

Preface

Notwithstanding some skepticism on the subject, few would disagree with the assertion that if there was ever a transformation in science which deserved the name revolution, that which occurred in seventeenth-century science was it. More so even than the one that took place in the first three decades of the twentieth century, or that wrought by Darwin. It may not have looked like a revolution to those participating in it, but that kind of perspective requires historical distance.

In any event, the last two decades have seen Robert Hooke rise from almost total obscurity to the point that he is nearly *fashionable*, something that would have been unimaginable not so very long ago. Much of this has resulted from tercentenary enthusiasm attending the anniversary of his death, which was celebrated in 2003,¹⁾ though it had its beginnings early in the last century, notably at the 300th anniversary of his birth in 1635, an example of how the ebb and flow of reputations has too often turned on such insubstantial accidents of chronology. On the other hand, and a bit ironically, some of this new appreciation of Hooke's place in seventeenth-century science came out of a recognition that the hero-worship with which Newton was treated during much of the twentieth century was distinctly uncritical. The best example, perhaps, is a conference held at the Royal Society in the summer of 1988, only a year after the monumental celebration of the 300th anniversary of the *Principia*.²⁾

Hooke's first biographer, Margaret 'Espinasse, published her account of his life and work in 1956, more than three centuries after his birth. This remained the only life of Hooke for over 40 years, but two ambitious and detailed biographies, by Stephen Inwood and Lisa Jardine, appeared in 2003–4,³⁾ and several other studies were published in the same period, including an excellent scientific biography by Alan Chapman and a detailed study of Hooke's role in the rebuilding of London after the fire by Michael Cooper.⁴⁾ The result is that the public is slowly learning something about the man, and even something of his science.

The evidence of Hooke's role in the Royal Society has always been present in its archives, but these were available only to scholars and little use was made of them. Hooke's importance was made abundantly clear in Thomas Birch's distillation of the journals of the Society for 1660–1687, published as the *History of the Royal Society of London* in 1756,⁵⁾ but by the late nineteenth and early twentieth century *Birch* was also hard to find. Birch's work, which was a transcription of the first quarter-century or so of the journals of the Society, and which therefore displays Hooke's contri-

butions on virtually every page, was published only 28 years after Newton's death, but Hooke had been dead over a half-century and had already been largely forgotten. Forgotten or not, *Birch* revealed Hooke's central role in those formative years of what was for all practical purposes the world's first scientific society. By the twentieth century, with *Birch* residing in rare book rooms, the process of reviving Hooke's reputation was a painfully slow one, stimulated by the recovery of his fascinating *Diary* and its publication in 1935, the advocacy of a few Hooke partisans, and, after the war, the 'Espinasse biography and the reprinting of *Birch* in 1968. Its wider availability has made Hooke's critical role in the Society much more accessible and evident, even though the work summarizes Society meetings only through 1687, more than fifteen years before his death.

As we proceed, we will generally assume that when Birch quotes from the *Journal Book* of the Society, he does so accurately. While this is not absolutely true, it is very nearly so; omissions and errors are infrequent and not generally significant. In many or most cases I have checked *Birch* against the original. Of course the Secretary may not have accurately represented all discussions which took place, but we have no way of knowing.⁶⁾

The impending tercentenary of Hooke's birth (1935) not only saw publication of the best known part of his *Diary*, but his championing by Robert Gunther, who devoted four volumes of his *Early Science in Oxford* to "that Oxonian, Robert Hooke". By the time Gunther published his Volume X, which contained Hooke's less famous later *Diary*, describing his activities between 1688 and 1693, Europe was on the verge of war. Gunther also reprinted all of Hooke's published Cutler Lectures in facsimile, again making them generally available for the first time.

As England recovered after the war, interest in Hooke was revived by E.N. Da C. Andrade's Wilkins Lecture to the Royal Society in 1948 (see Chapter 1) which revealed to a wider scientific audience Hooke's role in the founding of early modern science. 'Espinasse's account of his life and work was published in the next decade, and when Birch's *History* was reprinted, finally making it widely available, it exhibited once and for all Hooke's essential role in the early history of the Society and his important place in the early scientific revolution. Yet little was written about him in the following three decades until Ellen Tan Drake wrote extensively of his role in founding the science of geology, in 1996.

The last 30 years have largely been devoted to the absorption of this material. This has gradually led to a new understanding of Hooke's role in the formative first four decades of the Royal Society, and of Hooke the human being. As other resources have become available, including Turnbull's Newton correspondence (1959) and the discovery of some of Hooke's dynamical manuscripts and their decipherment, his importance as a dynamicist and the influence he had on Newton and the *Principia* have had to be reevaluated. Finally, work by architectural historians and students of the rebuilding of the City of London after the fire, especially by Michael Cooper, and fleshed out by innumerable *Diary* entries, have made clear Hooke's place as one of Restoration London's most important architects, and a major force in rebuilding the City.

But for most of the twentieth century Hooke has been ignored – indeed, it could be said that Hooke’s eclipse *has been his identity* (to paraphrase Adam Gopnik). At best he has been represented only by a cartoon image which emphasized his supposed quarrelsome nature and outsized claims. The same might be said of the two centuries that followed 1703, as his death, the passing of his friends and colleagues, especially Boyle (1691) and Wren (1723), Newton’s ascendancy in the Royal Society (he was its president from Hooke’s death until 1727), and most importantly, the triumph of Newton’s method, led to a swift decline in Hooke’s reputation, and eventually to his being forgotten altogether. Little remained other than his masterpiece, *Micrographia*, and the law of elasticity, “Hooke’s Law,” which is all that most physicists, who should know him best, know of him.⁷⁾

Two major forces shaped Hooke’s professional life. One, the Great Fire of London, in 1666, pushed him into a career of surveying, construction, and architecture that spanned a quarter-century, gained him prestige, partnership with Wren, and as it turned out, wealth. The other, the founding of the Royal Society in 1660, his employment as its Curator three years later, and the 40 years of service he gave to what was the central commitment of his life, is the principal focus of this book. For Hooke’s early role in the Society, there was no model, no precedent. He was, effectively, the first of a breed, the professional scientist,⁸⁾ paid for his services as an experimental scientist or philosopher.

As will become evident, the Royal Society of London, perhaps still the world’s most prestigious scientific institution, would very likely have foundered without Hooke’s contributions to it over four decades. Initially it would be the experiments he was charged to bring in at every weekly meeting that provided the Society’s *raison d’être*, and later, his lectures on pneumatics, microscopy, gravitation, comets, and, more broadly, natural philosophy, which gave the Society some intellectual coherence, especially as Boyle’s health declined and Wren’s attention was diverted elsewhere. The story of the Society’s founding and its early struggles to survive as essentially the world’s first scientific institution is told in many places, but what has not been described in detail, at least until very recently, is Hooke’s critical role in the Society’s formative early years and, in turn, its role in his rich and complex life.

Hooke, almost by default, became one of the most important figures in the process of institutionalization of science, which began with the founding of the Society in 1660. The same can be said of Henry Oldenburg, the Society’s long-time secretary, who while not personally involved in the discoveries of Society members and the discourses which characterized its meetings, patiently tended to the Society’s correspondence, and almost personally made it an international society, with foreign members and correspondents who included Huygens, Leibniz, Spinoza, Hevelius, Cassini, and others. This work for the Society is enshrined in the thirteen volumes of Oldenburg’s correspondence, almost all on scientific matters, compiled by Rupert and Marie Boas Hall. As the Halls put it, «To foreigners it was Henry Oldenburg who represented the Royal Society ...»⁹⁾ There is a certain irony in the fact that the two men who more than anyone else kept the Royal Society alive in its first two decades, Hooke and Oldenburg, ended up as bitter enemies.¹⁰⁾

Hooke had a dual role in the early years of the Society, initially as a young employee with great promise but no status, and soon in a role which gradually grew so that by his early 30s he had become the most important source of insights into the many problems in natural philosophy which came before the Society.

Much of what we know of Hooke comes from his rich and fascinating *Diary* which he kept, off and on, from his 30s into his mid-50s. The first and most important part of the *Diary* was lost for two centuries, which means that our understanding of who Hooke was is relatively recent, helping to explain why he faded so completely from view during the eighteenth and nineteenth centuries, when essentially nothing was written about him. The diaries are among the most valuable resources available to scholars trying to understand Restoration natural philosophy and the role of the Royal Society in English science, and as we try to flesh out a picture of Hooke from his own words, these sketchy and telegraphic memoranda – fascinating, provocative, maddingly incomplete – are our raw material. They make it possible for us to trace his daily activities and give us some insight into his inner life. They also tell us much about his relationship to the Royal Society, supplementing what we learn from its journals, but these brief and hasty jottings raise as many questions as they answer. Yet in their daily entries and private purpose, the diaries reveal Hooke the human being in his most unguarded moments.¹¹⁾

To supplement the *Diary* and to provide much-needed context, it is especially crucial in Hooke's case, with his complex and rich human interactions and his dealings with people of all stations, to consult the lives of his colleagues and contemporaries Wren, Boyle, Halley, Wilkins, Oldenburg, and others, in England and on the continent, and to read their correspondence, where available.¹²⁾ And to get a feel for the period and the London in which Hooke lived, a city in which the plague still raged, and which burned in the Great Fire of 1666, one can do no better than the admittedly Proustian task of reading through the diary of his friend Samuel Pepys.¹³⁾

The quintet of contemporaries, Boyle, Wren, Newton, Halley, and Hooke, epitomize much of Restoration science. Hooke was important in the lives of each of the others, and a close friend of all but Newton. Unlike Newton, whose massive correspondence has been edited by Turnbull and others¹⁴⁾ (and which includes important exchanges with Hooke), Hooke, as a creature of London, had little need for epistolary relationships, with the result that his correspondence is meager and uncollected. But because he attended virtually every Royal Society meeting for nearly 40 years, the archives of the Society tell us an enormous amount about his scientific career. Nonetheless, and despite recent interest in Hooke, very little has been added to the record of his life and work since shortly after his death, the main exceptions being the recovery of the early *Diary* in 1891, the patient combing of the archives of the City of London by Michael Cooper, the recent realization of the importance of some of Hooke's dynamical manuscripts, and an unexpected discovery in 2006 of a cache of his notes and letters which created a firestorm of publicity and the sale of the documents for close to \$1M.¹⁵⁾ This major and thoroughly unexpected discovery keeps alive the hope that unknown papers may yet be found. In what follows, we will

make use of the so-called “Hooke Folio” to shed light on some lacunae in the Society archives and the resultant controversies which have lain unresolved for 300 years.

An unexpected consequence of this interest in Hooke’s science is that his important contribution to the architecture of the City of London is finally and belatedly being recognized as well. These two sides of Hooke’s creativity, his natural philosophy and his architecture, are, of course, of a piece, and yet we can never know precisely how he saw his own career and how these activities, those of scientist and Curator of the Royal Society, and those of the surveyor, architect, creator of codes and practices, etc., contributed to his personal identity.

Finally, a note on calendrical matters. The Gregorian Reform took place in England only in 1752, so that all dates will be given in the Julian or Old Style. However, the reader will not have to be reminded that the Catholic countries, France, Italy, and Spain, had been using the Gregorian calendar since 1582. In the seventeenth century, the difference between the two calendars was 10 days, so that 8 August 1671 O.S. would be 18 August 1671 N.S. As another example, Hooke noted in his *Diary* for 10 December 1688, «Shortest Day.», whereas in France the winter solstice was celebrated on 20 December. With the turn of the century, the difference grew to 11 days (after 29 February 1699/1700 O.S.). Where confusion might result, we will offer the reader some guidance. With apology, we will use the somewhat cumbersome 1672/3 for dates in 1673 between January 1 and March 25, since one will encounter that usage almost everywhere in documents from the time, e.g., Hooke’s *Diaries*, Birch’s *History of the Royal Society of London*, etc. The new year began on 25 March, essentially the vernal equinox. Occasionally we will be unable to resist the modest anachronism of speaking of, say, Christmas 1687, as being at «the end of 1687,» and for that inconsistency, we offer in advance an apology. We note that Hooke died on 3 March 1702/3, so that it would not be incorrect to say either that he died in 1702 or 1703. Nonetheless, 3 March 2003 was the 300th anniversary of Hooke’s death.

When all is said and done, it is not the job of the historian to take sides, but rather to describe and interpret what transpired, to the best of one’s ability. In Hooke’s case it is sometimes difficult to maintain this level of objectivity, for reasons alluded to above and which will become obvious. But in the end, the reader will have to come to his own opinion about the very complex character and life of Robert Hooke.

Annotations

- 1) Conferences were held at the Royal Society and in Oxford in the tercentennial year of 2003. The volumes which emerged from those gatherings, Cooper and Hunter (2005) and Kent and Chapman (2005), contain many interesting and detailed papers on aspects of Hooke's life and his science. Some of these will be referenced in the text.
- 2) The 1987 celebrations also provided the genesis of the author's interest in Hooke. See Durham and Purrington, 1989.
- 3) Inwood (2003), Jardine (2004). There is much interesting detail in these studies which is outside the scope of the present work.
- 4) Cooper, 2003.
- 5) Birch painstakingly recounts the activities at every meeting of the Society and of its Council, often giving the full text of a paper delivered by a member.
- 6) The draft minutes from Oldenburg's tenure do exist and now (2006) we have Hooke's raw minutes which have been recovered after over 300 years.
- 7) To the question of *why* Hooke descended into obscurity in the century after his death, various answers have been given, and we address some of these below. One, clearly, is the triumph of Newton's method, as Hooke's Baconian principles were passing out of favor. The eighteenth century saw the widespread application of Newton's techniques, manifested most clearly in the mathematical physics of Euler, Laplace, Lagrange, and others. Newton's ire may or may not have been another factor. The nineteenth century saw the formulation of thermodynamics and electromagnetism, fields of which the seventeenth century was only dimly aware, and in which Hooke could play only the smallest role. One could say that Hooke's influence was felt primarily on Newton, and in what we might think of as peripheral scientific fields, geology and biology.
- 8) Hooke was, indeed, in a very real sense the first professional scientist. In assenting to this title, however, Michael Cooper has predicted some will object to "professional," some to "scientist," some to "first," and perhaps even to "the."
- 9) *CHO*, Volume X, p. xxvii.
- 10) There is an important new biography of Oldenburg by Marie Boas Hall: M.B. Hall (2002).
- 11) Here we refer to the first of Hooke's diaries, or at least the earliest extant part. We examine the diaries in Chapter 2, but suffice it to say at this point that the first *Diary* begins on March 10, 1672, with no fanfare at all – mainly recounting meteorological observations for the first 10 months – and comes to an inauspicious ending, largely through neglect, in May 1683, being continuous only up to about the end of 1680 – which is what Adams and Robinson published. Whether the diaries are parts of a more or less continuous whole, or whether we have all of what Hooke wrote, we will likely never know.

- 12) The Boyle correspondence has been recently published by Michael Hunter, et al. (Hunter, Clericuzio and Principe, 2001). Previously one had to resort to Birch's collection in *The Life and Works of the Honorable Robert Boyle*, 6 vols., London, 1772. Even more relevant to this narrative is the massive correspondence of the Society's long-time secretary, Henry Oldenburg, *The Correspondence of Henry Oldenburg*, in 13 volumes, edited by Rupert and Marie Boas Hall (1965–86). There are new biographies of Wren (Lisa Jardine) and Halley (Allan Cook); see the bibliography.
- 13) Though the literature on Restoration and Augustan England is vast.
- 14) Turnbull, et al. (1959)
- 15) Michael Cooper's patient scouring of the records of the City of London and its many parishes, showing precisely Hooke's role in rebuilding the City after the fire, is especially notable. Some of the work will be cited below, but see Cooper on Hooke's surveying work for the City of London (Cooper, 1997, 1998a, 1998b, 2000, 2003). Hooke's crucial dynamical paper is discussed in Chapter 10. The recently discovered Hooke manuscripts were obtained for the Royal Society at a cost of \$940,000, about half of which was provided by the Wellcome Trust. The implications of this collection for our understanding of Hooke and his work will be discussed in due course.



<http://www.springer.com/978-3-0346-0036-1>

The First Professional Scientist
Robert Hooke and the Royal Society of London
Purrington, R.D.
2009, XIX, 283 p., Hardcover
ISBN: 978-3-0346-0036-1
A product of Birkhäuser Basel