decision was made that, since the charters did not make provision for funding, the fellows needed to make their own arrangements for financial support which did not require them to rely solely on election and subscription fees or small gifts and bequests. Also, the text was designed to encourage more men to seek election to the Society, thus increasing the size of the fellowship. As such, the text will be analysed not based on whether Sprat was providing an entirely accurate depiction of the Society as it really was; rather, the ideas and language will be shown to reveal much about the social, political and economic concerns of Sprat's target audience: the professions and the social elite. More

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[7] Henry Oldenburg, *The Correspondence of Henry Oldenburg*, *Vol. III 1666 - 1667*, ed. and trans. A Rupert Hall & Marie Boas Hall (Madison, Wisconsin, 1965 – 1973), p. 516.
[8] Birch, *History*, Vol. II, p. 344.
[9] Birch, *History*, Vol. II, p. 426.
[10] Shapin refers to both Sprat and Joseph Glanvill as 'publicists'; Steven Shapin, " 'A Scholar and a Gentleman': The Problematic Identity of the Scientific Practitioner in Early Modern England", *History of Science*, Vol. xxix (1991), pp. 298, 299. Also in Shapin, "The House of Experiment in Seventeenth-Century England", *Isis*, Vol. 79, No. 3, A Special Issue on Artifact and Experiment (September 1988), p. 395.

importantly, it was a means by which the Society would do what the charters did not do: define a public role and purpose for the organisation and its work. The Royal Society was framed by Sprat as a means by which England would continue its drive to improve the overall prosperity of the nation, and to establish the nation as a superior to all others in Europe. Ultimately however, it will be seen that Sprat's text failed to help the Society to achieve the primary goal of the founding fellows which was to raise funds sufficient to build a college. Despite the additional support of Joseph Glanvill's *Plus Ultra* (1668), the Society's fortunes began to decline, unable to attract either funding or new fellows, leaving it in a weaker position to deal with the challenges to its learned authority in the following decade.

4.1 Identify the Market, Devise a Campaign

There is a trope in modern historiography relating to the *History of the Royal Society* which states that the text was the product of the fellows' concerns about the wider public perception of the Royal Society and its experimental philosophy. Historians from Dorothy Stimson in the 1940s to Michael Hunter in the 1980s and beyond have variously described the *History* as an apology or a manifesto or even propaganda, designed to explain, defend and justify the Society's purpose and activities to a sceptical public. This historiography has focused most on the ideological content of the text, with relation to the role of the experimental philosophy in society.[11] Margery Purver and Charles Webster analysed the *History* as a basis for discerning the intellectual origins of the Society as revealed in the

[11] Michael Hunter, *Science and Society in Restoration England* (Cambridge: Cambridge University Press, 1981); Dorothy Stimson, *Scientists and Amateurs: A History of the Royal Society* (New York: Henry Schuman, 1948); John Henry, "The Scientific Revolution in England", in *The Scientific Revolution in National Context*, eds. Roy Porter and Mikulas Teich (Cambridge, 1992); Barbara Shapiro, *John Wilkins 1614 – 1672* (Berkeley, 1969); William Eamon, "From the Secrets of nature to public knowledge", and Michael Hunter, "Science and Heterodoxy: An early modern problem reconsidered", both in *Reappraisals of the Scientific Revolution*, eds. David C Lindberg and Robert S Westman (Cambridge, 1990); John Morgan, "Religious conventions and 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*, Vol. 42, No. 3 (Sept. 2009), 321 – 344.

History, again suggesting that this was the purpose of the text.[12] P B Wood portrayed the *History* as being vital to the Royal Society, 'since its continued existence depended upon the creation of a social basis for the institutionalized pursuit of natural philosophy.'[13] Generally the conclusion has been that the sole function of the text was to present an idealised picture of the Royal Society designed to mitigate the pressure exerted by those who criticised the Society on religious or scholastic grounds. The *History* does not accurately reflect the reality of the operation of the Society, the relationships of the fellows, or even the social composition of the fellowship. Hunter for instance, wrote that 'reservations have rightly been expressed about the extent to which it is trustworthy as a historical source or as a statement of the 'official' policy of the body it celebrated.'[14] The *History* was significant to the history of science primarily for its assertion of the Royal Society's Baconian-influenced experimental philosophy, and its role in Restoration society. Sprat's text has also been of interest to literary historians for his assertion of the need for the reform of writing style, particularly in the communication of the details of experiments and observations.[15] This new writing style has also been discussed in terms of its influence over later seventeenth century prose and poetry, as well as its significance in redefining the nature of rhetoric. [16]

The problem is that the focus has been on the intellectual and ideological content of the text rather than its purpose; in other words, what the text *said*, rather than what it was *for*. These interpretations are based on an erroneous premise which is that of timing. Analyses of the *History* have been made based on the date on which it was *published*, not the

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[12] Margery Purver, *The Royal Society: Concept and Creation* (London, 1967); Charles Webster, "The Origins of the Royal Society", *History of Science*, Vol. 6 (1967), pp. 106 – 128.
[13] P B Wood, "Methodology and Apologetics: Thomas Sprat's 'History of the Royal Society' ", *The British Journal for the History of Science*, Vol. 13, No. 1 (March 1980), p. 1.
[14] Hunter, *Science and Society*, p. 29.
[15] Sprat, *History*, p. 113.
[16] E.g., R F Jones, Science and Language in England of the Mid-Seventeenth Century", *The Seventeenth Century: Studies in the History of English Thought and Literature from Bacon to Pope*, ed. R F Jones (Stanford, CA, 1951); also Robert Cluett, "Style, Precept, Personality: A Test Case (Thomas Sprat, 1635 – 1713), *Computers and Humanities*, Vol. 5, No. 5 (May 1971), pp. 257 – 277. For a modern analysis of Sprat's rhetoric see Tina Skouen, "Science versus Rhetoric? Sprat's *History of the Royal Society* Reconsidered", *Rhetorica: A Journal of the History of Rhetoric*, Vol. 29, No. 1 (Winter 20111), pp. 23 – 52.

date on which it was first commissioned. It will be argued here that this is crucial to fathoming the primary reason the text was commissioned in the first place. In a 2009 analysis of Sprat's *History*, John Morgan described the *History* as a 'propagandist tract' which the Society commissioned as a defence of its 'allegedly 'Baconian" methods, achievements and values'.[17] The problem with this interpretation is that it misrepresents the state of the Royal Society when Sprat as elected to the Society to write the *History*. Morgan stated that the Royal Society was fearful for its existence in 1662 and sought then to publish a defence. Morgan based this on a passage in Thomas Birch's *History*, which transcribed an entry in the Society's minutes in which a letter from Seth Ward was read to the meeting of the Society.[18] In it Ward described a 'person of quality' who was interested in the Society and its activities, but who wished to know more details about the organisation. A committee was duly formed, and a document was sent to Ward. However, in fact, the matter was then closed. Ward's request was not mentioned as having any reference to a defence, nor does it suggest that the person requesting information was in any way hostile to the Society or its activities.[19]

In fact, by the time Thomas Sprat was elected to the Society in April 1663, the Society was enjoying a period of relative success. It had become a publicly incorporated institution with the king's personal approval, and with the approval of his then closest advisor the Earl of Clarendon. Year on year from the award of their first charter, they were electing a steady stream of men to the Society, and in March 1661 decided to increase their proposed maximum membership, presumably to accommodate the numbers of men who showed interest in becoming fellows. [20] Not only that, but by 1665 that membership list included men who formed the highest echelons of English society: the king himself, his brother the future James II, the Archbishop of Canterbury Gilbert Sheldon, the Bishop of London, the Earl of Clarendon, and a host of men from the social and political elite.[21] In addition, they had begun

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[17] John Morgan, "Science, England's 'Interest' and Universal Monarchy: The Making of Thomas Sprat's *History of the Royal Society*", *History of Science*, Vol. 47, No. 155 (2009), pp. 321 – 344.
[18] Morgan, "Science, England's 'Interest' and Universal Monarchy", p. 27 and footnote 1, p. 46.
[19] Birch, *History*, Vol. I, p. 85.
[20] Birch, *History*, Vol. I, p. 19.
[21] Henry Lyons, *The Record of the Royal Society of London for the Promotion of Natural Knowledge*, 4th ed (Oxford, 1992), pp. 375 – 379.

to develop a promisingly positive reputation abroad. Correspondence engaged in by the fellows, and especially Henry Oldenburg, reveals that European learned men of all kinds and degrees sought to know more about the organisation, and crucially to become involved in the Society's work. Such men ranged from Prince Leopold, brother to the Grand Duke of Tuscany, to the astronomer Johannes Hevelius.[22] News of the Society's existence had captured the interest of many on the continent. The Royal Society at this point could claim a growing and prestigious national and European reputation.

So, the Society was hardly facing serious difficulties at this point, except in at least one specific area: money. Addressing the issue of encouraging fellows to pay their election and subscription fees was one of the first orders of business recorded in the minutes of the very first council meetings of the Society, which began in May 1663. The Society had just about enough money for the day-to-day running of the organisation – although it sometimes had to postpone paying its employees for a time.[23] However, from the first, the Society's founding fellows had the ultimate goal of founding a college within which they could realise the principles if not the actuality of Bacon's 'Solomon's House'.[24] In Thomas Birch's *History*, he described the 28 November meeting of the twelve founding fellows, during which 'something was offered about a design of founding a college for the promoting of physico-mathematical experimental learning'.[25] Thomas Sprat elaborated on this design in his own *History*. He recounted that the founding fellows, hoped to capitalise on the general atmosphere of goodwill amongst their countrymen on the restoration of the monarch, whose hearts had been 'inlarg'd by their Joys, and fitted for any noble Proposition'. These men 'began now to imagine some greater Thing, and to bring out experimental Knowledge from the *Retreats*, in which it had long hid itself, to take its Part in the *Triumphs* of that universal Jubilee'. Sprat continued: 'While they were thus ordering their Platform, there came forth a Treatise, which

[22] See for instance, Birch, *History*, Vol. I, p. 22, also Henry Oldenburg's *Correspondence*, esp. Volumes 2 and 3. There are also numerous references in both the Society's minutes and Oldenburg's correspondence to interactions with both European and North American correspondents.
[23] R K Bluhm, "Remarks on the Royal Society's Finances, 1660 – 1768", *Notes and Records of the Royal Society of London*, Vol. 13, No. 2 (November 1958), pp. 82 – 103, esp. p. 102.
[24] See Chapter 2.
[25] Birch, *History*, Vol. I, p. 3.

very much hasten'd its Contrivance: and that was a proposal by Master Cowley, of erecting a Philosophical College.' Their only objection to Cowley's plan, wrote Sprat, was that it undertook 'the *Education of Youth*', and that it presupposed the '*Largness of the Revenue*' required, which Sprat suggested was unrealistic.[26] However, the Society had begun to put some of the 'other particulars of his Draught' into practice.[27] This then was not only the true final goal of the founding fellows, but also the primary function of the text. Indeed, the purpose of the text was set out right at the very beginning by Sprat, which was quoted above: he wrote the text in the hopes that the public would consider 'their Indeavours worthy of its *Assistance*'.

That the function of the text was to raise money is further supported by the following timeline of the Society's existence from inception to the end of its first decade:

[26] Sprat, *History*, pp. 58 – 59.
[27] Sprat, *History*, p. 60.

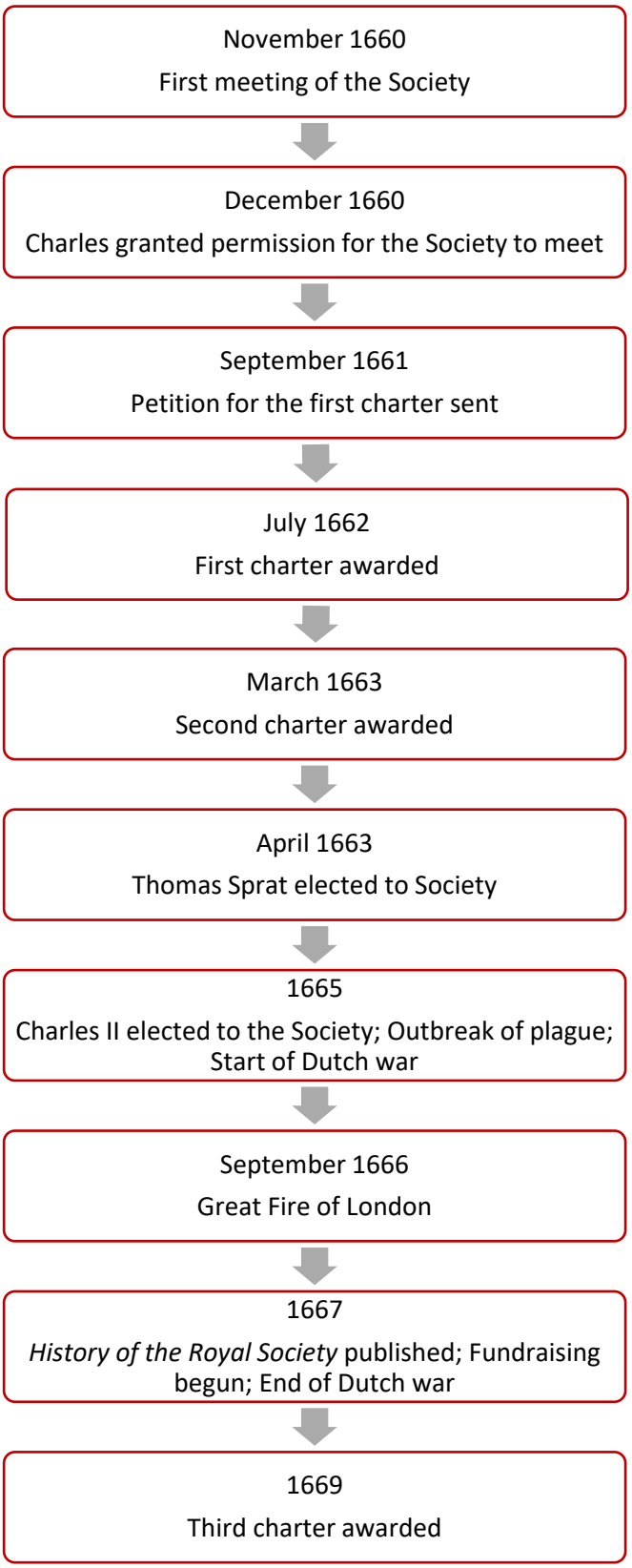

Figure 1: Timeline of significant events affecting the Royal Society and its Fellows

As can be seen, the Royal Society's fortunes did encounter serious obstacles in its first decade – the disruption caused by the outbreak of plague and the Great Fire - and it did begin to face challenges which were not addressed in the *History*, such as the decision taken to suspend meetings of the Society in the summer months when many of the fellows had decamped to the country for the summer season. Nonetheless, the timing of the commissioning of a history of the Society arguably coincided with the award of the second charter. While this does not exclude the impact of the king's facetious comments to William Petty at court (as described in Chapter Three), this formed only a part of the Society's motivation for arranging for the writing of the text at that point. P B Wood, in arguing that the Society was responding to the criticisms of men like Meric Casaubon, Henry Stubbe and John Fell, failed to consider this matter of timing.[28] These criticisms will be discussed in more detail near the end of the chapter. The point is that these criticisms post-date both the election of Sprat to begin the *History* as well as its final publication. Michael Heyd has pointed out that there are no written examples of criticism of the Royal Society prior to the publication of Sprat's text. He suggested that the existence of oral criticisms could be inferred from Sprat's references to critics in the *History*.[29] This raises the question of how threatening the Royal Society felt these oral criticisms to be, such that they would commission the production of an entire text to counter them. It should also be noted that in the minutes of council meetings, there are numerous mentions of efforts to raise money from fellows and outside sources, but none relating to damaging criticism of the organisation or of the need to address it. Lack of money and lack of a definition of a public role were the Society's biggest concerns at this point. Thus, the neglect of the timing of the writing and publication of Sprat's *History* has distorted the understanding of the real and most significant challenges faced by the Society in this period.

The circumstance which underscores the argument that the *History* was marketing and promotional material, is also seen in the timeline. The Royal Society launched a campaign

[28] Wood, "Methodology and Apologetics", p. 2.
[29] Michael Heyd, *"Be Sober and Reasonable": The Critique of Enthusiasm in the Seventeenth and Early Eighteenth Centuries* (Leiden, 1995), p. 144 on.

almost immediately after the publication of Sprat's *History* to raise money to erect their college.[30] The text was published in the summer of 1667; in September of that year the following was recorded in the minutes of a meeting of the council:

> Dr Wilkins moved, that a committee both of the society and council might be considered of, for raising contributions among the members of the society, in order to build a college.[31]

By the beginning of 1668 a committee was appointed, and fellows were required to approach persons who might be sympathetic to the Society's cause. Henry Oldenburg, in recounting the content of the Society's meetings on the subject to Robert Boyle, made clear why a college would benefit the Society: a college

> will in all likelyhood establish our Institution, and fixe us (who are now lookt upon but as Wanderers, using precariously the lodgings of other Men) in a certain place, where we may meet, prepare and make our Experiments and Observations, lodge our Curators and Operators, have our Laboratory, Observatory and Operatory all together.[32]

The college fundraising effort will be discussed in more detail later in the chapter. Nonetheless, it is not a stretch to see cause and effect in the timing of this campaign. Sprat's *History* was designed to operate much like any modern promotional material: it described the organisation and what it did, it identified what the organisation hoped to achieve and why, and why financial support was needed. The evidence is there that the time was a propitious, even necessary one, and the *History* was designed to serve as part of that campaign. The fellows could use the text in their fundraising activities to explain just what the Society was all

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[30] This is described in detail in Michael Hunter, "A 'College' for the Royal Society: The Abortive Plan of 1667 – 1668", *Notes and Records of the Royal Society of London*, Vol. 38, No. 2 (March 1984), pp. 159 – 186.
[31] Birch, *History*, Vol. II, p. 194.
[32] Oldenburg, *Correspondence*, *Vol. IV 1667 - 1668*, p. 116.

about. Barbara Shapiro described John Wilkins obtaining some copies of the *History* for just this purpose, as being one of the 'more mundane uses' of the text, during this campaign.[33]

It was only by the time Sprat's *History* was eventually published in 1667, that the Royal Society did begin to come under some pressure. The number of elections of new fellows had begun to decline from their peak in the mid-1660s. They were beginning to come under financial pressure: the minutes of the council meetings indicate that there were frequent efforts made to extract overdue subscription fees from recalcitrant fellows. In addition, the outbreak of plague and the fire had taken its toll on meetings. The attendance at council meetings and general meetings of the Society had dwindled, and they were sometimes cancelled because of non-attendance. The decision was eventually made that the president would only call meetings of the council when necessary. So, the *History* was published at a critical moment, and the Society's impatience for Sprat to finish the text could in part be explained by their desire to take as full advantage as possible of the interest in the Society to raise funds before it dwindled too far.

Besides the needs for funds was the subsidiary need of the Royal Society to properly explain to the public the role the Society could play for the public good, something which was not made sufficiently clear in the Society's charter. The charter spoke vaguely of improving natural knowledge and the mechanical arts, and the good which would result, but without either demonstrating how this would be achieved, or assigning any kind of public demonstration or application of its achievements. The Society was also concerned to ensure that they maintained the then current surge in elections to the organisation, by encouraging more men to join. This then was the nature of the 'assistance' that they required: money and new fellows to facilitate the plan of the Society to build a college. The *History* was therefore designed to outline to those whose involvement was of potential value to the Society exactly why the Society was worth being involved in, and how they could support the Society's

[33] Shapiro, *John Wilkins*, p. 204.

activities. The following sections will illustrate what arguments Sprat used to encourage men to provide either financial or experimental support to the organisation.

4.2 Marketing and Promotional Material – The Key Elements

Having established that the *History of the Royal Society* was a marketing and promotional tool, designed to attract financial backers and expand the fellowship, it is worth examining more evidence in the text which supports this position. Sprat's approach is to interweave an argument for the public role of the Society, with sometimes subtle suggestions for funding, and more straightforward appeals to potential fellows. Throughout he addresses actual or potential concerns, criticisms and objections to the Society's existence, ideology, function or activities, and uses them to create persuasive arguments to further encourage financial or experimental involvement from his audience. This section will identify the core marketing elements of the text and demonstrate how these elements support the fundamental marketing purpose of the text.

i We Want You…To Join the Royal Society

In the *History*, Thomas Sprat described a specific group whom he described as comprising the majority of the fellows: gentlemen, 'free and unconfin'd'; the suggestion in the passage being that these men were in fact the ideal persons to be recruited to form the basis of the Society's fellowship. [34] This has been taken by some historians as emphasising the elite nature of the fellowship.[35] However, Sprat suggested – with sound justification - that this particular group of men had specific advantages which made their involvement ideal. Basically, these men had the time, leisure, money and sizeable estates to be able to devote themselves largely full time to the pursuit of natural knowledge. The work of the Society was

[34] Sprat, *History*, p. 67.
[35] Hunter, *Science and Society*, Chapter Three; Lotte and Glenn Mulligan, "Reconstructing Restoration Science: Styles of Leadership and Social Composition of the Early Royal Society", *Social Studies of Science*, Vol. 11, No. 3 (Aug. 1981), pp. 327 – 364; Wood, "Methodology and Apologetics:", pp. 1 – 2.

safer in the hands of these gentlemen, 'who, by the Freedom of their Education, the Plenty of their Estates, and the usual Generosity of noble Blood', were 'most averse from such sordid Considerations' as the pursuit of material wealth.[36] This makes sound sense since the Society had the example of Robert Boyle to follow. Boyle was the well-off son of an Irish aristocrat, and a learned man of leisure. He owned an experimental laboratory equipped with some of the latest scientific instruments. He in fact was one of only two men in Europe to have been wealthy enough to commission the construction of an air pump (Christian Huygens was the other). Boyle also employed a number of assistants to work in his laboratory, including Robert Hooke, who was released from Boyle's employ in order to take up the position of curator of experiments at the Royal Society. Boyle was thus able to devote as much of his leisure to experimenting as he pleased and was able to establish himself wherever he felt would ensure contact with other learned men, and so make many valuable contributions to the Society's work. Boyle's wealth meant for instance, that he was not a closely bound to a singular location, and he could and did travel to different locations as it suited him. He spent a great deal of his time in Oxford both before and after the founding of the Royal Society where he was an influential member of the Oxford Philosophical Club, and he often spent time living with his sister Lady Ranelagh in her home in London.

Another advantage that Sprat highlighted that gentlemen had over other potential fellows, was their education. They were educated enough to be able to conduct a variety of investigations and experiments, but were truly 'free, and unconfin'd' by not being restricted in their thinking by adherence to one or other school of thought, as perhaps some university-trained men might be. It was rare for gentlemen's sons to take degrees, spending perhaps only a couple of terms at university, and finishing off their formal education on the continent, where they might also spend some time at universities such as Leiden or Padua, as well as travelling around the continent visiting places of artistic interest. Robert Boyle and his brother, and John Evelyn for instance spent some of their time in this way. In addition, according to Sprat, these men were largely self-taught, honing their skills and developing

[36] Sprat, *History*, p. 68.

their ideas in 'Laboratories' rather than in 'Schools' where the student is forced to subscribe to the teaching of his master, where the learning and methods of the ancients predominated.[37] Sprat contrasted this with the learning of those who were subject to the teaching of 'school-men', which served to 'very much suppress and tame Men's Spirits; which though it be proper for discipline and Education; yet it is no means consistent with a free philosophical Consultation.'[38] Such an approach tended to perpetuate and exacerbate the problem:

> from this only Teaching, and Learning, there does not only follow a Continuance, but an Increase of the Yoak upon our Reasons: For those who take their Opinions from others Rules, are commonly stricter Imposers upon their Scholars, than their own Authors were on them, or than the first Inventors of Things themselves are upon others.[39]

Gentlemen whose thinking had not been constricted by the 'school-men' were therefore best placed to support the Society's efforts to produce and improve natural knowledge.

Sprat was careful though, to ensure that he widened the Society's appeal to gentlemen who were not necessarily interested in conducting experiments, or who felt they were not qualified to do so. He made it clear that involvement in the Society could take a different form. The Society needed not only experimenters or 'perfect Philosophers', but men who were otherwise prepared to become involved in the Society's activities.

> If we cannot have a sufficient Choice of those that are skill'd in all *Divine* and *Human* Things (which was the ancient Definition of a Philosopher) it suffices, if many of them be plain, diligent, and laborious Observers: such, who though they bring not much Knowledge, yet bring their Hand, and their Eyes uncorrupted:

[37] Sprat, *History*, *p. 68.*
[38] Sprat, *History*, p. 68.
[39] Sprat, *History*, p. 69.

> such as have not their Brains infected by false Images, and can honestly assist in the *examining* and *registering* what the others represent to their View.[40]

There was no need for men to have had long experience of or extensive training in such matters; 'Experience, on the contrary, tells us, that greater Things are produced by the free way, than the formal'.[41] Sprat makes it clear that gentlemen had a vital role to play in assessing and verifying the information being presented at meetings, and thus assisting in confirming their probable veracity. This was an important part of how the Society established 'matters of fact', and served to demonstrate the importance of collective effort and mutual agreement in the study of nature:

> In *Assemblies*, the *Wits* of most Men are *Sharper*, their *Apprehensions readier*, their *Thoughts fuller*, than in their *Closets*. ...
>
> Then comes in the second great Work of the *Assembly*; which is to *judge* and *resolve* upon the Matters of *Fact*. In this Part of their Imployment, they us'd to take an exact View of the Repetition of the whole Course of the *Experiment*; ...
>
> ...never giving it over till the whole *Company* has been fully satisfied of the Certainty and Constancy; or, on the other side, of the absolute Impossibility of the Effect.[42]

There are several men who were or became fellows who certainly fitted Sprat's ideal. Boyle and Evelyn have already been mentioned. Others included Sir Robert Moray, John Beale, John Aubrey, Sir Paul Neile, Viscount Brouncker. These men were officers of the Society, were enthusiastic attendees at meetings, conducted experiments, observations and investigations, wrote reports, conveyed news and correspondence to Henry Oldenburg, served in administrative roles, and generally contributed to the life of the Society. Robert Moray was arguably one of the most effective fellows in the first few years of the Society's existence, being the group's initial conduit between them and the king**.** He was also heavily

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[40] Sprat, *History*, pp. 72 – 73.
[41] Sprat, *History*, p. 73.
[42] Sprat, *History*, p. 99.

involved in conducting a variety of experiments and investigations. Viscount Brouncker served as the first president of the Royal Society and continued in that role for nearly two decades. Sir Paul Neile was also a valuable fellow at court, as well as being himself an experimentalist. All these men and many others corresponded regularly with a wide variety of men both in the British Isles and in Europe, and their correspondence was regularly shared at meetings of the Society. Such men as these are largely ignored in the modern historiography of the Royal Society, as playing a very minor role in the life of the Society; after all they were mere virtuosi, not 'serious scientists'. Hunter was sceptical for instance about John Aubrey's contribution to the work of the Society.[43] Their view though, has been coloured by a twentieth century perception of what constituted 'science' and by a perception of what kinds of activities the Society needed to engage in to be successful. Contemporaneously though, these fellows were vital to supporting the Society's goals of collective effort, consistent contribution, and enthusiastic promotion of the organisation. Of equal importance was the fact that these men were able to fund their own activities, relieving the Society of the financial burden of funding such enquiries.

Merchants were another group of men whom Sprat courted in the text. A great deal of the *History* is taken up with praise of the unique and superior qualities of the English merchant. For instance, for Sprat, the Society was singularly helped by the membership of the 'inquisitive Genius' of the English merchant. In contrast to those of Holland,

> The *Merchants* of *England* live honourably in foreign Parts; ... converse freely, and learn from all; having in their Behaviour very much of the *Gentility* of the Families, from which so many of them are descended; ... of the *English Merchants* I will affirm, that in all sorts of Politeness, Skill in the *World* and *human Affairs*, they do not only excel them, but are equal to any other sort of Men amongst us. [44]

[43] Michael Hunter, *John Aubrey and the Realm of Learning* (New York, 1975), pp. 132 – 147.
[44] Sprat, *History*, p. 88.

Sprat was not exaggerating in highlighting some merchants' gentle antecedents. Many of London's apprentices were sons of the gentry, sent to London to train with some of the City's more prominent merchants. This trend increased as mercantilism came to be regarded as central to England's success, although many younger sons still tended to go into the professions, especially into law. [45] Sprat continues with even more fulsome praise of the merchant fellows of the Society:

> Of our chief and most wealthy Merchants and Citizens, very many have assisted it with their Presence; and thereby have added the industrious, punctual, and active Genius of Men of Traffick, to the quiet, sedentary, and reserved Temper of Men of Learning. They have contributed their Labour; they have help'd their Correspondence; they have employ'd their Factors Abroad to answer their Inquiries; they have laid out in all Countries for Observations; they have bestow'd many considerable Gifts on their Treasury and Repository.[46]

This passage illustrates the advantages of encouraging the involvement of merchants in the Society. Perry Gauci and Steve Pincus pointed out that early modern merchants were becoming increasingly wealthy and influential in English society. While some republicans in the 1650s such as John Milton and James Harrington deplored the growth of mercantile trade as individualistic and supportive of the monarchy, many others saw trade as essential for promoting the good of the country by increasing the nation's wealth and helping ensure England's military preparedness. Sprat's support for merchants therefore, reflects the sentiment that England's merchants were central to the overall prosperity of the country.[47] As David Ormrod pointed out, by the middle of the seventeenth century, 'trade and navigation came to occupy an unprecedented place in the national esteem.' Merchants were themselves increasingly highly-regarded, with their advancements in trade, especially

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[45] Wilfrid Prest, ed., Introduction, *The Professions in Early Modern England* (London, 1987), **PAGES**
[46] Sprat, *History*, pp. 129 – 130.
[47] Perry Gauci, *The Politics of Trade: The Overseas Merchant in State and Society, 1660 – 1720* (Oxford, 2003); Steve Pincus, "Neither Machiavellian Moment nor Possessive Individualism: Commercial Society and the Defenders of the English Commonwealth", *The American Historical Review*, Vol. 103, No. 3 (June 1998), pp. 705 – 736.

maritime trade being used as 'an indicator of national well-being and prosperity, and naval power was equated with national security.' [48]

With shipping interests that at this point almost literally spanned the globe, merchants were also uniquely placed to procure for the Society a variety of rare and curious objects and substances from overseas. Exotic animals, substances such as Peruvian bark, rare instruments and devices such as clocks and mathematical instruments could be obtained by various merchants. Some such merchandise had already been passed to the Society through fellows. It is also interesting to note that Sprat saw the presence of merchants in the Society as having a specific purpose in forming a contrast to the other learned fellows. Like the gentlemen who may not be inclined to experiment, these merchants also had a role to play in the Society which was well within their means and skills, a characteristic of the Society's inclusivity, not exclusivity. The Society also could – and did – use the assistance, and reports written, and objects collected by personnel on merchant ships to further their researches abroad. The mariners and travellers on mercantile vessels were also useful procurers of and conduits for natural knowledge in distant parts. The Royal Society made deliberate efforts to exploit willing travellers who were prepared and able to carry out experiments and observations on the Society's behalf. Minutes of the meetings indicate that there were numerous instances where the Society made use of such offers of help:

> Mr. Colwall introduced to the society a captain of an East-India ship, who offered to observe such inquiries, as they should propose to him.
>
> Mr. Hill related, that a ship-master had told him, that he had in the Mediterranean drawn some water, that was grown stinking in the close vessels, into tubs, where having stood exposed to the air for two or three days, it was grown sweet again, and good to drink.
>
> Mr. Colwall mentioned, that Mr. Thorowgood, a master of a ship, who had received instructions from the society for the East-Indies, was returned, and had

[48] David Ormrod, *The Rise of Commercial Empires: England and the Netherlands in the Age of Mercantilism, 1650 – 1770* (Cambridge, 2008), p. 1.

> some account to give of what he had done for the society in his voyage; which he was desired to bring in at the next meeting.[49]

Henry Oldenburg used Issue No. 24 of his *Philosophical Transactions* to exploit the help of seamen: according to the minutes of the council meeting held on 4 April 1667, an issue of the *Transactions* 'being peculiarly designed for the instruction of seamen in making observations in their voyages, one hundred copies extraordinary were ordered to be printed off at the expence of the society'. The issue contained advice and instructions for activities such as observing meteors and comets, recording the weather, finding the depth of seas, and accurately observing the 'Declinations and Variations of the Compass or Needle from the Meridian exactly'[50]. The Society eventually developed a very profitable relationship with the East India Company, with the help of Society fellow Lord Berkeley, who was also a member of the Company. They even established a committee to coordinate reports coming to the Society from seaman of the Company. The Society also used maritime sources to conduct numerous experiments in Tenerife. [51] Steven Harris has shown that this increased production and dissemination of natural knowledge in which the Royal Society played such an important role, went hand in hand with the expansion of overseas travel beyond Europe to Asia, Africa and the Americas. [52]

Sprat makes an appeal to another group of men whose membership of the Royal Society would naturally help them greatly: natural philosophers and inventors. Such an appeal seems obvious but was necessary because as Quentin Skinner pointed out, there were many natural philosophers working in England who never became fellows of the Royal Society.[53]

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[49] Birch, *History*, Vol. I, pp. 63, 311, and 297.
[50] Birch, *History*, Vol. 1, p. 163; Henry Oldenburg, "Directions for Observations and Experiments to Be Made by Masters of Ships, Pilots, and Other Fit Persons in Their Sea-Voyages", *Philosophical Transactions (1665 – 1678)*, Vol. 2 (1666 – 1667), pp. 433 – 448, esp., 435.
[51] Daniel Carey, "Compiling nature's history: Travellers and travel narratives in the early Royal Society", *Annals of Science*, Vol. 54, No. 3 (1997), pp. 269 – 292, esp. pp. 272 – 275;
[52] Steven Harris, "Networks of travel, Correspondence, and Exchange", in K Park and L Daston, eds., *The Cambridge History of Science*, Vol. 3 (Cambridge, print edition 2006; online edition 2008, accessed 28/02/2017), pp. 341 – 362; also Fernand Braudel, *The Wheels of Commerce: Civilization & Capitalism 15th – 18th Century*, Vol. II, trans. Sian Reynolds (New York, 1982), esp. pp. 403 – 410.
[53] Quentin Skinner, "Thomas Hobbes and the Nature of the Early Royal Society", *The Historical Journal*, Vol. 12, No. 2 (1969), pp. 217 – 239.

Naturally having such men and their work associated with the Society would allow it to claim even more successes through their fellows. Sprat described the five different types of contemporary philosophers and demonstrated an understanding of the difficulties faced by those engaged in the study of nature, primarily to persuade such men of the value of joining the Royal Society. Some men, wrote Sprat, had been put off a serious study of nature, for fear of religious censure or the scorn of their peers. The pursuit of natural knowledge in England had stagnated as a result.[54] Others were hampered by an inability to set aside dogmatism even when they had displayed a properly sceptical approach to the ancients, choosing instead to either impose new theories or even replace the ancients with other sects.[55] Those philosophers who were able to divest themselves of 'the Authority of Aristotle' were otherwise hampered in their efforts by 'the Shortness of their own Lives, or the Multiplicity of their other Affairs, or the Narrowness of their Fortunes.'[56] In this Sprat used the example of Sir Francis Bacon, who despite his occupation in law and his governmental duties, was still able to find leisure time enough to pursue his experimental philosophy. [57] Sprat was at pains to stress the value and importance of the collective pursuit of the secrets of nature, in terms of the far greater progress which could be made by men working together and sharing knowledge than men working alone. Using the example of Bacon,

> his *Philosophical Works* do shew, that a single and busie Hand can never grasp all this whole Design, of which we treat.
>
> [while] there is as much Honour to be paid, as can be due to any one single human Wit: But they must pardon us, if we still prefer the joint Force of many Men. [58]

Nonetheless Sprat needed to reassure these philosophers and inventors that they would receive due credit for their work. Sprat acknowledged that many possessors of new inventions or medical recipes held their knowledge close lest they lose the material wealth

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[54] Sprat, *History*, p. 26 - 28.
[55] Sprat, *History*, pp. 28 – 35.
[56] Sprat, *History*, p. 35.
[57] Sprat, *History*, pp. 35 – 36.
[58] Sprat, *History*, p. 36, 39.

and fame for their discoveries; however, the Royal Society aimed to purchase 'such extraordinary Inventions, which are now close lock'd up in *Cabinets*', and then make them available to the public. In this way, 'The *Artificers* should reap the common Crop of their *Arts*: but the *Publick* should still have *Title* to the miraculous Productions.'[59]

In an effort to ensure that the Society could attract as many different kinds of men as possible, Sprat devoted a large section of the *History* to a description of the Society's current membership. The emphasis was consistently on the great diversity of the fellowship, including men from all levels of society, many nationalities and religious persuasions. This was the deliberate policy of the Society, wrote Sprat, which had 'broken down the Partition wall, and made a fair Entrance, for *all Conditions of* Men to engage in these Studies'.[60] According to Sprat, this was so that the results of the work of the Society would better serve those it was intended for:

> Thus they have form'd that *Society*, which intends a *Philosophy*, for the Use of *Cities*, and not for the Retirements of *Schools*, to resemble the *Cities* themselves; which are compounded of all Sorts of Men, of the *Gown*, of the *Sword*, of the *Shop*, of the *Field*, of the *Court*, or of the *Sea*, all mutually assisting each other.[61]

This diversity is presented by Sprat as one of the Society's biggest achievements, and this does not support the current modern perception that the Society looked only to recruit members of the social elite. While the actual membership may not have included many men from the trade and mercantile groups, these men were indeed present. John Graunt, an ordinary tradesman, was in fact singled out by Sprat as part of his description of the Society's desire to include ordinary men, and including a description of how he came to the attention of the Royal Society:

> they diligently search out, and join to them, all extraordinary Men, though but of ordinary Trades. ... I will shew by one Instance; and it is the Recommendation

[59] Sprat, *History*, p. 75.
[60] Sprat, *History*, p. 76.
[61] Sprat, *History*, p. 76.

> which the *King* himself was pleased to make, of the judicious Author of *the Observations on the Bills of Mortality*: In whose Election, it was so far from being a Prejudice, that he was a Shop keeper of *London*; that his Majesty gave this particular Charge to his Society, that if they found any more such Tradesmen, they should be sure to admit them all, without any more ado.[62]

This was because, wrote Sprat, they aimed to follow Bacon in their engagement with 'all Sorts of *Mechanick Artists'*, as part of their history of trades programme. Just as they courted the merchants and gentlemen, so too did the Society adopt a pragmatic approach to the membership of all kinds of men: all of these men could make any kind of contribution to the life and work of the Royal Society. The fact that the Society was not successful in encouraging many men from the lower classes into the Society does not diminish the fact that in principle their aim was for as diverse a fellowship as possible.

ii Money, Money, Money: The Appeal for Cash

Sprat included in the *History* a more general appeal for funding from his audience. The nature of the arguments that Sprat uses suggests that his targets were merchants, and particularly wealthy landowners, many of whom were also members of parliament and other government officials who could possibly influence the diversion of public funds to the Society. The physical size of the completed text is testament to this: the copy of the original text held in the Royal Society's library measures approximately 24 cm x 19 cm, so quite a large book, and is bound in brown calf. This made it quite an expensive text to purchase. Even more importantly, the Society could appeal to these men's understanding of and support for the concept of improvement. As has already been mentioned, the idea of improvement was one which was widely understood in this period, even if it was not viewed positively by everyone. The goal of founding a college, even the smaller scale version described by Cowley required significant funding. By the point at which Sprat had been writing the *History*, the Society's

[62] Sprat, *History*, p. 67.

council had drafted and submitted a petition to the king for the granting of the building and lands of the former Chelsea College, and the council was sufficiently confident of the petition's success to begin to pay off people who came forward to make a claim on the property. At a meeting of the council on 18 May 1664, it was decided that Robert Moray should speak with a Mr Cole about the 'marketable value' of Cole's interest, when – not if – 'the society shall have obtained the grant of Chelsea College, both of the house and land belonging to it'. [63] They were certainly sure of their success by the time the text was published in 1667, although the charter formally granting the Society the lands was not issued by Charles until 1669. In the meantime, the Society was still resolved on founding their own college, either on the site of the old Chelsea College or on some other parcel of land. With this goal in sight, the Society needed to ensure that there would be potential donors on board to support their enterprise.

It has already been shown that merchants were specifically courted by Sprat in the *History* for the rarities and curiosities they could procure, and the access to foreign parts for the conduct of experiments. They were also of potential value for their wealth. Some English merchants had made considerable fortunes and Sprat sought to engage their interest in the Society in order to divert some of that money into the Society's coffers. After all, Gresham College, the building within which the Society held their meetings from its inception, had been founded from a bequest in the will of Sir Thomas Gresham, a wealthy sixteenth century merchant. The tantalising possibility of finding such a benefactor would have been encouragement enough for the Royal Society to appeal to merchants. They were able to attract a monetary gift from a merchant in June 1664. Sir John Cutler provided a stipend of £50 per year for Robert Hooke to present an annual lecture on the history of trades.[64] This gift meant that the Society was able to reduce the salary it paid to Robert Hooke, who was by this time employed full time as the Society's curator of experiments; Hooke's salary was a financial burden the Society found it increasingly difficult to shoulder. A bequest such as that

[63] Birch, *History*, Vol. I, p. 425.
[64] Birch, *History*, Vol. I, p. 442.

which founded Gresham College would have solved the Society's difficulty in founding a college in one fell swoop.

It was however MPs and government officials to whom Sprat's main arguments for funding were directed. While the Society could boast of wide support at court, the same could not be said of wealthy country gentlemen, many of whom were MPs and held other positions in the government. These were largely conservative men, relatively few of whom had university degrees, and who formed part of the group described by Steven Shapin who were increasingly reluctant to send their sons to university, and who held that too much learned study made a man bad company, and unfit to take up their duties as future landowners and statesmen.[65] Of this, Sprat wrote that men were often drawn away from the study of nature by 'the *Affairs* of *State*, the Administration of civil Government, and the Execution of Laws'. Natural knowledge was seen as

> a study out of the Way, fitter for a melancholy Humorist, or a retir'd weak Spirit, than to make Men equal to Business, or serviceable to their Country.
>
> the Men of the World, and Business, ... esteem it merely as an idle Matter of Fancy, and as that which disables us from taking right Measures in human Affairs.[66]

Parliament was really the Society's best hope for obtaining funding from the public purse. Charles had little income beyond what was permitted him by parliament, and his extravagances at court combined with an underestimation of the revenue needed to run the government meant that he had little scope for spending.[67] Unfortunately for the Royal Society, the more conservative nature of parliament meant that it was unlikely to be willing to

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[65] Steven Shapin, " 'A Scholar and a Gentleman' ", pp. 290 – 312.
[66] Sprat, *History*, pp. 26 – 27.
[67] Lionel K J Glassey, "Politics, Finance and Government", in *The Reigns of Charles II and James VUU & II*, ed. Lionel K J Glassey (Basingstoke, 1997), pp. 40 – 49; Paul Seaward, 'Charles II (1630–1685)', *Oxford Dictionary of National Biography*, Oxford University Press, 2004; online edition, May 2011, www.oxforddnb.com.idpproxy.reading.ac.uk/view/article/5144 accessed 3 May 2017; Tim Harris, *Restoration: Charles II and his Kingdoms 1660 – 1685* (London, 2005), p. 60; John Miller, "The Later Stuart Monarchy", in *The Restored Monarchy 1660 – 1688*, ed. J R Jones (Totowa, NJ, 1979), pp. 35 – 36.

fund a new and as yet apparently unproven organisation such as the Royal Society. In his memoirs the Earl of Clarendon, writing of Charles' attempts to obtain funding for a project from parliament, noted that they were reluctant to approve the provision of such funding because they had never provided money for such a project previously; they were suspicious of novelty.[68] Nonetheless Sprat did attempt to appeal to members of parliament, albeit somewhat obliquely, and by addressing this reluctance to divert public funds to an unproven enterprise:

> it is so difficult a Thing to draw Men in to be willing to divert an antient Revenue, which has long run in another Stream, or to contribute out of their own Purses, to the supporting of a new Design, while it shews nothing but Promise, and Hopes...[69]

There are in the text numerous examples of Sprat's appeal for funds. The quote at the beginning of the chapter is one example: the 'Assistance' Sprat was seeking was not only fellows, but money as well. Sprat opted at times for subtlety and a clever use of rhetoric to make his appeal. He explained for instance that the Society's first fellows had willingly borne the burden of financing on themselves, in the form of their admission payments and weekly subscription fees. This was quite reasonable, wrote Sprat, since

> If they had speedily at first call'd for *mighty Treasures*; and said aloud, that their Enterprize requir'd the *Exchequer of a Kingdom*; they would only have been contemn'd as vain *Projectors*. So ready is Mankind to suspect all new Undertakings to be Cheats and *Chimeras*, especially when they seem chargeable.[70]

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[68] Edward Hyde, *The Life of Edward Earl of Clarendon, Lord High Chancellor of England and Chancellor of the University of Oxford,* Vol. II (Oxford, 1760), p. 199.
[69] Sprat, *History*, p. 60.
[70] Sprat, *History*, p. 77.

Sprat went on to reassure these men of business that the Society actually represented value for money. One of the many hindrances to the development of the study of nature was the belief it required a '*vast Charge*' and 'a *mighty Revenue*.' In fact,

> Philosophy need not so great a Prodigality to maintain it; ...the most *profitable* Trials are not always the most *costly*; ...the best Inventions have not been found out by the *richest*, but by the most *prudent* and *industrious* Observers; ...the right *Art* of *Experimenting*, when it is once set forward, will go near to sustain it self. This I speak, not to stop Men's future Bounty, by a philosophical Boast, that the Royal Society has enough already: But rather to encourage them to cast in more Help; by shewing them, what Return may be made from a little, by a wise Administration.[71]

Sprat supplemented this argument with first a description of the formal and business-like conduct of the Society's work and meetings, followed by descriptions of the areas of research and enquiry which the Society had pursued since its inception. Note that the enquiries detailed by Sprat are of a practical rather than theoretical nature. They included for instance improvements to metalworking, physic, horticulture, architecture and navigation. These activities had a utilitarian application which would have strengthened Sprat's argument for the practical value of the Society's research, as did the probably deliberate use of the term 'improvement'.[72] This was followed by descriptions of inventions made or improved by the Society, as well as the texts of some papers presented at the Society's meetings, as well as more details and lists of experiments and many other papers and texts written by fellows of the Society. A substantial proportion of the *History* is devoted to providing as many details of the Society's activities as possible. Indeed, the Society's council was particularly concerned that Sprat would take care to include appropriate material cast the work of the Society in as positive a light as possible. From late March to late May 1667, there are several journal entries in which John Wilkins was asked to select suitable reports of experiments for inclusion in the *History*. Wilkins was asked to consult with Robert Hooke who helped with the selection,

[71] Sprat, *History*, pp. 79 - 80.
[72] Sprat, *History*, pp. 149 – 150.

as well as Sprat himself. [73] The intended effect of this wealth of detail was to impress on the audience that this Society was no mere leisure club for men to pass an idle hour or two, nor was their work so much pie in the sky. By demonstrating both the activity and the effectiveness of the Fellows' research, Sprat could hope to convince his audience of the real, practical value of the Society, which made it a good investment for governmental or private funding.

The very language that Sprat used contributes to an appreciation of his attempt to appeal to this specific group. His use of terms such as 'industry' or 'industrious', 'improvement', 'labours' and especially 'nation' would all have resonated with this group. Interestingly, Sprat used the word 'nation' 59 times in the text, 'labour' or 'labours' 39 times, and 'learning', 'knowledge' and 'education' 214 times. Curiously, 'improvement' or 'improving' are terms which he only used 26 times, in most cases – other than in the name of the Society – related to not only improvement in agriculture or horticulture, but also with reference to improvements in experiments, or an individual's personal improvement.[74] For many in this group, improvement, particularly agricultural improvement which primarily entailed the enclosure of common land and the draining of fens and marshes, had increased the income that could be derived from land ownership. The idea that the Society's fellows were not merely amusing themselves but were engaged in 'labours' and were being 'industrious' in supporting the good of the 'nation' would have been a powerful one. The need felt by many to meet the challenge posed by the Dutch Republic for dominance of the seas and overseas trade – and therefore dominance of the world – would have struck a chord with this group of Sprat's readers. Even in the problematic third part of the *History*, Sprat exhorted gentlemen to support England's naval and trading strength by directing their labours towards engaging in the business of trade, and in the study of nature and the 'improvement of these *Arts*' involving the conduct of experiments and observations. [75]

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[73] Sprat, *History*, pp. 158 – 213, 215 – 243, 240 – 252, 253 – 309. Birch, *History*, Vol. II, pp. 161, 163, 171, 176.
[74] Analysis made possible through *Early English Books Online*, *Text Creation Partnership*, https://quod.lib.umich.edu/e/eebogroup/ , accessed 13 April 2018.
[75] Sprat, *History*, pp. 405 – 406.

One important way in which Sprat portrayed the Royal Society's support for improvement was to give details of the Society's proposed and already completed histories of trade. These histories covered a wide range of subjects, from refining to cloth making, bread making to the making of paper and parchment, mining to the making of gunpowder. [76] These histories formed what Slack called 'the discovery of England', an essential element of William Petty's political economy. [77] Similarly, Sprat also included details of the Society's new inventions and improvements to existing ones, such as a range of scientific instruments, pendulum watches, astronomical devices, instruments for measuring ocean depths and wind strength, a new type of spectacles and even an instrument for planting corn. These kinds of developments and improvements would have made the Society very attractive to landowners since innovation was also an important part of overall improvement which promoted the general good. Thanks to Petty and his colleagues in the Hartlib circle, by the mid-1600s improvement, especially agrarian improvement, had become 'respectable'. [78]

Sprat therefore used arguments which were more likely to appeal to hard-headed businessmen and MPs who would want to have a very good reason for providing financial support for the Society. One of the key arguments used by Sprat was nationalism. This was a particularly astute argument to use. At the time of writing, England had become engaged in another war with the Dutch Republic which lasted until 1667. Sprat therefore emphasised England's superiority over particularly the Dutch and the French in many areas of activity, which the Royal Society's activities would increase. In Europe, 'the English Name does manifestly get Ground, by the Bravery of their Arms, the Glory of their Naval Strength, and the Spreading of their Commerce'.[79] Sprat emphasised that the Royal Society was the envy of Europe, and set the standard for the organisation of the study of the natural world.[80] Further, that the intent of the Society was not to 'stop at some *particular Benefit,* but goes to the Root of *all noble Inventions*, and proposes an infallible Course to make *England*, the Glory of the

[76] Sprat, *History*, pp. 257 – 258.
[77] Paul Slack, *The Invention of Improvement: Information and Material Progress in Seventeenth-Century England* (Oxford, 2015), p. 15.
[78] Slack, *Invention of Improvement*, p. 106 – 108, esp. p. 106.
[79] Sprat, *History*, p. 125.
[80] Sprat, *History*, pp. 124 – 128.

Western World.'[81] It is interesting that in this passage, Sprat compared this potential benefit which the Royal Society would bring to the country, with acts of parliament enacted since the restoration of the monarchy, approving expenditure on the repairs of roads, the cleaning and 'beautifying' of the streets, and investments in manufacturing and fishing, and 'many other such publick Works, to adorn the State', suggesting that funding the Royal Society would be another public work, only of wider and more lasting benefit. Sprat even declared that London had unique advantages over the other leading cities in Europe, including Paris, Vienna, and Amsterdam.

> It is the Head of a mighty Empire, the greatest that ever commanded the Ocean: It is compos'd of Gentlemen, as well as Traders It has a large Intercourse with all the Earth: It is, as the Poets describe their House of Fame, a City, where all the Noises and Business in the World do meet: and therefore this Honours justly due to it, to be the constant place of Residence for that Knowledge, which is to be made up of the Reports and Intelligence of all Countries.[82]

In other words, the Royal Society was vastly helped in its work by the distinct advantages that they accrued from operating out of London. In this Sprat is making a virtue out of a necessity of the Society's London location (see Chapter Three); however, this kind of inflated nationalistic rhetoric would appeal to conservative and patriotic men of business. Sprat adds goes even further in describing England's unique position as the heart of natural knowledge:

> even the Position of our Climate, the Air, the Influence of the Heaven, the Composition of the *English* Blood; as well as the Embraces of the Ocean, seem to join with the Labours of the *Royal Society*, to render our Country a Land of *experimental Knowledge*. And it is a good Sign, that Nature will reveal more of its Secrets to the *English*, than to others; because it has already furnish'd them with a Genius so well proportion'd, for the receiving and retaining its Mysteries.[83]

[81] Sprat, *History*, p. 78 – 79.
[82] Sprat, *History*, p. 89.
[83] Sprat, *History*, pp. 114 – 115.

The examples from the text provided here are only a sample of the extent to which the *History* is devoted to the appeal for money. Most of Part Two of the text is devoted to the promotion of the Society with the aim of attracting financial support for the organisation, as well as expanding the fellowship. Sprat utilises a variety of devices to achieve this purpose. One of the most significant of these was the definition of the Society's public role and public function.

4.3 Going Public: Defining the Royal Society's Public Purpose

A significant element in the *History of the Royal Society* is a clearer definition of the Society's public function, something which was lacking in the charters, and in this respect, Sprat brought all of his skills as a publicist to bear. Sprat's emphasis on the fellows' industry and labours, and his relation of their work to improvement of the nation have been discussed above. In defining what public role the Society aimed to fill, Sprat also frequently made clear that for the fellows of the Society, their own private interests, and those of the Society as a private club had now to be subordinated to the dictates of the charters which transformed the organisation into a publicly incorporated institution. As was shown in Chapter Three, the founding fellows took their legal obligations seriously, and their concern to make their private records public was a part of their concern to fulfil their public obligations. Sprat made clear that the Society served the public good in ways which extended beyond their experimental and investigative activities. Thus, he positioned the Society as being an important public organisation whose function could be of value throughout English society.

As part of reinforcing the Society's public persona, Sprat included in the *History* a slightly abridged version of the charter, translated from the Latin. This was followed in the text by a transcription of the Society's statutes. The emphasis here was on the 'Legal Ratification' of the Society's existence.[84] Whatever its origins, the Royal Society was no longer a private club, but an actual public institution, and must therefore be taken seriously as an

[84] Sprat, *History*, p. 143.

organisation. This is followed in the text by a reiteration of Charles' support for the Royal Society and taking care to include a mention of James and their cousin Prince Rupert.[85] This is then followed by a sample of reports which had been presented at some of the Society's meetings. The cumulative effect of this content is to show that the Royal Society was a busy, thriving and serious public corporation which was intent on conducting its affairs in a formal and responsible manner. The president, the members of the council and the ordinary fellows are all depicted as being enjoined through legal documents to conduct the affairs of the Society with honour and dedication, befitting members of a publicly incorporated organisation.

A common refrain in the text is the subordination of the Society and its fellows' private interests to their public duties as members of this public institution. Over and again, the work of the Society is portrayed as being more important than an individual's private material gain, or the institution's desire to keep its business private. For Sprat, the enterprise was of such importance that it had to be brought to the attention of the public:

> the *Greatness* of the *Design* it self, on which I am to speak, and the Zeal which I have for the *Honour* of our *Nation*, which have been the chief Reasons that have mov'd me to this Confidence of Writing...[86]

Indeed, if the Society and fellows wanted to attract a wider interest in the general public and demonstrate the value of their work, they needed to go public. Natural philosophy had been so long neglected because it had become too esoteric and had been pursued in private:

> It is, because *Philosophy* had been spun out to so fine a Thread, that it could be known but only to those who would throw away all their whole Lives upon it. It was made too subtile for the *common* and *gross* Conceptions of Men of Business. It had before in a Measure been banish'd by the Philosophers themselves, out of

[85] Sprat, *History*, pp. 148 – 149.
[86] Sprat, *History*, p. 2.

> the World, and shut up in the Shades of their Walks. And by this means, it was first look'd upon as most *useless*, and so fit soonest to be *neglected*.[87]

Similarly, it was also necessary for the origins of the Society to be made public, although some might think that in doing so Sprat would 'treat of Things, that may appear to be of too private and domestick Concernment, to be spoken in this publick Way.'[88] It was necessary though, because

> if this *Enterprize*, which is now so well establish'd, shall be hereafter advantageous to Mankind (as I make no scruple to foretel that it will) it is but just, that future Times should hear the Names of its first *Promoters*: That they may be able to render particular Thanks to them, who first conceiv'd it in their Minds, and practis'd some little Draught of it long ago.[89]

Rather, the Society's role for the public good required it to make information that had previously been private and even secret, available for public scrutiny through the *History.* The Society had already demonstrated this by allowing Sprat access to the minutes of the meetings and the registers. Sprat is being somewhat economical with the truth here. In fact, the statutes of the Society state that as a fellow he was entitled to access to the Society's books in any case; non-fellows were not. This is probably why he was elected as a fellow before he began the *History*. However, the publication of the *History*, containing as it did details of the inner workings of the Society, is significant in that such material would not normally have been available to the public. As for their discoveries and inventions:

> The Society has reduc'd its principal Observations, into one common Stock; and laid them up in publick *Registers*, to be nakedly transmitted to the next Generation of Men...[90]

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[87] Sprat, *History*, pp. 118 – 119.
[88] Sprat, *History*, p. 52.
[89] Sprat, *History*, pp. 52 – 53.
[90] Sprat, *History*, p. 115.

The very fact of making the Society's business public – both through the public charter and through content of the *History* - was to assign a public function for the Society. Going public meant that the organisation was no longer just for individuals' private benefit; the fellows now had public duties and were now serving the public good. The reference above to individual inventors' desire to accrue material gain from their inventions is part of this sacrifice of private individuals for the public good. As part of those public duties, fellows had to be fully committed to the Society and its work:

> That by laying down, on what course of Discovery they intend to proceed, the Gentlemen of the Society may be more solemnly engag'd, to prosecute the same. For now they will not be able, handsomely to draw back, and to forsake such honourable Intentions; when the World shall have taken notice, that so many prudent Men have gone so far, in a Business of this universal Importance, and have given such undoubted Pledges of many admirable Inventions to follow.[91]

This last is a reference to the difficulties faced by the previous groups described in Chapter Two: the problem of men losing interest in the organisation and drifting away. To reinforce this, Sprat also included the text of the 'obligation' signed by all fellows on election to the Society.[92] Thus, Sprat made it clear that by making the Society – and its membership list – public, the fellows were morally if not legally obliged to fulfil the terms of their subscription.

The difficulty for the Royal Society in trying to establish their public role was that their meetings were conducted almost entirely in private. Apart from members of the aristocracy, no-one was admitted to meetings unless they were specifically invited. However, as has been discussed in Chapter Two, the basis of the reliability and veracity of the Society's natural knowledge was that it was presented and verified in the presence of others, but both this process of verification and most of the experiments and observations considered were conducted in private. Thomas Hobbes, famously not a fellow of the Society, based his objections to the Royal Society's 'space' on the basis that their meetings were not public. In

[91] Sprat, *History*, p. 3.
[92] Sprat, *History*, pp. 144 – 145. The text of the obligation is quoted in Chapter Two, pp. 25 – 26, fn 90.

his *Dialogus physicus* (1661) Hobbes pointed out that not only were the meetings conducted behind closed doors, but they were also only available to a limited number of self-selected men. Hobbes questioned the Society's legal right to exclude the public, since, he claimed, the Society was 'constituted by public privilege'.[93] This then raised questions about whether the Royal Society was truly public, as well as questions about just how authentic the knowledge, the 'matters of fact' were, as the Royal Society claimed. Thus, while Hobbes was not on very friendly terms with many in the learned community in this period and so his views may not have gained much traction, nonetheless this illustrates that there was a sense of what constituted a public institution, and Sprat's task here was to demonstrate that despite lacking many of the trappings of other public institutions, the Royal Society still served a public purpose. In any case, Cowley's model for a college which Sprat wrote was the preferred choice of the fellows, could not be properly public, in the sense that Cowley's college did not specify that the public would be invited to enter.

Sprat used his portrayal of the social, religious and political diversity of the Society to suggest that the organisation set an example which English society could follow. Despite the different attitudes, ideas and antecedents, and even nationalities of the fellows, they were nonetheless able to set aside these differences in the interests of their collective effort for the good of all mankind:

> It is to be noted, that they have freely admitted Men of different Religions, Countries, and Professions of Life. This they were oblig'd to do, or else they would come far short of the Largeness of their own Declarations. For they openly profess, not to lay the Foundation of an *English*, *Scottish*, *Irish*, *Popish*, or *Protestant* Philosophy; but a Philosophy of *Mankind*.[94]

This was borne out in the conduct of the Society's meetings, where men aimed to debate calmly and with reason and restraint:

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[93] Quoted in Steven Shapin & Simon Schaffer, *Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life* (Princeton, NJ, 2011), p. 113.
[94] Sprat, *History*, pp.

> In them their principal Endeavours have been, that they might enjoy the Benefits of a *mix'd Assembly*, which are Largeness of Observation, and Diversity of Judgements, without the Mischiefs that usually accompany it; such as Confusion, Unsteadiness, and the little Animosities of divided Parties. That they have avoided these Dangers for the time past, there can be no better Proof than their constant Practice; wherein they have perpetually preserv'd a singular Sobriety of debating, Slowness of consenting, and Moderation of dissenting. Not have they been only free from *Faction*, but from the very *Causes* and *Beginnings* of it.[95]

This serves as a reminder to the reader that the lack of such restraint had led in the previous two decades to conflict and bloodshed. Men were able in meetings to disagree with one another, but politely and without rancour. This was because these men recognised that meaningful discussion was an important part of the process of establishing matters of fact. Indeed, the Royal Society is portrayed as being intrinsically bound up with the country's return to 'the Perfection of its former Civility', since its very existence was made possible by the joyous restoration of the monarch, '...when our Country was freed from Confusion and Slavery...'. The time is right, suggested Sprat,

> now, when Men's Minds are somewhat settled, their Passions allay'd and the Peace of our Country gives us the Opportunity of such Diversions', that the Society had to offer.[96]

Thus, the Royal Society's role served the public good not only in the form of its discoveries and inventions, but also in the portrayal of the conduct of the fellows which presented an ideal vision of society which was free of the conflicts of the past. Sprat's image of the Society is obviously an ideal one. Meetings were indeed very civilly done, but there were always men who simply did not get along, such as Hooke and Oldenburg. Nonetheless, Sprat would necessarily have wanted to present a palatable image of the Society to an audience from whom the Society hoped to receive material assistance. As such, he devised an image that would receive general acceptance. Sprat's depiction of the Society's public role was therefore

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[95] Sprat, *History*, p. 91.
[96] Sprat, *History*, pp. 3, 58. 42.

partly designed to attract potential fellows to the Society, but also reflects further the impact on the Society of the political context of this period.

4.4 Aftermath

Unfortunately for the Royal Society, Sprat's *History* did not have the effect that it hoped. While the Society's public profile had indeed been raised, this did not result in either any substantial increase in new recruits, nor was it successful in attracting significant funding. Money was not forthcoming from the government or parliament, and no wealthy benefactor came forward. Furthermore from 1663 the number of new fellows elected to the Society began to fall, to the point that in 1670 only two new fellows were elected.[97] There were specific reasons for this failure. One important reason was that the *History* was much less effective than it could have been because of the impact on the text of Part Three. Part Three was a complete departure from the previous two parts. The tone was lecturing, almost haranguing, and giving the impression of a thundering sermon from the pulpit, with much of the text contradicting the tone and content of the previous parts. What follows are some examples where the content of Part Three serves to undermine and contradict that of the previous parts, and the ways in which this could alienate or render hostile the audience for the History. Part Three is a vigorous defence of the Society and its experimental philosophy – as Sprat outlined at the start of the text – but written in such a way as to nullify the more persuasive tone of the previous two parts.

In Part Two Sprat lauded the talent to be found, even amongst the nation's tradesmen. Men like John Graunt were therefore welcome as equals in the Society for their knowledge and skills in the mechanical arts. In Part Three however, tradesmen were much reduced in their role, particularly when it came to improvements to the mechanical devices they used in their work:

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[97] These numbers were compiled from the chronological register of fellows recorded by the Society and reproduced in Sir Henry Lyons, *The Record of The Royal Society of London for the Promotion of Natural Knowledge*, 4th ed. (London: The Royal Society, 1940), pp. 375 – 381.

> The *Tradesmen* themselves, having had their Hands directed from their Youth in the same *Methods of Working*, cannot when they please so easily alter their Custom, and turn themselves into new Roads of Practice. Besides this, they chiefly labour for present Livelihood, and therefore cannot defer their *Expectations* so long, as is commonly requisite for the ripening of any *new Contrivance*. Bust especially having long handled their *Instruments* in the same Fashion, and regarded their *Materials* with the same Thoughts, they are not apt to be surpriz'd much with them, nor to have any extraordinary *Fancies*, or *Raptures* about them. These are the usual Defects of the *Artificers* themselves: Whereas the Men of freer Lives, have all the contrary Advantages. They do not approach those *Trades*, as their dull and unavoidable and perpetual *Employments*, but as their *Diversions*.[98]

These 'Men of freer Lives' – gentlemen and aristocrats, or even members of the professions – would be able, even with their limited knowledge, to make improvements to devices that the tradesmen would not. This completely belies the equality and cooperation implied in Part Two, when such men were portrayed as valuable and productive fellows of the Society. For tradesmen, the idea that an inexperienced and untrained person would presume to make improvements to devices which they spent many years learning to manufacture and operate effectively, would have been an insult, as well as potentially threatening to their livelihoods. This kind of rhetoric would not have encouraged tradesmen to participate in the Society's activities.

Sprat further found fault with the English character. Rather than praising Englishmen of all classes for their ingenuity, Sprat declared that the prosperity of the nation was being held back by the lack of industry of all men. While England had improved in agriculture and forestry, they could do still much more. The problem was

[98] Sprat, *History*, pp. 391 – 392.

> the Want of Employment for younger Brothers, and many other Conditions of Men; and by the number of our Poor, whom *Idleness* and not *Infirmities* do impoverish.[99]

The 'Hollanders' on the other hand, were far superior to the English in their 'Industry'. They had toiled to improve their country, and in so doing had reached a point where

> their Successes and Riches still added new Heat to their Minds; and thus they have continued *improving*, till they have not only disgrac'd but terrify'd their *Neighbours* by their *Industry*.[100]

Given that by the time the text was published, the English had suffered an ignominious military defeat at the hands of the Dutch, this was hardly tactful. Sprat even attacked what he considered the frivolous nature of some wealthy men who were more concerned with wasting money on adornment and amusement than on activities which were more sensible. Experiments, wrote Sprat, which even encouraged gentlemen to labour with their own hands, were not only preferable but were also a source of virtue for men who wished to emulate the achievements of their forebears. As such, 'They may then be taught, that their present *Honour* cannot be mantain'd by intemperate *Pleasures,* or the gawdy Shews of Pomp, but by true *Labours* and *industrious Virtue.*'[101] Sprat echoed the advantages that gentlemen had in the pursuit of natural knowledge, in that their country seats provided them with natural benefits which aided the study of nature: stables, kennels and stalls for observing animals, and parks, orchards, gardens for studying plants and minerals, not to mention the clearer air and skies more favourable for studying the stars and planets. [102] Unfortunately, the sermonising tone would have been unlikely to have persuaded a social elite who, influenced by the often hedonist behaviour of the monarch, would have preferred other kinds of pleasures. [103] So, despite the more strenuous defence of the work of the Society, and the

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[99] Sprat, *History*, pp. 421 – 422.
[100] Sprat, *History*, p. 423.
[101] Sprat, *History*, pp. 409 – 410.
[102] Sprat, *History*, pp. 405 – 406.
[103] See Ronald Hutton, *Charles II: King of England, Scotland, and Ireland* (Oxford, 1989), pp. 185 – 186; Harris, *Restoration*, p. 46. For the behavior of Charles' closest courtiers, see for example V. del la

more defensive rebuttal of criticism which had been levelled at the Society and its fellows, Sprat's approach in this part would be unlikely to persuade.

Part Three of the text is widely acknowledged as being the work of Sprat alone, without the more moderate input of John Wilkins. Barbara Shapiro has noted – and this was implied by Sprat in the text as well - that John Wilkins was closely involved with the writing of the text, and there are distinct similarities in the style and content of the *History* to some of Wilkins writings.[104] It is also arguably the sole source of the modern perception of the text as solely an apology or defence of the Society. By this point, the committee overseeing Sprat's work had begun to pressure him to complete the project; much of this part shows signs of haste, in that the arguments were far less carefully constructed. In Sprat's defence, his work on the *History* had been hampered – as he points out – by the impact of the outbreak of plague and the Great Fire in 1665 and 1666. Sprat also halted work on the *History* in order to write a reply to M. Sorbiere's text written after a visit to England.[105] Nonetheless, left to his own devices, Sprat's final part of the text became less positive in tone, and with content which would have nullified the persuasive and more positive and upbeat nature of the previous two parts. With many biblical references and admonitions on various groups to improve their ways, this part of the text reflects far more Sprat's own personal peeves and concerns; they cannot be taken to be representative of the Society to any great extent.

Another aspect of the text which likely did not help to win over wealthy landowners and other members of the social elite was the portion of the text which described the work that had already been conducted by the Royal Society's fellows. It has been described in the previous sections how Sprat used descriptions of the proposed and actual work completed by

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Sola Pinto, *Sir Charles Sedley 1639 – 1701: A Study in the Life and Literature of the Restoration* (New York, 1927), Chapter III, "The Wits and their Frolics"; John Wilmot, *The Complete Poems of John Wilmot, Earl of Rochester*, ed. David M Vieth (New Haven, 1962), Introduction, esp. pp. xvii – xxxiii.

[104] Shapiro, *John Wilkins*, pp. 203 – 204. See also Sprat, *History*, p. 94.

[105] The text which prompted the halt of work on the *History* was Samuel Sorbière, *Relation d'un Voyage en Angleterre où sont touchées plusiers choses qui regardent l'état des sciences, et de la religion, et autres matières curieuses* (1664). Sprat published a reply in the form of a letter to Christopher Wren, *Observations on Monsieur de Sorbier's Voyage into England. Written to Dr. Wren, Professor of Astronomy in Oxford* (1665). Sprat had taken strong exception to comments made by Sorbière with reference to England in general and the Royal Society in particular.

the fellows, with details of inventions and improvements to inventions. However, a closer look at what Sprat detailed of the Society's activities may not have actually been that appealing. In trying to demonstrate just how active and successful the Society, Sprat included information of experiments, observations and discourses which may well have raised scepticism in certain of his audience's minds. Many of the experiments for instance, would surely not have been perceived by many as having any kind of practical, useful application. Observations of lunar eclipses, experiments with fire, air and water, dissections of dogs, fish and reptiles of various kinds are fascinating as knowledge for its own sake, but arguably would appear to have no real purpose which would promote the public good. Charles II's raillery of Petty and the fellows for only weighing air is an indication that there was a disconnect between what the Society and the public considered to be useful knowledge worth improving. In Sprat's *History*, the Society seem to have found it difficult to reconcile its desire to improve knowledge for its own sake, with the improvement of knowledge which would specifically contribute to the nation's material progress. The experiments, observations, histories and inventions included in the text – selected by the committee of the council overseeing the text – would have certainly appealed to natural philosophers and experimenters, but not necessarily to a landowner looking for new innovations or improvements to agricultural techniques which would increase the yield of his land and therefore his profits.

There is evidence that the council of the Society was dissatisfied with the finished product. Most telling was the Society's apparent refusal to order the text to be published under its own imprimatur, suggesting that they wished to distance themselves somewhat from the more controversial part of Sprat's text. The *History* does not contain an order from the President of the Society Viscount Brouncker or from the council of the Society – as there is for Evelyn's Sylva or Hooke's Micrographia - for the printing of the *History*. There is instead an order from William Morrice, who appears to have been one of the secretaries of the Stationer's Company.[106] Adrian Johns noted that there was real significance in the Society

[106] Jackson and Cope, eds., *History*, p. ix.

allowing texts to be published under their imprimatur, in that the Society intended the imprimatur to be an emblem of the organisation's licensing power, and as such was a signal honour for a text and its author: 'Its imprimatur was really to be a positive mark of distinction and authenticity, guaranteeing that a publication had been produced under conditions of propriety.'[107] This did not mean that the Society was not prepared to use the *History* to advance their cause, but they seem to have decided to use the text more with their foreign associates than their domestic ones. After using the promise of the *History* in his foreign correspondence, Henry Oldenburg asked leave of the council to send copies of the *History* to certain correspondents overseas: 'Mr. Oldenburg had leave to send a copy of that history to Mr. Hevelius, another to Mr. Winthrop in New England, and a third to Monsr. Auzout and Monsr. Petit at Paris.'[108] That same meeting also approved the dispatch of a copy of the *History* with an accompanying letter to Prince Leopold of Florence, illustrating what Adrian Johns has suggested was the Society's use of their publications as 'diplomatic gifts'.[109]

Even worse for the Society, the *History* does not seem to have fulfilled its primary purpose in the Society's fundraising campaign which followed the text's publication. At the end of September 1667, John Wilkins made his proposal for the raising of funds to build a college.[110] The timing was surely not coincidental: Sprat's *History* was supposed to be used as the marketing material to spearhead the fundraising effort to come. Perhaps because of the disappointment felt by the council with Sprat's *History*, it was nearly another two months before the council formally decided to begin collecting subscriptions for the college:

> The business of voluntary subscriptions for contributing towards the carrying on of the ends of the institution of the Royal Society being considered of, it was after debate and mature deliberation unanimously agreed upon.

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[107] Adrian Johns, *The Nature of the Book: Print and Knowledge in the Making* (Chicago: University of Chicago Press, 1998), p. 494.
[108] Birch, *History*, Vol. II, p. 207.
[109] Johns, *Nature of the Book*, p. 541.
[110] Birch, *History*, Vol. II, p. 194.

> That it was now a seasonable time for such subscriptions; and that they were to be made first by such of the council and the society, as were both willing and able, and afterwards by such other well-disposed persons not of the society, as should come in by the solicitation of a committee to be nominated by the council out of their own number, and out of the fellows of the society; which contributions should be employed in promoting the ends of the society, and particularly to the building of a college, as the most probable way of the society's establishment. [111]

Accordingly, the council drew up a form of subscription with instructions for Sir Anthony Morgan and Mr. Hoskyns to 'make it obligatory in law'. It is unclear just why it took the council so long to begin their campaign to raise funds, and why it needed such 'debate and mature deliberation'. They may have concluded that the time was as good as any to begin the campaign, despite the potentially negative impact of Sprat's *History*. On the other hand, the timing also allowed for Londoners to have had time to recover from the devastating impact of the fire in the previous year. In any case, the timing can be explained by the fact of the fact of the Society's usual summer recess. This speculation does indicate that the Society's council was continually aware of the need to respond to the external circumstances in London and the rest of the country which could have an impact on their efforts to establish their organisation.

For several months, much of the business of the meetings of the council – when not taken up with the legal wrangling over Chelsea College – was devoted to organising the acquisition of subscriptions for the Society's college, with individuals recorded as making their own subscriptions of money for the college. Lists of potential subscribers were drawn up, and members of the organising committee were each assigned a list of the names of specific men whom they were required to approach. It appears that in most cases, members of the committee were assigned men with whom they were personally acquainted or had some other kind of tie. For instance, John Wilkins was assigned to approach among others, the Duke of Buckingham, who was his patron, and Sir Robert Moray, a Scotsman, was asked to

[111] Birch, *History*, Vol. II, pp. 205 – 206.

contact several members of the Scottish nobility. This again illustrates the importance of personal knowledge of men and of patronage to the success of an enterprise in this period.[112] The council must have had high hopes for the success of the campaign, given that it ordered two hundred copies of the subscription form to be printed.[113] Interestingly, John Wilkins did use the *History* in exactly the way it was originally intended: as a marketing tool. On 17 February 1667/8, he asked and was granted leave of the council to obtain six copies of the *History* 'to be presented to some persons, from whom he expected contributions'.[114]

The council was indefatigable in its efforts to procure financial assistance from men who were appealed to directly in Sprat's *History*, including members of the House of Lords, and any fellows of the Society who were also members of parliament. The Society was very much aided in their plans for the building of their college by Henry Howard, the 6th Duke of Norfolk, who had given the Society house room at his home Arundel House after the fire of 1666. According to the journal minutes, it seems Howard set aside a plot of land in the grounds of Arundel House for the Royal Society's college and contributed to the plans devised by Christopher Wren and Robert Hooke.[115] Despite this activity however, the Fellows' fundraising efforts were a disappointing failure; the Society did not raise the sums needed. After 10 August 1668 there was no further mention of the building of a college. Subsequent council meetings indicate that the council decided to plan instead to adapt or re-design the buildings of the old Chelsea College which the Society had formally acquired in their third supplemental charter awarded in April 1669. Even these plans came to nothing however, no doubt partly because of the ongoing legal difficulties that the Society had encountered over titles to the property; the Society eventually sold back the property to the king in 1682.

Michael Hunter has rightly pointed out that the situation for the Royal Society in trying to raise funds for their college was exacerbated by the continuing impact of rebuilding efforts

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[112] Birch, *History*, Vol. II, pp. 238 – 239.
[113] Birch, *History*, Vol. II, p. 244.
[114] Birch, *History*, Vol. II, p. 249.
[115] Much of the activity related to the design of the college and the involvement of Henry Howard was recorded in the minutes of council meetings. See for example, Birch, *History*, Vol. II, pp. 284, 289, 299 – 300.

after the great fire in 1666. This underscores the external contexts which significantly hampered the Society's efforts to successfully establish itself as an institution. Hunter also suggested that the comparatively small sums raised from the fellows themselves indicated that not all the fellowship supported the erection of a college, and that this was another reason for the Society's failure. However, the sums gifted by fellows were, for the period, quite large – ranging from £10 to £100 - and not all fellows would have been able to command such funds. For instance, John Wilkins subscribed £50, which was equal to the annual sum gifted to the Society by Sir John Cutler to pay for Robert Hooke's lectureship. In any case, the Society's council struggled severely at this point with collecting arrears of fellows' weekly subscription fees and had begun to consider ejection of fellows for non-payment. Therefore, if a fellow was unwilling to pay one shilling per week subscription fee, it is surely unlikely that he would be willing to pledge £10 or more for a college. Sir Henry Lyons speculated that the college was never built because of legal problems over the title of the land at Arundel House. Possible legal difficulties aside though, the Society clearly did not have sufficient funds to purchase any land in another part of London, which would probably have circumvented any other legal entanglements.[116] This was a rather ignominious end to the Society's aspirations for their own 'Solomon's House'.

The publication by fellow Joseph Glanvill of his *Plus Ultra* which followed Sprat's *History* in 1668 was truly an apology for the Royal Society, one which was welcomed by the Society. [117] However, both *Plus Ultra* and Sprat's *History also* had the unfortunate consequence of attracting the unfavourable attention of two men: Meric Casaubon and Henry Stubbe. Meric Casaubon was a conservative cleric, prebendary of Canterbury Cathedral, and a staunch royalist. In 1669 he published *A Letter of Meric Casaubon D. D etc. to Peter du Moulin D. D. and Prebendarie of the same Church: Concerning Natural Experimental Philosophie, and some books lately set out about it.* In it, Casaubon expressed criticism for Glanvill's *Plus Ultra.* Casaubon's main criticism of the text was Glanvill's

[116] Hunter, "A 'College' for the Royal Society", pp. 177 – 178; Lyons, *Record of the Royal Society*, p. 26.
[117] Oldenburg, *Correspondence*, p. 503; Birch, *History*, Vo. II, p. 297.

> contempt of *Aristotle*, and his censuring all other learning besides *Experimental* Philosophy, and what tendeth to it as *useless*, and meer *wrangling* and *disputing*, excepted. [118]

Casaubon was a staunch believer in the value of the classical scholastic tradition of the universities, claiming the authority of tradition for its pursuance and he did not welcome Glanvill's at times energetic dismissal of it. Interestingly. Casaubon was at pains to state that he did not wish to disparage the Royal Society or its work; [119] however, he did not believe that the Society's experimental philosophy was suitable to replace all previous classical learning. Casaubon's main concerns lay in Glanvill's forceful rejection of the teachings of Aristotle, as well as his own belief that Glanvill's and others' fixation on 'matter and secondary causes and sensual objects' would lead to a disbelief in 'spirits' and 'supernatural operations' and eventually, even a disbelief in an immortal soul and God himself. [120] He also criticised sharply those whom he wrote believed that just because Charles II was the Society's patron, that all done by the Society was done in his name and with his approval. He went on to suggest that ideas and opinions of individual fellows – presumably meaning Glanvill – were not necessarily shared by the Society as a whole. This is damaging to the Society in two ways: first, it suggests that the Society's administrators did not have complete control over its fellows and could therefore bring the whole Society into disrepute. Second, Casaubon here suggests that the Society was not as unified or harmonious as Sprat's *History* tried to portray it. Given how often Sprat emphasised the unity of the fellows and held the Society up as a model for the conduct of English society, this had the potential to cause some damage to the Society's image. It also suggested that the Society ran the risk of threatening the king's continuing patronage if it continued to take his name and patronage in vain.

Henry Stubbe was a learned man, physician and propagandist who was known as a provocateur who enjoyed an argument. He later became a writer of propaganda during the

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[118] Meric Casaubon, *A Letter of Meric Casaubon D. D etc. to Peter du Moulin D. D. and Prebendarie of the same Church: Concenring Natural Experimental Philosophie, and some books lately set out about it* (1669), p. 35.
[119] Meric Casaubon, *A Letter of Meric Casaubon*, p. 36.
[120] Meric Casaubon, *A Letter of Meric Casaubon*, p. 30.

Third Anglo-Dutch War. [121] In 1670 he directed his ire towards both Sprat's *History* and Glanvill's *Plus Ultra* with the publication of In *Legends no Histories, or, A Specimen of Some Animadversions Upon the History of the Royal Society, A Censure upon Certaine Passages Contained in the 'History of the Royall Society', Plus Ultra of Mr. Joseph Glanvill reduced to a Non-Plus, Campanella Revived, Or an Enquiry into the History of the Royal Society*, all in the same year. Stubbe attacked the Royal Society's work and the learning of individual fellows, as well as launching a personal attack against Joseph Glanvill which resulted in a pamphlet war between Stubbe and Glanvill. [122] In *Censure Upon Certaine Passages* and *Campanella Revived* he accused Sprat of undermining the established church and accused the Society of being agents for the papacy intent on re-introducing Catholicism to England by undermining the monarchy, the universities and the church with their experimental philosophy. Stubbe's criticism of the Royal Society is also said to have been rooted in his antagonism towards latitudinarianism, which he saw as a threat to the monarchy as well as the established church, as well as being motivated by a defence of traditional physic. [123] It should be noted though that Stubbe's writings were often contradictory. His apparent concerns about the true goals of the Royal Society did not, for instance, prevent him from submitting reports on the flora and fauna of Jamaica sent during his tenure there as a royal physician, which were published in *Philosophical Transactions* in 1667 and 1668. [124]

Another very public attack on the Society was made by Robert South, Public Orator at the University of Oxford. South preached a strongly worded sermon in 1667 against the Royal Society and its activities, although it is not known whether it was given before or after the publication of Sprat's *History*. South described the fellows as having formed themselves into 'a kind of diabolical society', engaged in 'finding out new experiments in vice', and intent on

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[121] Mordechai Feingold, 'Stubbe [Stubbes, Stubbs], Henry (1632–1676), author and physician', *Oxford Dictionary of National Biography*. (Oxford, 2004; online edn., 2008). http://www.oxforddnb.com.idpproxy.reading.ac.uk/view/10.1093/ref:odnb/9780198614128.001.0001/odnb-9780198614128-e-26734. , accessed 20 Feb 2015; Anthony Wood, *Athenae Oxonienses* (London, 1692), pp. 412 – 420.
[122] Feingold, 'Stubbe [Stubbes, Stubbs], Henry'.
[123] Christopher Hill, *The Experience of Defeat: Milton and Some Contemporaries* (London, 2016), pp. 267 – 268.
[124] Hill, *Experience of Defeat*, p. 265

'obliging posterity with unheard of inventions and discoveries in sin'.[125] South made similar criticisms in an oratory at the dedication of the Sheldonian Theatre in Oxford. The text of his speech is lost, but fellows John Evelyn and John Wallis were in the audience and later wrote of it. Wallis described the speech in a letter to Robert Boyle, writing that South's speech

> consisted, of Satyricall Invectives; against Cromwel, Fanaticks, the Royal Society, & New Philosophy: The next, of Encomiasticks; in praise of the Archbishop, the Theater, the Vice-chancellor, the Architect, & the Painter: The last, of Execrations; against Fanaticks, Conventicles, Comprehension, & New Philosophy; damning them, ad Inferos, ad Gehennam. [126]

John Evelyn was much more dissatisfied at South's speech:

> …Dr South, the Universitie's Orator, in an eloquent speech, which was very long, and not without some malicious and indecent reflections on the Royal Society, as underminers of the University, which was very foolish and untrue, as well as unseasonable. [127]

It is unclear just how much of an impact these criticism and attacks had on the Society's image. Some historians believe they seriously damaged the Society and put some men off from joining the organisation. Stubbe's attacks encouraged others to attack the Society, and provoked later satire of the fellows and their activities.[128] Nonetheless, the Society's problems did not lessen: they struggled to recruit new fellows and their finances continued to be precarious. The Royal Society increasingly became the subject of satirists: Samuel Butler's "The Elephant in the Moon" – which probably circulated in manuscript form

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[125] Quoted in Hall and Hall, *Correspondence of Henry Oldenburg Vol. III 1667 - 1668*, pp. 429, footnote 12.
[126] Wallis to Boyle, 17 July, 1669, on website *Electronic Enlightenment*, http://www.e-enlightenment.com.idpproxy.reading.ac.uk/item/boylroPC0040140b1c/?srch_type=letters&auth=wallis%2C+john&recip=boyle%2C+robert&greg_year=1669&lang_main=all&r=1 , accessed 13 April 2018.
[127] John Evelyn, *The Diary of John Evelyn, Esq., F.R.S. from 1641 – 1705.6 With Memoir*, ed. William Bray (London, 1985), p. 341.
[128] For example, Stimson, *Scientists and Amateurs*, pp. 86 – 89; Hunter, *Science and Society*, pp. 137 – 138; R H Syfret, "Some Early Critics of the Royal Society", *Notes and Records of the Royal Society of London*, Vol. 8, No. 1 (October 1950), pp. 37, 63.

in the 1660s and 1670s before being published in 1759 [129] - and Thomas Shadwell's "The Virtuoso" (1672) made fun of the pretensions of the Society's fellows in their pursuit of knowledge. Steven Shapin has suggested that this satire directed at the Royal Society was a result of the Society's failure in their 'attempted re-specification of conceptions of learning and the learned'; in other words, the Society failed to convince gentlemen that the pursuit of natural knowledge was a suitable and desirable activity for the social elites. [130] In any case, the very public nature of these attacks created the kind of negative publicity which the struggling Society could have done without. To make matters for the Society worse, as the 1670s progressed, England and Charles II continued to experience continuing religious and political difficulties: England became embroiled in the Third Anglo-Dutch War, and paranoia over Catholicism occasioned the exposure of the supposed Popish Plot. These events would have distracted the public's attention from the Society and its activities, especially given for instance, that the Society had no useful role to play in supporting the country's war effort with practical advancements in naval designs and technology. Without funding, a stable fellowship or even a home to call their own, the Royal Society could ill-afford to add the damage done to their public persona to their list of woes.

Conclusion

This chapter has demonstrated that Thomas Sprat's *History of the Royal Society of London* was a text designed as a marketing tool to attract funding and new fellows, and to create a public role and definition for their organisation. The text was written to attract the kinds of men who were best placed to support the Society as they needed: merchants and the social elite. As such, Sprat tried to appeal to current ideas about improvement and its relationship to national prosperity, as well as nationalism and England's competition with the Dutch Republic. Sprat tried to present an ideal picture of the Royal Society, focusing on its position at the forefront of discoveries in natural knowledge, and emphasising both its social,

[129] Syfret, "Some Early Critics", p. 59.
[130] Shapin, " 'A Scholar and a Gentleman' ", p. 312.

religious and political diversity. Sprat portrayed the Society as being a remarkable for the unity of the fellowship and the civility with which it conducted its affairs, setting as it did, an example for the rest of English society as whole to follow. However, deficiencies in the text undermined its message of the usefulness of its activities and failed to convince wealthy men of the value in financially supporting the organisation in its efforts to raise money to build a college. Far from attracting support, the *History*, and Glanvill's *Plus Ultra*, served to instead attract the negative attention of men like Meric Casaubon and Henry Stubbe. These men's writings arguably served to tarnish the Society's image and may have encouraged the satire that was directed at the Society and its fellows in the following decade. The 1670s and 1680s proved to be extremely difficult decades for the Society, which struggled with both internal problems and the external political and religious upheavals in the country. Despite commissioning Sprat's *History* and aiming to make an appeal based on contemporary ideas and concerns, the Royal Society was unable to secure a strong foundation upon which the organisation could look forward with confidence to the future.

CHAPTER FIVE - Conclusion: A Different Approach to the Royal Society

> ...the later *Virtuosi*, who several of them *combined* together, and set themselves on work upon this *grand* Design; in which they have been so happy, as to obtain the *Royal Countenance* and *Establishment*, to gather a great Body of *generous* Persons of all *Qualities* and sorts of *Learning*, to overcome the *difficulties* of the *Institution*, and to make a very encouraging and hopeful *progress* in their pursuits.[1]

The goal of this thesis has been to demonstrate that the narrative of the Royal Society is not complete. This research has aimed to demonstrate that there were other factors which need to be examined which poses a challenge to a simplistic picture of the fledgling institution. By focusing on three seminal events in the Society's first decade, it has become clear that the advent of the Royal Society represents more than just an important moment in the history of early modern science. Rather, the Society also represents a mirror which reflects the social and political history of the early Restoration. As such, this organisation should be of greater significance to social and political historians of Restoration England, and it should be viewed differently by historians of Restoration science. Previous research has focused closely on the epistemological and religious bases upon which the founding and early fellows established their organisation. However, with the development of late twentieth-century interest in the social history of science, there have emerged models of research which indicate that the production and dissemination of natural knowledge was – and still is – also grounded in societal factors such as political ideology and social status. Natural knowledge did not exist in a vacuum, in and of itself; rather it was a product of the societies within which was produced. This is the basis upon this research has pursued a re-examination of the early history of the Royal Society. Questions of why the Society was founded when it was and by whom, why these founders chose to organise the new organisation in the way that they did, and why they sought certain people to support them in their enterprise, are addressed in this research. This

[1] Joseph Glanvill, *Plus Ultra: or, The Progress and Advancement of Knowledge Since the Days of Aristotle* (London, 1668), p. 88.

history of the early Royal Society has demonstrated that there is more to learn about the factors which influenced this first attempt at the institutionalisation of the study of nature.

The period which saw the restoration of Charles II to the throne of England was one in which politics and religion were still inextricably linked. Charles, his advisors and parliament understood his restoration to the throne was by no means greeted with universal enthusiasm. While many genuinely welcomed the return of the traditional institutions of the monarchy and the established church, many others viewed Charles' return with at best, a wait-and-see attitude or a desire to back the winning side, or at worst, open hostility. This hostility could – and sometimes did – erupt into violence. Concerns about the potential for religious dissent and rumoured or actual plots of civil uprisings to destabilise the government and the crown, led to the return of the Licensing Act to halt the uncontrolled dissemination of ideas through printed material, as well as the imposition of increasingly oppressive measures encompassed in the Clarendon Code. Most institutions in the country felt the impact of the political manoeuvrings adopted by Charles and parliament, and the fledgling Royal Society was no exception. From the outset, the founding fellows of the Royal Society were well aware of the need to avoid running afoul of the political tension which existed in the country at this time; hence their haste in seeking permission from Charles to form their organisation. The social and religious diversity as well as the political affiliations of some of the founders during the civil war and Interregnum made it imperative that they seek permission from Charles, lest he suspect a plot against his throne. Charles' permission though, cannot be taken for granted, despite his known interest in natural philosophical pursuits. He could have quite understandably refused his permission on the basis of the antecedents of some of the founding fellows, and this could well have delayed or even completely ended the founders' goal of founding their society, and of building a college. Charles' acquiescence can be attributed to his desire, in these early months of his restoration, to establish himself as a benevolent monarch who wished to promote a positive image to his subjects, suggesting a political expediency which he had already demonstrated in his Declaration at Breda. This does not preclude Charles' genuine desire to promote unity in the country; however, his experiences during the civil war and Interregnum strongly influenced both his and parliament's approach to tackling dissent in the country.

As the decade progressed, and as the acts of the Clarendon Code were enforced more harshly, so too did the threat of uprisings increase. While Charles opposed some of the measures of the Clarendon Code, he too took steps to ensure that the ability of dissenters to influence the public were limited. His use of renewed borough charters to prevent dissenters taking public office is key to understanding his motivation in the form of the charters for the Royal Society. While historians have focused on the positive benefits of the privileges which were awarded to the Society, such as the award of an imprimatur, this and other privileges came with restrictions which were designed to avoid the Society being influenced or even usurped by those who wished the monarchy ill. Their right to meet and found a college was balanced by caveats which limited the expansion of their meetings beyond the immediate environment of the City of London. The elected president and his deputies, and council members were bound by oaths of loyalty to the monarchy. Also, their ability to correspond freely with foreigners on natural philosophical matters was subject to scrutiny, as Henry Oldenburg discovered to his cost. Even more important was the appointment of his chancellor, initially the Earl of Clarendon, to oversee the activities of the new society, alongside the keeper of the privy seal and the archbishop of Canterbury and the bishop of London. Thus, while Charles stated his benevolence towards his subjects and their learned endeavours in the opening text of the charters of the Royal Society, he did not allow his desire to promote the well-being of his subjects to prevent him from securing the protection of his monarchy, as well as furthering the unity of his country by preventing nonconformists from acquiring positions of influence. Thomas Sprat used this desire for unity as part of his appeal for support in his *History of the Royal Society of London*. His marketing of the Society used concerns for unity and the desire to avoid another outbreak of civil war held by the powerful and wealthy men who could provide the Society with financial and intellectual support that the organisation needed. He promoted the Society as an example for the country's government to follow, citing the civility of the Society's meetings, and their rejection of dogmatism as a blueprint for public conduct.

The founding and early fellows of the Royal Society were part of an intellectual community in England which shared an interest in the pursuit of natural knowledge through experiment and observation. Many of these men had part of formal and informal

groups which met in a variety of places such as rooms in colleges and coffeehouses, in England or on the continent, or whose interaction was through correspondence. These men brought these experiences to bear as they discussed their models for a college devoted to all aspects of the study of nature. These experiences influenced some fellows' ideas for a model of a college to be built in England, although they were all influenced by the model of Sir Francis Bacon for his fictional 'Solomon's House'. All these models were utilitarian to a greater or lesser extent, revealing the influence also of Samuel Hartlib's 'Office of Address', with ideas for improving education and the trades, as well as specifically improvements in agricultural practices and technologies. The Society's 'History of Trades' programme grew from the utilitarian ideas of the Interregnum period. Nonetheless, these models also represented the personal experiences of for instance John Evelyn, whose exile during the period of the Interregnum led him to desire a learned retreat from the upheavals in the country. The Society's preferred model, that of Abraham Cowley, illustrated both the desire of the fellows to retain as much of the breadth of the scope of activities in 'Solomon's House' but with a recognition that public or private funding would be crucial to such a foundation's success. The fellows' goal in founding such a college though, was one of service to the public, and indeed, to all of humankind. The improvements in knowledge and the trades would benefit all people, in many aspects of human life. The plans for a college also indicate that for the founding fellows, the Society was a stepping stone to this goal of a college, and much of their efforts of establishment during this first decade were directed towards this end.

The Royal Society's social, political and religious diversity has been the subject of much research. The main conclusions drawn have suggested that the Society was Anglican royalists of the aristocracy and gentry. However, amongst the active membership of the Society – men who attended meetings regularly, contributed reports of experiments and observations, and/or those who paid their subscriptions regularly – most of these were men of more humble antecedents, with a diverse religious and political background. One common factor is that many of these active members had also attended university, although the trend was not for the sons of the social elite to take degrees. Indeed, it has been shown that gentlemen were more inclined to reject too much learning as pedantry, and this included the experimental activities of the Royal Society. This emphasises even

more that the fellows of the Society were united in their desire to pursue natural knowledge through experiment. It has been shown that the experimental activities of the Society were considered by many to be a leisure pursuit, an activity to be conducted in one's spare time, for pleasure. Very few experimenters had the means or opportunity to conduct their researches full-time, since many of the fellows had 'day jobs', professions, trades and other forms of employment by which they made a living. As a result, this research has shown that the appellation of anachronistic terms such as 'amateur' or 'professional' to designate the quality of the contributions of fellows distorts the true picture of what was possible for fellows to contribute given their individual circumstances. Additionally, the relative absence of men from the trades and crafts classes has seen as being to the detriment of the Society's scientific progress. However, differences in the nature of leisure pursuits between the social classes in the early modern period meant that the activities of the Royal Society did not hold the same attraction for many tradesmen and craftsmen, as it did among men with some form of university education, since it was at university that many young men were introduced to the new knowledge being produced at that time. It is true that the involvement of men of the trades and crafts would have helped the Society's history of trades programme to succeed; however, the value to men of these groups of their trade secrets and their subsequent unwillingness to share such secrets with strangers was a powerful reason for keeping such men out of the Society. While such men were willing to be associated with the Royal Society as a means of advancing sales of a range of technical and mathematical instruments, such an arrangement was as willing as many were prepared to go.

In discussing the social factors affecting the Royal Society, it has been shown that patronage was a powerful force in the success of almost any enterprise. It has been seen how important Charles' permission to establish the Society was; Charles was also seen by the Society's founding and early fellows as an important potential source of funding, either directly from Charles himself, or through parliament or some other government department. It was therefore important to maintain and advertise the Society's proximity to and approval of the king for their enterprise, since his approbation of the organisation would be encouragement for other among the social and religious elites to follow suit. This can be seen in the Society's membership lists, which contained not only the king and

the future James II, but also the archbishop of Canterbury, the chancellor of the exchequer and several of the highest members of the nobility. Unfortunately for the Royal Society, Charles was not always positive in his attitude to the Society, and this would have had a negative impact on the attitudes to the Society of those around him. The example that Charles set towards the Royal Society did not always help them. Nonetheless, the support of the social elite was still recognised by the Society as their best chance for financial support, as well as for fellows who were best placed to carry on the Society's work. Thomas Sprat highlighted in his *History*, the value of such men as having the money, leisure and property which would facilitate the carrying out of experiments and observations. Sprat also acknowledged that merchants, who were amassing large fortunes in the early modern period, were also targeted as being of potential benefit to the Society, not only for their wealth but also for their access to a variety of curiosities, rarities and strange and unusual natural objects from around the world. As Sprat demonstrated, the Society valued the contributions of its fellows from the various professions, but the intellectual freedom from traditional systems of knowledge, and the openness to new ideas of particularly gentlemen made them ideal candidates for fellowship.

Finally, the Royal Society has been shown to have presented an institutional challenge in the early Restoration. Not only was this a brand-new type of incorporated institution, its sphere of activities overlapped with those of other chartered organisations such as the universities of Oxford and Cambridge, the Royal College of Physicians, and even many of the London livery companies, whose members included technical instrument makers. There was antagonism from some members of the universities and the College of Physicians for the Society's fellows' sometimes immoderate attacks on the classical tradition of natural knowledge, although these organisations were engaged in their own efforts to re-establish their credibility after the attacks on them during the Interregnum. The fact of having a charter created the potential for serious institutional conflict between these institutions, raising questions about what the nature of the relationship should be between the knowledge being produced by the Royal Society, and that which was used by the universities for the education of the country's clergymen and physicians, and that used by the College of Physicians to regulate medical provision and determine the medical knowledge used by physicians as elite medical practitioners.

Defining the proper public role for the Royal Society would have also required a redefinition of the roles and functions of the other institutions, a task which perhaps Charles would not have wished to undertake. Unfortunately for the Royal Society – and fortunately for the other institutions – the result was a charter which conferred privileges, but not duties or responsibilities, and thus the authority over natural knowledge which would derive from them. Thus, while the award of a charter conferred royal approval and prestige on the Society, it was a public corporation in name only, not much more than a private voluntary association, without even a form of funding to support it. The lack of funding was also central to the Society's ability to establish itself as a public institution. Without funding it could not properly establish permanence, despite an administrative structure and modes of conducting its business like for instance, that of the College of Physicians. This lack of secure, regular funds meant no permanent location (the Society did not purchase its own premises until the early eighteenth century), few salaried staff to conduct its activities, and little money to fund the experiments and observations which were central to its purpose. The Society's abortive fundraising campaign to raise the money to build a college based at Chelsea further emphasised the more precarious situation for the Royal Society compared to other institutions.

This present research provides some scope for further research into the early Royal Society. Given the Society's susceptibility to political and social factors, the organisation's history in the years of crisis in the 1670s and 1680s would make an interesting and potentially fruitful study. This was a period of even greater upheaval in England. The increasing harshness of the imposition of the Clarendon Code, and the growing disillusionment with Charles II's reign created a period of tension and unrest, additionally complicated by the Third Anglo-Dutch War. Similarly, the anti-Catholic feeling which culminated in the Popish Plot and then the Exclusion Crisis added to the feeling in the country even among royalists that the Stuart monarchy was not what they had hoped it would be. This paralleled a period of crisis for the Royal Society. The Society attracted very few new fellows, their financial situation was at times acute, not helped by the dilatoriness of fellows in paying their fees. The Society's council had to take the drastic step of expelling fellows who refused to pay their dues. Meetings were often only sparsely attended, a problem which had begun to arise in the late 1660s as a result of annual

summer exodus to the country, but which continued even in the winter months when many would have returned to the city for the season. Given the Society's policy of associating itself as much as possible with Charles II as its patron, there is scope to investigate how far the Society's decline in its fortunes was directly affected by Charles II's increasing public disfavour. It was in the 1670s that attacks from Henry Stubbe appeared as well as the more measured opposition of Meric Casaubon. The satire of Samuel Butler and especially Thomas Shadwell also began to be felt by the Society's fellows. However, by the 1670s the Society was also able to hold meetings anywhere in the country that it wished, and yet did not avail itself of this privilege. It did though gain a wider international reputation and was the inspiration for the founding of similar learned institutions around Europe, reflecting its inclusion in the wider Republic of Letters. The overwhelming change in the country occasioned by the Glorious Revolution in 1688 would have had some impact on the Royal Society and its fellows, and it would be worth pursuing how these changes were felt in an already vulnerable institution.

The nature of the Society's fellowship would also bear further study, particularly the role of the 'middling sort'. The 'middling sort' is a term which is still only loosely defined, having been applied to people from the lower ranks of the gentry to better-off tradesmen and craftsmen. Nonetheless, men who fall into even that range of social ranks formed most of the active membership of the Royal Society. Given the impact of political, religious and social factors which determined the establishment of the Society, it would be worth investigating how those same factors attracted such men to this organisation, especially given that many did not conduct any prolonged or in-depth experiments or investigations. Were some attracted to the Society as a kind of 'safe space', much as John Evelyn's model for a college was for him? Did they see the Society as a means of advancing their careers or their livelihoods? How far were they concerned to play a role for the public good? Given the comparative dearth of clubs and societies begun during the Restoration – although clubbing became enormously popular during the eighteenth century – did the attraction of the Royal Society lay more in the opportunities it provided to socialise with likeminded people, people who were intent on personal improvement as much as societal improvement? Was it truly merely a fashionable diversion in which many lost interest as other leisure activities became attractive? The diverse nature of the Royal

Society's membership, however the people of the 'middling sort' are defined, provides an excellent opportunity to discover just what the attraction was for so many men.

Finally, the institutional conundrum posed by the Royal Society raises questions about the early modern definition of a public institution. The attitudes and expectations of people in England towards a range of public institutions had begun to change even before the Restoration. The Royal Society certainly represented a departure as a public institution, given its origins as a private voluntary association. However, its charter did not create an institution that was truly 'public', and yet perhaps this signalled a change which led to more and more spheres of activity warranting the creation of a new type of public institution. For instance, the Royal Observatory is an example of an institution founded not to regulate or control public activity but to discover new knowledge for the benefit of the government and the country. Similarly, Thomas Sprat advocated the founding of academies for the 'improvement' of the English language and to produce the history of the English civil war. [2] Sprat suggested these academies as being based on the French models which had been established under the absolute monarchy of Louis XIV. There is a possibility here that there was a role for the government in further controlling knowledge and information, beyond enforcing the rules of the Licensing Act. Similarly, Charles and especially the Earl of Clarendon became increasingly concerned at the role of coffeehouses as providing a space for potentially dangerous republican and dissenting ideas to be shared and disseminated. Would the foundation of kinds of 'knowledge academies' provide the government with more control over its populace? William Petty's 'political economy' which was related to the concept of improvement, was based on the premise that the government would function more efficiently if it had as complete a knowledge of the state of the country as possible. Do these institutions, including the Royal Society, form part of a kind of 'knowledge economy' tied to the greater prosperity of the English nation?

Whatever direction the research into the early Royal Society takes, the most important aspect of that research will be to demonstrate that it is an organisation which bears further scrutiny, not only from historians and social historians of science, but also

[2] Thomas Sprat, *The History of the Royal Society of London For the Improving of Natural Knowledge*, 3rd ed. (London, 1722), pp. 40 – 44.

social and political historians of the Restoration. The challenges that the organisation faced, despite its success in convincing the monarch of the importance of its experimental philosophy, at times almost overwhelmed the fledgling institution. Its survival even in its most difficult periods suggests a more profound interest of its fellows in ensuring its success. Whether the founding and early fellows had the foresight to comprehend the profound importance of their activities to future generations or whether they were content to look no further than their present enjoyment, the men of the Royal Society cannot have envisaged the continuing success of their organisation, and its contribution to the creation and dissemination of scientific knowledge. However, its significance as an institution of the Restoration extends beyond science and into the wider history of a turbulent period in early modern English history.

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