

## REPORT

### The return of the Hooke folio

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It was one of those discoveries that historians of science dream of.

At the end of a routine valuation visit to a country house in Hampshire, in January 2006, an auction-house representative already had his coat on to leave when the owner produced a battered box of papers. They had been sitting at the back of a cupboard for years; they were probably not of any interest or value. Among the old playbills and sheet music, alongside some letters and documents relating to the life of the seventeenth-century naturalist and taxonomist John Ray, was a bulky book in an eighteenth-century calf-backed binding, made up of handwritten notes, mounted on stubs and sewn into gatherings. The valuer judged it important.

Further examination revealed that what had come to light was a body of long-lost work by the seventeenth-century experimentalist, astronomer, microscopist, engineer, architect and surveyor, Robert Hooke, from the period when he served as the Royal Society's Secretary, after the death of Henry Oldenburg in 1677. A public appeal was launched by the President of the Royal Society to secure funds to acquire the 'Hooke folio'. At the end of March 2006 the Society was successful in purchasing the manuscript and returning it to its archives.

The Hooke folio (figure 1) consists of two bodies of original manuscript materials, both in Hooke's distinctive hand. William Derham, Hooke's posthumous editor, has made out an index to the folio in two loose gatherings (from which it appears that it has remained intact from his day to this), and has annotated it throughout. He has headed the first leaf: 'Dr Hookes Extracts out of the Journal-Books of the R.S. for his own private use'.

The first hundred pages do indeed comprise detailed notes taken by Hooke out of the Royal Society's records, after the death of the first Secretary of the Society, Henry Oldenburg. Convinced that Oldenburg had actively hindered his attempts to gain international acknowledgement for his contributions to key scientific fields, Hooke trawled through the Society's Journal Books transcribing evidence that he believed would prove his priority in such matters as the use of a spring to regulate a pocket-watch, and his innovative experimental work in microscopy. Sometimes he doubled back on himself, and scrutinized and excerpted again from a period already trawled. Drawing on both Oldenburg's rough notes and the fair copies of minutes of meetings, Hooke annotated with brusque candour his transcriptions of large sections with his views of what he found in the records.

Personal interjections of Hooke's own pepper his transcriptions, as he tracks the interference of Oldenburg (whom he had both disliked and mistrusted) with the records.

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Figure 1. The Hooke folio. (Copyright © the Royal Society.)

'From this [April 1675] to Oldenburg's death in 77 he did me all the mischief he could'. Or against a vague reference to an experiment performed by Hooke: 'The dog has entred nothing but left a blank'. And although we all believed that the one person Hooke never quarrelled with was his old patron, the 'Father of Modern Chemistry', Robert Boyle, even he does not escape a tongue-lashing. Against an entry describing a plan by Boyle for a systematic presentation of the whole of natural history, Hooke has scribbled irritably: 'stolen from me'.

In her biography of Oldenburg, Marie Boas Hall describes how Hooke waited impatiently for the trunk of Oldenburg's papers to be returned to the Royal Society after Oldenburg's death. Once they arrived, Hooke

promptly opened the trunk and spent much time thereafter 'examining' and 'cataloguing' the papers, hunting for anything which might indicate the betrayal, as he saw it, of his ideas by Oldenburg or, earlier, Moray to Huygens and/or Hevelius and copying out anything which suggested they had so 'betrayed' him. ... In the first half of 1678 Hooke continued to scabble through the papers, to sort and list them, to sift out and copy those relating to himself, as he noted in his diary from time to time. No remains of all this activity survive, neither the transcripts nor the catalogues, which disappeared along with Hooke's other private papers.<sup>1</sup>

These are the papers now retrieved in the first section of the Hooke folio.

Among these is probably the most telling of all Hooke's obsessions about the way in which Oldenburg had, in his view, damaged his scientific reputation. Concerning this, there are two crucial pieces of paper bound in at the appropriate point in the first section of the Hooke folio, both of them in Oldenburg's hand, removed by Hooke from his predecessor's original drafts of the minutes.

The first insert is Oldenburg's minute for 28 February 1666/7:

The circular pendulum designed for an equal motion with unequal weights being again spoken of, the president affirmed, that though the inventor Mr. Hooke had demonstrated, that the bullet of the circular pendulum, if it can be always kept rising or falling in a parabola, will kept its circular motion in the same time; yet he had not demonstrated, that the diameter of the parabola from the point of contact in the curve to the vertex of the diameter is equal to that portion of the curve from the said point of contact to the vertex of the same curve, *plus* half the *latus rectum* or *plus* double the focus of the parabola.

June 16. 70.  
 No meeting.

June 23. 70.  
 The Curator produced a <sup>pocket-</sup>watch of a new contrivance devised  
 by himself, and he affirmed should goe as equally as a pocket  
 watch, and ~~not stoppage~~ <sup>and</sup> without stoppage, and might be made  
 to goe 10. days. ~~The contrivance was this~~ <sup>The contrivance was this</sup> ~~the~~ ~~contrivance~~ ~~was~~ ~~this~~  
~~with an action of a balance, having only one shadow, and was a circle about it, but both a~~  
~~large balance of a hand, or with a watch in the inside of the hand, which there is a~~  
~~hand~~

Mr R. Boyle made a report, of June 13. 70. he and Mr Hooke  
 had made an observation <sup>by ye North pole</sup> whether there were a differ-  
 ence of ye present Meridian from ye, which was formerly made  
 on the dial in White hall garden. He said, that there ~~was~~ <sup>was</sup> ~~an~~ ~~observation~~  
~~made by the North pole in this manner.~~ <sup>The observation</sup>  
~~was made at 10. country 7. they hang on poles two perpen-~~ <sup>was made</sup>  
~~dicular Staves, with coverd one another and the Star, and~~ <sup>at ye North</sup>  
~~the South-East <sup>edge</sup> of ye dial. The breadth of ye dial~~ <sup>edge</sup>  
~~East <sup>at 17.</sup>~~ <sup>at 17.</sup> that side to the opposite was 4 feet 4. inches; and the place  
 between the two perpendicular Staves was distant <sup>at</sup> from the  
 North-East <sup>edge</sup> of the dial, 3 inches wanting 70. parts, which  
 gives ye length of ye Pole distance Eastward from the Meridian  
 of ye dial. Here ye breadth of ye dial gives the Radius,  
 and the distance of ye Staff between the 2 perpendiculars,  
 gives the Tangent. Then the difference between the dis-  
 tance of ye Staff from the Pole, and the distance of the  
 Staff between the perpendiculars from ye ~~East~~ side of ye  
 dial, gives ye distance of ye dial from the Meridian, if any  
 there be.  
 Mr Hooke having computed it, said, yt ~~ye~~ <sup>ye</sup> by this observa-  
 tion the Meridian of ye dial at White hall did differ ~~and~~  
 one degree from the true Meridian.  
~~Whereupon he whereupon it being considered, that the posi-~~  
~~tion of ye dial having been made by Mr Gunther with~~  
~~it much great exactnes, and having been hitherto esteemed~~  
~~as an authentick one, the Observation was to be repeated~~

Figure 2. Minutes of a meeting dated 23 June 1670, in which the curator produced a pocket-watch. (Copyright © the Royal Society.)

This is verbatim as in the Journal Book, so it is not yet clear why Hooke has chosen to remove Oldenburg's original draft version from the run of his filed minutes in the records at the Royal Society.

The second is Oldenburg's draft minute for the Society meeting of June 23, 1670. Oldenburg's draft minute (figure 2) records that Hooke produced a modified pocket-watch, and is followed by a gap after 'The contrivance was this' into which Hooke has pencilled the precise details of his modifications for Oldenburg (himself no horologist), continuing his text down the left-hand margin. Oldenburg seems to have begun to ink this passage in, but broken off at the end of the first sentence. He subsequently crossed through the entire entry, including the pencil. At some time later the remaining pencil text has been rubbed out.

This filched piece of Oldenburg's draft minutes for the meeting on 23 July runs for four complete pages. On the facing page containing his own extracts, Hooke has transcribed the entry from the Journal Book, and then written: 'NB Oldenburg entred not the 3 last meetings. viz. June 16. 23. & 30. but only this last nonsense...'

In the Journal Book for 23 July 1670 there is no mention of the watch demonstration, just an account of Moray and Hooke observing the meridian at Whitehall. In other words, the whole of this minute, and thus the major part of the meeting, has simply been left out of the RS records. On an earlier occasion, on 27 February 1668, the Italian Lorenzo Magalotti recorded in his diary, with comparable detail, that he had been at a meeting of the Society at which Hooke demonstrated a new pocket-watch. Here again, there is no mention in Oldenburg's official minutes. This new evidence does suggest that Oldenburg—whether accidentally or deliberately—did prevent Hooke from getting his full credit in the matter of balance-spring watches.

By removing the original from among Oldenburg's papers, however, Hooke succeeded in obscuring yet further the history of his involvement with precision timekeepers. Until these papers reappeared, we simply assumed that no records of watch demonstrations existed for this period, and were sceptical about Hooke's claim that Oldenburg had suppressed them.

The other 400 or more pages of the Hooke folio are Hooke's own rough notes of meetings of the Society for the period 1678–83 when he himself was Secretary. Derham has once again labelled these correctly: 'From Oct: 25. 1677. Mr Oldenb: being dead, & H. in his place, these Papers I conceive were Hook's Rough draught Minutes taken at the Meetings of R.S. & transcribed into the Journal fair'.

At a number of crucial points these draft minutes are fuller and more detailed than the official transcriptions into the Journal Books made by the scribes whose weekly job it was to produce a tidy account for the record. At least one long passage relating to the microscopist Anton van Leeuwenhoek's discovery of protozoa in pepper-water is missing entirely from the 'official' records. Taken together, here is a veritable treasure-trove of freshly contextualized information about the day-to-day activities of the early Royal Society.

Since the Hooke folio has returned to the Royal Society, we have had leisure to examine both it and the associated records safely stored in the Society's strongroom. It is therefore possible to explain how the recovered documents in the second half of the folio—the draft minutes of Society and Council meetings, covering the period from January 1678 to November 1683 during which Hooke was Secretary—dovetail with the existing records.

We should begin by reporting that record-keeping was clearly not one of Hooke's many and varied talents. He begins well, taking clear minutes of proceedings, and passing them regularly, on Thursday mornings, to the scribes for fair-copying into the formal Journal Books (the details of Hooke's timetabling of his work with the minutes are found in his personal diary). Within months, however, the timetable is slipping, and minutes are not entered weekly as required by the Society's regulations, but held over from week to week. Increasingly Hooke leaves gaps in his notes, with an instruction to the transcriber to consult him for the further materials—detailed descriptions of experiments, sketches of equipment and remarkable materials brought to meetings, and so on.

When we turn to the Journal Books, we find that these gaps were never filled. The same gaps are to be found—sometimes stretching to several pages—in the official fair copy of the minutes. Clearly Hooke never provided the necessary additional papers and illustrations. There are larger gaps too, where it seems Hooke provided no draft minutes at all, for example 15 November 1677 to 6 December 1677, where minutes from two entire meetings are missing.

As well as the minutes, the Secretary was responsible for transferring to the Register Book all papers read at Society meetings. Here Hooke failed in his duties almost entirely. There are no papers entered at all between Hooke's starting date as Secretary and early 1680. A few experiments (mostly Hooke's own) are transcribed between January and March 1680. One of these is a paper submitted by the Astronomer Royal John Flamsteed on 'the variation of the [compass] needle', the original of which is among the papers recovered in the Hooke folio. From 25 March 1680 to the termination of Hooke's period as Secretary there are no entries at all in the Register Book. Entries begin again on 12 December 1683, when Aston and Plot took over as Secretaries, after Hooke's removal from the post by the Council.

The most striking piece of evidence in the existing records relating to the Hooke folio, however, is in the bound volumes of secretarial draft minutes. An almost complete run of Henry Oldenburg's draft minutes is preserved in the Society's archives, bound up on stubs in matching volumes. When the binder came to Hooke's period of office and found the 400 pages of his minutes missing, he left a suitable number of stubs empty in case they should ever reappear. Binding began again as usual with the new secretarial era in December 1683. Nothing more vividly captures the way the Hooke folio completes the early Royal Society records than the thick wadge of empty stubs—waiting for their documents—comprising most of volume MS 559 and the beginning of MS 560 of the draft minutes.

It was in the end the Wellcome Trust that helped the President and Fellows of the Royal Society to pull off that last-minute rescue. But the 145 individual pledges that had been received from Fellows and members of the public certainly helped make up the Wellcome's mind to lend its financial support. Those of us for whom the Hooke folio will help provide the answer to vitally important historical questions are eternally grateful. So, too, are the general public, who will eventually be able to see the book themselves and to examine it in detail online once it has been digitized and transcribed. That process is already under way.

The Hooke folio is surely the most important manuscript discovery connected with the early Royal Society of the past 50 years. It is hard to describe to those who do not spend their lives handling and studying the residue of original manuscripts and documents on which the narrative of history is constructed, the feeling of elation and excitement one has in handling a new and unknown collection of documents such as this. On almost every page one finds some spontaneous comment, or some vital piece of information not contained in the familiar archives.

The Hooke folio is a crucial missing piece in a historical jigsaw puzzle, completing a run of seventeenth-century documents, and enabling us to bring back to life the early history of the Royal Society.

#### NOTE

- 1 M. Boas Hall, *Henry Oldenburg: shaping the Royal Society* (Oxford University Press, 2002), pp. 306–307.