# Early Biographies of Isaac Newton, 1660–1885

## Eighteenth-Century Biography of Isaac Newton: The Unpublished Manuscripts and Early Texts

Edited by
Rob Iliffe

ROUTLEDGE

# EARLY BIOGRAPHIES OF ISAAC NEWTON
## 1660–1885

*General Editors*
Rob Iliffe
Milo Keynes
Rebekah Higgitt

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Eighteenth-Century Biography of Isaac Newton:
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# EARLY BIOGRAPHIES OF ISAAC NEWTON 1660–1885

Volume 1

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*Edited by*

Rob Iliffe

*Preface by*

Milo Keynes

Routledge
Taylor & Francis Group
LONDON AND NEW YORK

First published 2006 by Pickering & Chatto (Publishers) Limited

Published 2016 by Routledge
2 Park Square, Milton Park, Abingdon, Oxon OX14 4RN
711 Third Avenue, New York, NY 10017, USA

*Routledge is an imprint of the Taylor & Francis Group, an informa business*



BRITISH LIBRARY CATALOGUING IN PUBLICATION DATA
Early biographies of Isaac Newton, 1660–1885
1. Newton, Isaac, Sir, 1642–1727 2. Newton, Isaac, Sir, 1642–1727 – Manuscripts 3. Newton, Isaac, Sir, 1642–1727 – Biography 4. Physicists – Great Britain – Biography 5. Science – History – 17th century 6. Science – History – 18th century
I. Iliffe, Rob II. Keynes, Milo III. Higgitt, Rebekah
530'.092

ISBN-13: 978-1-85196-778-0 (set)

New material typeset by
P&C

DOI: 10.4324/9781003551379

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# PREFACE

L'Académie Royale des Sciences de Paris, founded in 1666, was reformed by Louis XIV in 1699, the year that Newton was elected *associé étranger*. In 1727 it fell to Bernard de Fontenelle, *secrétaire-perpétuel*, to deliver his 'Éloge'.[1] This he built up from his understanding of the *Principia*, the *Commercium Epistolicum* and other writings, but also after he had asked John Conduitt to give him details of Newton's family and personal life. The memoir in French that Conduitt finally sent him naturally included information from Catherine Barton, Newton's half-niece whom Conduitt had married in 1717, but also from four letters about Newton's early years sent by William Stukeley to Dr Richard Mead at Conduitt's request.

Conduitt told Fontenelle that he was himself preparing a 'Life' of Newton but, despite gathering further biographical material, he only left various drafts of it when he died in 1737. Conduitt's papers, as well as quantities of Newton's manuscripts, passed to his daughter Kitty, who married into the Earl of Portsmouth's family in 1740, and remained largely unused for many years. They were sold at Sotheby's in 1936 and, with one important exception, were acquired by John Maynard Keynes, providing the source for his essay, 'Newton, the Man'.[2] This was completed in London for a 1942 celebration of the tercentenary of Newton's birth, not held until 1946 after the end of World War II. To add a personal note, after my uncle had finished writing his essay his collection of Conduitt papers was kept in a suitcase under my bed in the country to save it from possible bombing in London. This started an interest in Newton and, as a medical historian, my authorship of a paper on his personality.[3] The need for a reliable iconography[4] then became apparent, as did the need for the present two volumes.

1 Bernard le Bovyer de Fontenelle, *Éloge de Monsieur le Chevalier Newton* (Paris, 1727).

2 John Maynard Keynes, 'Newton, the Man' in *The Royal Society Newton Tercentenary Celebrations, July 1946* (Cambridge, Cambridge University Press, 1947), pp. 27–34.

3 Milo Keynes, 'The Personality of Isaac Newton', *Notes and Records of the Royal Society*, 49 (1995), pp. 1–56.

4 Milo Keynes, *The Iconography of Sir Isaac Newton to 1800* (Woodbridge, Suffolk, The Boydell Press, 2005).

After obtaining copies of his four 1727 letters at the time of John Conduitt's death, William Stukeley did not touch the subject of Newton's life until 1752, when he wrote his 'Memoirs'. These 'Memoirs' remained in his family archive until being sold in 1931, when Hastings White used them in compiling an edition.[5] They appear in this volume, alongside Conduitt's de Moivre memorandum, the item that Keynes failed to acquire in 1936. The rest of the Conduitt papers are also published here, for the first time, along with Fontenelle's 'Éloge' in a 1728 translation and views of Newton by John Flamsteed, William Stukeley Henry Pemberton and William Whiston.

After Fontenelle's 'Éloge' the additions to published accounts of Newton's personal life were sparse until J. B. Biot's entry on him appeared in the *Biographie universelle* in 1822.[6] In this he claimed that Newton's intellect had been permanently weakened as a result of his '*dérangement d'esprit*'; when he had fallen into a '*frénésie*', that is, was insane, in 1692. As discussed in Volume 2, where an English translation of 1829 is reproduced, Biot had obtained this disputable revelation from seeing entries in Christiaan Huygens's *Journal* of 1694.[7] In total twelve articles and essays from between 1822 and 1885 are reproduced in Volume 2, all reflecting on, or contributing to, a changed image of Newton from that of the eighteenth century.

Milo Keynes

5 William Stukeley, *Memoirs of Sir Isaac Newton's Life*, ed. A. Hastings White (London, Taylor and Francis, 1936).

6 Jean-Baptiste Biot, 'Newton (Isaac)' in *Biographie universelle, ancienne et moderne*, 53 vols (Paris, L. G. Michaud, Libraire-Editeur, 1811–28), vol. 31 (1822), pp. 127–94.

7 Christiaan Huygens, 'Journal of Christiaan Huygens, 29 May and 8 June, 1694' in *Oeuvres complètes*, 22 vols (The Hague, M. Nijhoff, 1888–1950), vol. 10, pp. 616, 618.

# ACKNOWLEDGEMENTS

For help given during the course of the of this book, I would like to thank Raquel Delgado-Moreira, Mike Hawkins, Adam Perkins, Rebekah Higgitt, John Young, Sarah Dry, Andy Warwick, Karen Peters, Joanna Corden, Deborah Bircham, Susan Summerfield, Julie Wilson, Milo Keynes, Ros Moad, Serafina Cuomo, Niccolo Guiccardini, David McGee and Dolores Iorizzo.

The initial transcription of the Conduitt manuscripts was performed by Rebekah Higgitt and John Young under the aegis of the Newton Project, although responsibility for the final state of the texts is mine. Richard Westfall's transliteration of the Fitzwilliam Museum shorthand confessions is reproduced by permission of the Royal Society.

# INTRODUCTION

## 'Pluralities of Himself': Eighteenth-Century Manuscript Writings on Newton

Isaac Newton has been the subject of universal fascination ever since his rise to fame in the late seventeenth century. Along with Charles Darwin and Albert Einstein, he is the archetypal scientist – other-worldly, brilliant and dedicated. Perhaps even more than his fellows, what is known about Newton through anecdote and printed account has come to define what it means to be a scientist or, more accurately before 1800, a 'natural philosopher'. In the decades after his death, the picture of Newton was fractured. For most, he was a uniquely virtuous and singularly gifted man, who had laid the foundations (and built most of the edifice) of a natural philosophy that was both experimental and mathematical. Like his approach to philosophy, many features of his life and works were worthy of imitation, yet other aspects were more peculiar. He was known and celebrated for being a severe and eccentric scholar, who was notoriously neglectful of the ordinary demands of living. Moreover, in the first half of his career at least, he had existed practically as a recluse within the walls of Trinity College Cambridge. Nor was his intellectual legacy straightforward. There was substantial disagreement over whether he believed that light and gravity could be explained by means of aethers or by forces that acted at a distance. Equally problematic was the question of his religious views, and whether he was doctrinally orthodox or deeply heretical. Anti-clerical *philosophes* even suggested that his theological studies were a mere hobby or even the result of senility, carried out after his creative energies had dissipated.[1]

1 For eighteenth-century efforts to come to terms with many of these issues, see Richard Yeo, 'Genius, method and morality: images of Newton in Britain, 1760–1860', *Science in Context*, 2 (1988), pp. 157–84; Henry Guerlac, 'Where the statue stood: divergent loyalties to Newton in the eighteenth century' in Earl Wasserman (ed.), *Aspects of the Eighteenth Century* (Baltimore, Johns Hopkins University Press, 1965), pp. 317–54; and Patricia Fara, *Newton: The Making of Genius* (London, Macmillan, 2002).

As the texts reproduced in this volume demonstrate, there was feverish activity to record, describe, explain and praise Newton's life and works in the immediate wake of his death in March 1727. Nevertheless, although Henry Pemberton, Bernard Fontenelle and William Whiston published short accounts of Newton's character and achievements in 1728, the larger projects of John Flamsteed, William Stukeley and John Conduitt remained unpublished in the eighteenth (and the last two in the nineteenth) century. Fontenelle's 'Éloge' of Newton, based to a certain extent on a 'Memoir' sent to him by Conduitt, went through five independent translations into English in 1728, and underpinned all the major English biographies published in the eighteenth century. Weightier tomes appeared sporadically after 1850. David Brewster's *Memoirs of the Life, Writings and Discoveries of Isaac Newton* of 1855 was based on extensive work in relevant archives, and benefited from the substantial amount of new material that had appeared in the public domain in the previous century. This was the dominant biography of Newton until Frank Manuel's *Portrait of Isaac Newton* of 1968, which used insights from the work of psychoanalytical historian Erik Erikson to present a provocative and scholarly account of Newton's psyche. In 1980 Richard S. Westfall published *Never at Rest: A Biography of Isaac Newton*, the most authoritative scholarly biography of Newton at the time of writing this introduction. Like Brewster and Manuel, Westfall's account of Newton's personality is based heavily on the texts reproduced in this volume.

Along with editions of Newton's scientific papers, these biographies have added greatly to our understanding of Newton and his work. As essential sources of reference, the very thoroughness of their use of the manuscripts has often precluded the need for others to consult the original sources. In many cases, secondary works have become wholly derivative of these biographies, echoing the situation (discussed below) in which Fontenelle's 'Éloge' became the basis for other published biographies for nearly a century. It is also extremely unlikely that future biographies of Newton's personality will be able to draw upon a substantial new cache of papers, materials that would have escaped the concerted quest for new sources on Newton over the last two centuries. The presentation in this volume of all the major eighteenth-century sources of evidence relating to Newton's character provides an unprecedented opportunity to re-examine the concerns that shaped the writing of this life following his death. These documents are presented in full for the first time, and are placed in their original social and intellectual contexts.

While Newton was alive, there was no consensus about what constituted an appropriate way of writing a 'life', although there was agreement that only the lives of the great or the godly were worth recording. The most relevant contemporary 'biographer' was the non-juring lawyer and Cartesian

Roger North who, beginning in the 1690s, wrote lives of three of his brothers as well as an account of the theory of such writing (entitled the *General Preface*). Before North, such lives had tended to be exhortations to virtue, or patterns for imitation, and from the mid-1640s they were intensely political, often composed to shed light on the times in which individuals had lived. Authors tended to stress religious beliefs and actions, especially in accounts of Dissenters, and trivial material was seen to be denigratory. North was keenly aware of the moral and political functions of biographies, but in the *General Preface* he urged that lives should be entertaining as well as exemplary, and he argued that life-writers should aim to offer a comprehensive narrative that included the details of the ordinary, private man. For North the ideal life-writer was one who was a friend of the subject and who could display the inner person – whose ethical personality was revealed through his ability to tackle personal or other problems that were thrown in his path. In his own work, he employed numerous anecdotes from the many notebooks in which he had recorded information about his brothers, and he turned the lengthy digression into an art form. These were often on topics in which North himself was interested, such as the new philosophy or music, and many of these were significant works in their own right. For example, one, from the life of his brother John, was a 125-page account of the new philosophy in which Descartes's advances were praised while Newton's dictatorial philosophy was condemned for taking learning back to the Dark Ages.[2]

North's *Life of John North* depicted a slight and unhealthy man whose unhappy and unsuccessful mastership of Trinity College (1677–83) coincided with Newton's most intense research into alchemy and theology. North admitted that his candid depiction of his brother was inconsistent with 'exhibit[ing] the portrait of a great man', but he noted: 'I am not giving the portrait of a perfect man, and whoever pretends so to do is a foul flatterer'. Roger's life of his brother is indeed unremittingly honest about the way that the hard-working scholar fought against his own defects. Ultimately he was condemned by having no relief from his study, unlike Newton, whom John thought would have killed himself if he had not 'wrought with his hands in making experiments'.[3]

The first of the *Lives of the Norths*, that of Francis, did not appear in print until 1742, while those of Dudley and John were published two years later.

2 Roger North, *General Preface and Life of Dr. John North*, ed. Peter Millard (Toronto, University of Toronto Press, 1984), pp. 14–15, 18–19, 27–33, 39–42; see also M. Hunter (ed.), *Robert Boyle by himself and his Friends* (London, W. Pickering, 1994).

3 North, *General Preface*, pp. 144–5, 142, 108; Rob Iliffe, 'Isaac Newton: Lucatello Professor of Mathematics' in Christopher Lawrence and Steven Shapin (eds), *Science Incarnate: Historical Embodiments of Natural Knowledge* (Chicago and London, University of Chicago Press, 1998), pp. 121–55; pp. 127–30.

There were few public models for writing biographies of natural philosophers when Robert Boyle died in 1691, or indeed when Newton died in 1727, and their biographers would be loath to present balanced assessments of their heroes. During the eighteenth century Newton became the first natural philosopher genius and thereafter his life defined what such a person was. He was depicted as someone who had studied himself to near exhaustion while combining the ostensibly incompatible attributes of extreme self-neglect and virtuous equanimity. Some of his apparent personal qualities, such as modesty and his distaste for hypothetical systems, were routinely linked by his followers and were held to have spelled out the proper method and the appropriate ethical demeanour that natural philosophers should adopt. Nevertheless, the notion that his methodology was accessible to everyone was controversial, and Joseph Priestley criticized Newton himself for rendering his own account of his discoveries too obscure. Moreover, many of his contemporaries and followers had pointed to the frankly supernatural quality of his mental abilities, and to the unintelligibility of many of his works. This tension sprang to some extent from Newton himself, for the stories he told about himself frequently pointed to his uniqueness.[4]

When Jean-Baptiste Biot revealed in 1822 that Newton had suffered a breakdown in the early 1690s, the fact was accepted with some difficulty by British commentators but it hardly dented Newton's heroic reputation. As evidence was published in the following years concerning the reaction to this incident by Samuel Pepys and John Locke, it became clear that Newton had come out of the episode with his mental faculties intact. More damagingly, in the 1830s a barrage of evidence emerged in Francis Baily's 1835 edition of the papers of the first Astronomer Royal, John Flamsteed, which at the very least presented a tarnished view of Newton's demeanour. As Rebekah Higgitt shows in the second volume of this work, Newton's supporters now had to try much harder to defend their man. In 1855, for example, Brewster admitted that it was hard to maintain the standard lines to the effect that Newton disdained alchemy, that he was doctrinally an orthodox Anglican and that he behaved with good grace to friend and foe alike. By the end of the twentieth century, the existence of new evidence, different historiographical fashions and a public eager for salacious information about their heroes have all led to a picture of Newton that is radically altered from that portrayed by his Enlightenment and Victorian champions.

4 Steven Shapin, 'The philosopher and the chicken: on the dietetics of disembodied knowledge' in Christopher Lawrence and Steven Shapin (eds), *Science Incarnate: Historical Embodiments of Natural Knowledge* (Chicago and London, University of Chicago Press, 1998), pp. 21–50; Iliffe, 'Lucatello Professor', pp. 131–51; Yeo, 'Genius, method and morality', pp. 261–4; Fara, *Newton: The Making of Genius*.

Substantial primary material from Newton's early years remains in the form of notebooks, and there was a flurry of activity after his death concerned with gathering information about his life and deeds. The vast bulk of anecdotal evidence relating to Newton's life can be attributed, directly or indirectly, to the work of John Conduitt, the man who married Newton's half-niece, Catherine Barton. Indeed, Conduitt orchestrated virtually all the serious artistic and literary representations of Newton after the latter's death, and organized the marshalling of evidence that would help him compose a 'Life' of his great relative. As it turned out, business and other reasons prevented its completion. Unlike the cases of Flamsteed and Stukeley, there has been no edition of Conduitt's biography of Newton, despite many calls for such a publication over the last one and a half centuries. To some extent, this is because it was only in the 1930s that the papers left the care of the Portsmouth family who had owned them for nearly two centuries. They were sold at the 1936 Sotheby sale of Newton's non-scientific writings, and with one important exception were bought by John Maynard Keynes and bequeathed to King's College Cambridge. Although they have been available for scholarly consultation since the 1950s, they have become more widely accessible to historians only as a result of the publication of a microfilm collection of the bulk of Newton's papers in 1991. Most recently, the advent of the online medium as a forum for presenting scholarly materials has enabled all the texts in this volume to be published in their entirety, as part of the Newton Project.[5]

William Stukeley's archive was sold in 1931 and two versions of his 'Memoirs' of Newton (along with an earlier draft of a small part of the text), composed in the summer of 1752, came to the Royal Society. A. Hastings White, a consulting librarian to the Royal Society, used both of these in compiling his edition of the *Memoirs* that appeared in 1936, although the publication is allegedly based solely on the later text. Both manuscript 'Memoirs' were heavily revised by Stukeley and as such could not have formed the basis for an eighteenth-century print publication.[6] In a period when an editor's role was to produce a coherent printed narrative approximating to what the author intended, this also prevented the

5 Conduitt's de Moivre memorandum (this volume, pp. 123–5) was not bought by Keynes at the Sotheby sale, and was known until recently only from a late nineteenth-century transcription made by the committee that examined the 'scientific' portion of the 'Portsmouth' papers between 1872 and 1888. For the history of Newton's papers after he died, see Rob Iliffe, '"A connected system"? The snare of a beautiful hand and the unity of Newton's archive' in Michael Hunter (ed.), *Archives of the Scientific Revolution* (Woodbridge, Suffolk, Boydell Press, 1998), pp. 137–57. The Newton Project website can be found at http://www.newtonproject.ic.ac.uk.

6 William Stukeley, *Memoirs of Sir Isaac Newton's Life*, ed. A. Hastings White (London, Taylor and Francis, 1936), pp. vii, xi.

appearance of any edition of the Conduitt papers. Indeed, these remain too disordered to produce a coherent narrative and they have been presented *in extenso* in this volume with no claim that they represent the exact structure that Conduitt would have intended. As for Flamsteed's suppressed 'Preface' to his *Historia Britannia Coelestis*, Francis Baily's 1835 edition of his papers and correspondence is still useful today, although there are now superior modern versions of the 'Preface' and his correspondence.

The three main texts reproduced here – those by Flamsteed, Conduitt and Stukeley – are far richer than the public, printed representations of Newton that were widely distributed in the eighteenth century. To some extent, the publication of these writings balances the emphasis placed by recent historians on the later, more public representations and appropriations of Newton's character and works over the more immediate, 'private' shaping of his reputation by his disciples. The analysis of the way Newton's status was created and sustained in the late eighteenth and nineteenth centuries is highly significant, and draws attention to Newton's enduring and totemic significance. Nevertheless, his immediate posthumous reputation was to a large extent an achievement that was co-authored by himself and his most favoured acolytes. In particular, although Conduitt's 'Life' of Newton remained private, the dominant eighteenth-century depiction of Newton was sculpted, painted and written by people working under his energetic guidance. Indeed, the influence of Conduitt's work, and especially his 'Life', has been cyclically recurrent. Apart from the fact that he provoked Stukeley into gathering crucial information about Newton in Grantham, and provided the 'Memoir' for Fontenelle that was the basis of the latter's influential 'Éloge', Brewster, Manuel, Westfall and other historians of Newton's life and works have all repeatedly returned to Conduitt's papers.[7]

Unlike the printed accounts of Newton, the manuscript narratives of his life display an evolving and artful process of construction. Although they were 'private' compositions, the hagiographical accounts by Stukeley and Conduitt were collaborative efforts. This introduction and the notes to the texts indicate how, with the exception of Flamsteed's 'Preface', there were intricate connections between the texts reproduced here. Moreover, the Stukeley and in particular the Conduitt texts remain 'incomplete', and the writings show a substantial and fascinating amount of redrafting. This frequently indicates the difficulties inherent in finding the right terms with which to describe and explain the monumental man that they had known. The interest in these texts lies at least partly in the additions and deletions

7 For later representations of Newton see Yeo, 'Genius, method and morality' and Fara, *Newton: The Making of Genius*.

that are lost when later historians excerpt passages for information about Newton, but also in the more personal touches in the narrative, which often say less about Newton than about the author and his project.

With this in mind, it is useful to compare the texts in these volumes with those printed in Rupert Hall's recent *Isaac Newton: Eighteenth Century Perspectives* (1999). Hall reproduces the most significant published English biographies of Newton that appeared before 1800, including Fontenelle's 'Éloge', which was translated in 1728, Thomas Birch's 1738 article on Newton in volume 7 of the *General Dictionary, Historical and Critical*, and the biography that appeared in volume 5 of the 1760 *Biographia Britannica*. Birch reprinted a number of significant letters then in the possession of William Jones (tutor to the son of the Earl of Macclesfield) and some others that were in the Royal Society archives, yet he made no use of them in his text. Moreover, Jones composed for him a lengthy history of Newton's early mathematical development, but this too seems to have been almost wholly ignored. He did draw from Pemberton's 1728 *View of Newton's Philosophy*, and was heavily reliant upon Fontenelle's 'Éloge' – itself based on both the 'Memoir' sent to him in the summer of 1727 by John Conduitt and on the Newton-inspired *Commercium Epistolicum* of 1713. The 1760 biography was much richer, and used a number of published texts of Newton's theology and natural philosophy that had been unavailable to Birch – such as John Colson's 1736 *Method of Fluxions and Infinite Series*, and the 1756 publication of Newton's letters to Richard Bentley (originally exchanged in the early 1690s). Drawing heavily as it did from Birch, for Hall 'it enriched but did not modify the eighteenth century British view of Newton and Newtonianism'. As for the article on Newton by Charles Hutton that first appeared in his *Mathematical and Philosophical Dictionary* in 1795, this does not appear in Hall's collection because it 'contains nothing new, while repeating the conventional mistakes'. Hutton did, however, include the famous anecdote concerning the burning of his papers occasioned by the actions of Newton's dog 'Diamond', and he pointed to the sheer quantity of papers on chronology and church history that Newton had left behind.[8]

8 A. Rupert Hall, *Isaac Newton: Eighteenth Century Perspectives* (Oxford, New York and Tokyo, Oxford University Press, 1999), pp. 76–81, 96–107 (esp. p. 99), 174, 178. Hall also reproduces the *Elogio del Cavalieri Isaaco Newton* by Paolo Frisi, which first appeared in 1778. The Diamond story first surfaced in Thomas Maude's *Wensleydale; or, Rural Contemplations: A Poem* (London, T. Davies, J. Dodsley, B. White, J. Robson and J. Walter, 1780). Jones's account is now Cambridge University Library Add. MS 3960.2; see *The Mathematical Papers of Isaac Newton*, ed. Derek Thomas Whiteside, 8 vols (Cambridge, Cambridge University Press, 1967–81), vol. 8, pp. xx–xxiii; esp. p. xxii, n. 34, for Whiteside's view that the text must have subsequently been acquired by Conduitt. See also the reference to Jones in this volume, p. 173, which conceivably refers to his account.

While these printed biographies of Newton were incestuous, taking little account of new material that was entering the public domain, the private writings were seldom perused. There were efforts to have some of them published. Catherine Conduitt added a codicil to her will in June 1737 in which she asked that a number of Newton's papers might be published, that 'the labour and sincere search of so good a xtian [*sic*] and so great a genius, may not be lost to the world'. Knowledge of the precise whereabouts of Newton's papers seems to have become hazy by the late 1750s although in fact they had come into the possession of the Portsmouth family (the Conduitts' daughter having married the son of the first Lord Portsmouth). Samuel Horsley was one of the few to seek and be given permission to consult the Portsmouth papers in the 1770s, in connection with his edition of Newton's *Opera Omnia* (1779–85), while Edmund Turnor and then David Brewster separately examined the Conduitt papers in the first half of the nineteenth century. Flamsteed's portrayal of Newton was almost completely unknown before Baily published his *Account* in 1835, while Stukeley's material had been published only in a truncated form before Hastings White's edition of his *Memoirs* appeared in 1936. The publication of all these pieces together, along with ancillary texts such as Henry Pemberton's *View of Sir Isaac Newton's Philosophy* and Fontenelle's 'Éloge', constitutes a unique resource for grasping the ways in which Newton and his works were understood in the first half of the eighteenth century. As far as possible, the editor of this volume has tried to avoid passing judgement on how well these texts 'correspond' to some independently determinable, 'real' Newton. Readers can, of course, frame their own hypotheses.[9]

## Newton's Personal Notebooks

Although they are not in any sense biographies of Newton, this edition reproduces the early pocket books in which Newton recorded his expenses,

9 For Catherine Conduitt's will and a letter from Jeffrey Ekins to Joseph Wilcox of March 1757 indicating the general ignorance of the location of Newton's papers, see New College Oxford MS 361.4, ff. 139–42. Ekins had been given a number of theological texts for safe keeping by Arthur Ashley Sykes, to whom Catherine Conduitt had entrusted them with a view to selecting some for publication. David Brewster went to Hurstbourne Park, the seat of the Earl of Portsmouth, in June 1837, see *Memoirs of the Life, Writings and Discoveries of Sir Isaac Newton*, 2 vols (Edinburgh, Thomas Constable, 1855), vol. 1 pp. vii–xii. Francis Baily also had help from Fellowes when he visited Hurstbourne Park in 1834 or 1835, and it may well have been his description of the treasures in the Portsmouth Papers (Baily, *An Account of the Reverend John Flamsteed, the first Astronomer-Royal, compiled from his own Manuscripts, and Other Authentic Documents, Never before Published* (London, The Admiralty, 1835), p. xxi) that prompted Brewster's visit.

including his loans to fellow students. These have always been of immense interest to biographers of Newton, and date from his first trip to Cambridge in the summer of 1661 to the period shortly before he became Lucasian Professor of Mathematics in 1669. Apart from loans and purchases of food, the Trinity College notebook (pp. 1–7) details the books that he bought in his first years as a Cambridge undergraduate, thereby offering a good picture of the sort of texts to which he (and others) were exposed. The Fitzwilliam notebook (pp. 9–14) describes a very different part of Newton's life, namely the few years after 1665 when he made most of his significant discoveries in optics, physics and mathematics. While much of the period between late 1665 and spring 1667 was spent in Lincolnshire because of the plague, from 1667 Newton records purchases of tools and instruments that indicate a burgeoning interest in practical aspects of natural philosophy, and he also began to purchase texts such as Thomas Sprat's *History of the Royal Society* and early issues of the *Philosophical Transactions* (founded in 1665). Despite this, most of the purchases noted for the years 1667–9 reflect the new lifestyle to which he became accustomed when he became first a minor and then a major fellow of Trinity College. The notebook also includes the remarkable list of confessions (pp. 7–9) that Newton wrote out in Sheltonian shorthand in two stages, firstly on Whitsun 1662, and secondly for a short period afterwards.[10]

## John Flamsteed: Newton as 'Friend'

The initial item of biographical material comes from the pen of the first Astronomer Royal, John Flamsteed. Flamsteed came to loathe Newton, and there is no doubt that the latter made it his business to humiliate Flamsteed when their relationship deteriorated in the last few years of the seventeenth century. Unlike Gottfried Leibniz and Robert Hooke, both of whom were on the receiving end of Newton's furious efforts to demolish their credit, Flamsteed wrote numerous remarks on what he took to be Newton's malevolent Machiavellianism, all brought together in the draft 'Preface' to his *Historia Britannia Coelestis* that is reproduced in this volume. In 1835 Francis Baily published this essay for the first time, along with copious corroborating evidence of Newton's unsaintly behaviour as revealed in Flamsteed's correspondence. As many of the texts reproduced

10 The best account of Newton's early period at Cambridge is in Richard S. Westfall, *Never at Rest: A Biography of Isaac Newton* (Cambridge, Cambridge University Press, 1980), while Manuel gives a deeply insightful account of Newton's youthful state of mind in *A Portrait of Isaac Newton* (Cambridge, MA, The Belknap Press, 1968), pp. 23–35, 51–65.

in Volume 2 of this collection show, Newton's defenders justified his behaviour by suggesting that Flamsteed was intellectually inferior, insufferable, and had provoked Newton into many (but not all) of his actions. Modern historians have been much more ready to accept Newton's failings, but have referred repeatedly to Flamsteed's sanctimonious self-righteousness. Nevertheless, whatever Flamsteed's psychological build, his ethical and religious comportment was that of a devout Protestant and he was primed to see his life in terms of a Bunyanesque narrative of a virtuous and godly Christian pitted against the tribulations put in his way by godless backsliders (ironically, a presentation of self close to that adopted by Newton).

Flamsteed was born in August 1646 but, having suffered from a childhood illness, he was forced to leave school in 1662, and thereafter studied mainly at home. Having communicated a prediction of an eclipse to the Royal Society in 1669, he was quickly recognized by the mathematical 'intelligencer' John Collins and the Secretary of the Royal Society, Henry Oldenburg, as an astronomer of immense promise. With the support of patrons such as Sir Jonas Moore, Surveyor General of the King's Ordnance, he became a highly respected astronomer. In London, he briefly lived at Moore's abode in the Tower and, after some discussion about producing an accurate tide-table for Charles II, he became the obvious choice for the position of Astronomer Royal when plans were realized to found a royal observatory on Greenwich Hill in 1675. The fact that he effectively provided all the instruments himself would be a central factor in complicating the already vexed question of who owned the data that was produced in the Observatory. However, in the late 1670s, with the help of Moore he gradually built up a number of quadrants, sextants and accurate pendulum clocks. From 1689, he was also able to make use of a Mural Arc (a massive quadrant attached to a wall). In addition, he had refracting telescopes that were fitted with screw micrometers; these gave a degree of accuracy that he saw as part of the ethical imperative of his work. Apart from his belief in the virtue of astronomy, Flamsteed saw himself as divinely ordained to determine the nature of the heavens. He was ordained as a priest in Easter 1675 and in 1684 he was appointed rector of Burstow in Surrey, a position he held until his death.[11]

11 *The Correspondence of John Flamsteed, First Astronomer Royal*, ed. Eric Forbes, Lesley Murdin and Frances Willmoth, 3 vols (Bristol, Institute of Physics Publishing, 1995–2002), vol. 1, pp. 4–5; *The Preface to John Flamsteed's 'Historia Coelestis Britannica' or British Catalogue of the Heavens (1725)*, ed. Allan Chapman, trans. Alison Dione Johnson (Greenwich, Maritime Monographs and Reports no. 52, 1982), pp. 2–4, 111–20; Baily, *Account*, pp. xxv–xxxi, 29 (for Newton's theory of light), 30–53, esp. p. 47; Frances Willmoth, *Sir Jonas Moore: Practical Mathematics and Restoration Science* (Woodbridge, Suffolk, The Boydell Press, 1993), pp. 164–75, 182–6, 191–3.

From the outset Flamsteed modelled himself on his heroes Jeremiah Horrocks and Tycho Brahe, and saw it as his central task to provide a catalogue of the heavens that would be immensely more accurate than anything that had come before. It was the delays in producing this that were to cause so much trouble between himself and Newton. In the last two decades of his life, Newton spread it around that Flamsteed's tardiness in providing him with data had delayed and finally obstructed what would have been his greatest success, namely the removal of serious anomalies in his lunar theory (see e.g. pp. 81, 254). Flamsteed refused to accept the role of astronomer drudge that Newton accorded him, and believed that his contribution was equal to that of Newton (p. 194). Yet the relationship had started reasonably well. At the end of 1680 the so-called 'Great Comet' appeared in the Northern Hemisphere, disappearing behind the sun at the end of November and then reappearing early the following month. Flamsteed wrote to Newton in January 1681 to say that he had predicted its return and that the two comets were therefore one, the November comet having been turned in front of the sun by means of magnetic repulsion. Newton thanked Flamsteed for his 'hypothetical notions' and asserted convolutedly that he would 'act y$^{e}$ part of a friend … not in objecting against it by way of opposition but in describing what I imagin might be objected by others'. As ever, the poses of disengagement and friendship were difficult to sustain and he proceeded to launch major criticisms against Flamsteed's position. The known paths of both comets were inconsistent with it being only one if it turned in front of the sun, while Flamsteed had not explained why magnetic force that attracted the comet would suddenly repel it. Perhaps most importantly, experience showed that magnets that became extremely hot lost their power. Newton remained wedded to the two-comet view until he suddenly announced that he had changed his mind in autumn 1685 – by which time he had a non-magnetic explanation for the sun's attractive force. As in the case of his correspondence with Hooke in 1679–80, this exchange of letters undoubtedly had a major effect in helping him develop central concepts later employed in the *Principia Mathematica*.[12]

The fact that Newton never mentioned his previous allegiance to the incorrect view about the comet, and his unwillingness to give Flamsteed (or rather, 'her Ma$^{ties}$ Observatory' as Flamsteed wrote in the reign of Queen Anne) sufficient credit for providing him with relevant data, always

12 *Correspondence of John Flamsteed*, vol. 1, pp. 5–7; Eric Forbes (ed.), *The Gresham Lectures of John Flamsteed* (London, Mansell Information Publishing, 1975); and Willmoth, 'Models for the practice of astronomy: Flamsteed, Horrocks and Tycho' in Frances Willmoth (ed.), *Flamsteed's Stars: New Perspectives on the Life and Work of the First Astronomer Royal, 1646–1719* (Woodbridge, Suffolk, The Boydell Press, 1997), pp. 62–75.

rankled (pp. 15–21, 23). However, while Flamsteed's relationship with Newton had not yet deteriorated beyond repair by the time the *Principia* appeared in 1687, this was not true of his interactions with Robert Hooke and Edmond Halley. His attitude towards them formed a template for his later relationship with Newton, and he came to see them as cunning, ambitious and ignorant in opposition to his own hard-earned competence and plain-speaking godliness. Hooke, who publicly humiliated Flamsteed over his understanding of lenses, constantly irritated Flamsteed (as he did many others) by failing to deliver on his boasts of bringing the design of instruments to perfection.[13] Halley, whom Flamsteed had trained briefly in 1675, was also to feel his ire and after a decade of friendship he was attacked by Flamsteed for plagiarism and for having cultivated an unhealthy desire for 'applause'. Some of the pique at Halley was almost certainly prompted by the relative lack of respect Flamsteed felt he had received in the *Principia* in comparison with the praise lavished on the junior astronomer, who had edited the great work and who now had a major position in the Royal Society. Halley came to be seen by Flamsteed as inextricably bound up with Newton as the chief of his 'criers up' and by the late 1690s he was identifying with Tycho's predicament in the face of his tormentor Nicolai Reymers Baer, or Ursus. Halley was henceforth rewarded with the soubriquet 'Raymer' in honour of the same.[14]

Later, Flamsteed would repeatedly state that relations with Newton were good during the first part of their exchanges in autumn 1694 concerning Newton's proposed revisions to his lunar theory. Indeed, Flamsteed was initially pleased to impart to Newton fifty observations of the moon's location 'drawn up in 3 large Synopses & on his request gave him copys of them he promising me not to impart or communicate them to anybody'. Under the same terms he sent another hundred observations over the course of the next few months, but was committed to producing the data for the star catalogue. Soon afterwards he found that Newton had shown

13 See *Correspondence of John Flamsteed*, vol. 1, pp. 17, 600; Feingold, 'Flamsteed and the Royal Society' in Willmoth, *Flamsteed's Stars*, pp. 31–48; pp. 41–2, 46–8; *The Diary of Robert Hooke, M.A., M.D., 1672–1680*, ed. Henry W. Robinson and Walter Adams (London, Taylor and Francis, 1935), pp. 105 (28 May 1674), 330 (27 November 1677); Adrian Johns, 'Flamsteed's optics and the identity of the astronomical observer' in Willmoth, *Flamsteed's Stars*, pp. 77–106; pp. 81–6; Forbes, *Gresham Lectures*, passim.; Iliffe, 'Mathematical characters: Flamsteed and Christ's Hospital Royal Mathematical School' in Willmoth, *Flamsteed's Stars*, pp. 115–44; pp. 126, 136–42.

14 *Correspondence of John Flamsteed*, vol. 2, pp. xl–xlii, and Flamsteed to Towneley, 4 November, 1686, ibid. vol. 2, p. 298; *The Diary of Robert Hooke*, p. 209; Alan Cook, 'Edmond Halley and John Flamsteed at the Royal Observatory' in Willmoth, *Flamsteed's Stars*, pp 167–88; pp. 170–83.

the lunar positions to Halley and the Savilian Professor of Astronomy at Oxford, David Gregory. Flamsteed was dismayed by this, and had done his best to prevent their distribution, ostensibly on the grounds that they had been made with a sextant and lacked the sort of accuracy with which he was satisfied. By early 1695 Newton was complaining that Flamsteed was holding up his work through his dilatoriness in providing information, though the latter tried hard to convince Newton that he should wait for new positions of the moon derived from work with the Mural Arc, which he had been using since 1689. Flamsteed assumed that Halley in particular was spreading malicious rumours about him, and tried to drive a wedge between Newton and Halley by condemning the latter's conduct.[15]

Relations between Newton and Flamsteed sank as the latter came to understand that Newton would treat him only as an underlabourer, despite Newton telling him in February 1695 that '<u>if I do not make a handsome acknowledgement, they will reccon me an ungratefull clown</u>'. When Newton told Flamsteed that he had a general way of 'correcting' Flamsteed's observations, Flamsteed asked first that he be told what method Newton was using to amend them, and second that he be the first to see the corrected positions. Flamsteed was never satisfied that the corrected places were accurate to the two or three minutes of which Newton, Halley and Gregory 'boasted', and his feelings were scarcely assuaged by rumours that Gregory was saying that his work at the Observatory would soon be made redundant by Newton's theory (p. 24). In turn, he hardly endeared himself to Newton by implying that the latter's work was merely concerned with correcting the lunar theory of Horrocks. By June 1695 their working relationship had broken down, and within a year Newton had taken up a position as Warden of the Mint.[16]

Despite Newton's time being taken up with business at the Mint, there was further contact between them on the subject. Flamsteed discovered that he had made mistakes in computing the places of the moon that he had sent to Newton, and tried to dissuade Newton from any idea that this had been deliberate. However, Newton told Gregory in July 1698 that 'On account of Flamsteed's irascibility the theory of the Moon will not be

15 The best account of Newton's relations with Flamsteed is in Manuel, *Portrait*, pp. 292–318, esp. pp. 303–4. For Flamsteed's comment of February 1695 on Halley's 'art of filching from other people' see *The Correspondence of Isaac Newton*, ed. H. W. Turnbull, J. F. Scott, A. Rupert Hall and Laura Tilling, 7 vols (Cambridge, Cambridge University Press, 1959–77), vol. 4, pp. 80–1, and cf. also Flamsteed to Newton, 7 February 1694/5, in ibid., vol. 4, p. 83, and *Correspondence of John Flamsteed*, vol. 2, pp. 565–6.

16 See ibid., vol. 2, pp. 568–70, and *Correspondence of Isaac Newton*, vol. 4, pp. 86–8 – the underlining is Flamsteed's.

brought to a conclusion, nor will there be any mention of Flamsteed, nevertheless he will complete to within four minutes what he would have completed to two, had Flamsteed supplied his observations'. If this were not bad enough, Flamsteed heard in October that Newton was proceeding in his lunar theory with observations from Halley, whom he also presumed had been shown the lunar positions he had given to Newton. In an effort to justify the more than two decades' work he had done at Greenwich, Flamsteed now sought in the third volume of John Wallis's *Opera* to mention the positions of the moon that he had given to Newton. The text, in which Flamsteed remarked that he would continue to send observations and corrections to Newton 'for correcting the Horroxian theory of the Moon', was passed by Wallis onto Gregory, his colleague at Oxford, whence it came to Newton. Gregory was immediately directed by Newton to have the offending passage deleted. Wallis duly informed Flamsteed, who immediately suspected skulduggery, that a 'friend' had suggested that the passage be removed.[17]

Flamsteed wrote to Newton at the start of January 1699 to say that he had included the passage to 'silence some busy people y$^{t}$ are allwayes askeing <u>why I did not print</u>?'. He told Newton what the paragraph contained, and offered to remove the reference to Horrocks, but in general he thought that Newton himself had praised the contribution of the Astronomer Royal more fulsomely than had Flamsteed himself in that passage. In high dudgeon he stated his belief that Gregory was attempting to blacken his name in order to gain the patronage of Charles Montagu (Newton's patron and soon to be suitor of his half-niece, Catherine) concerning the position of mathematics tutor to the Duke of Gloucester. The position would help defray the expenses of the assistants he paid for himself, he went on, but 'I feare It would be as prejudiciall to me other ways & therefore shall not move to traverse the D$^{rs}$ designe, except he force me to it by his <u>treacherous behaviour</u>'. An insinuation that Gregory was an untrustworthy nonjuror, and one last protestation of friendship with Newton sealed Flamsteed's final bid to split him from Gregory.[18]

Newton was alive to Flamsteed's strategems and was not about to cut himself adrift from a loyal henchman. His curt reply was among the most

17 Gregory memorandum, Flamsteed to Colson, 10 October 1698, Wallis to Flamsteed, 28 December 1698, *Correspondence of Isaac Newton*, vol. 4, pp. 277, 284–5, 288–90; *Correspondence of John Flamsteed*, vol. 2, pp. 698–9, 735; Manuel, *Portrait*, pp. 303–4; Westfall, *Never at Rest*, pp. 582–6.

18 Flamsteed to Newton, 2 January 1698/9, *Correspondence of Isaac Newton*, vol. 4, pp. 292–4; *Correspondence of John Flamsteed*, vol. 2, pp. 738–40. Underlined passages represent later emphases of Flamsteed.

brutal he ever penned and it should be understood in the context of his solution to the 'brachistochrone' challenge made to British mathematicians by Johann Bernoulli and Gottfried Leibniz at the start of 1697. He had not, he lectured Flamsteed, desired to be 'publickly brought upon y$^{e}$ stage about what perhaps will never be fitted for y$^{e}$ publick & thereby the world put into an expectation of what perhaps they are never like to have'. He did 'not love to be printed on every occasion' and much less 'to be dunned & teezed by forreigners about Mathematical things or to be thought by our own people to be trifling away my time about them when I should be about y$^{e}$ Kings business'. A condescending remark about Flamsteed being welcome to let the world know about his own store of observations, and a sarcastic comment about there perhaps being occasions when his 'friends' were not to be published without their permission, completed the missive. The last remark may be further explained by the fact that in December 1698 Newton apparently told Gregory – who noted it in the margin of his copy of the *Principia* – that Flamsteed's lunar tables had originally been composed by Halley, that Flamsteed had published them without his knowledge, 'and that this theft was the origin of [their] eternal quarrels'. Although Newton did not communicate with Flamsteed over the next few months, the die of their future relationship had been cast. The younger James Gregory wrote to Colin Campbell in May 1699 to say that Flamsteed 'has rectifyed above 3000 fixed stars: but is so perversly wicked that he will neither publish nor communicat his observations'.[19]

Judging by his angry annotations to Newton's letter, Flamsteed was bewildered both by its tone and its content, telling Wallis on 10 January that he thought it 'very Artificiall'. In his notes he asked whether Newton was 'trifling' when he got paid for teaching mathematics at Cambridge, and regarding cases of printing others' work without their permission he remarked that this was only a concern 'where persons thinke too well of themselves to acknowledge they are beholden to those who have furnisht them w$^{th}$ y$^{e}$ feathers they pride themselves in when they have great fr[iends] &c.'. Naturally, the last comment referred to Montagu, whom Flamsteed always thought of as the 'Great Courtier' safeguarding Newton's every move (e.g. pp. 24–5). Nor, he claimed, was he being proud when he said that his own labours and Newton's together would serve to promote the understanding of the natural world: 'I look upon pride as the worst of sins, Humility as the greatest virtues, this makes me excuse small

19 Newton to Flamsteed, 6 January 1698/9, Flamsteed to Wallis, 7 January, 1698/9, Gregory to Campbell, 29 May 1699, *Correspondence of Isaac Newton*, vol. 4, pp. 296–7, 298–9, 311; *Correspondence of John Flamsteed*, vol. 2, pp. 742–3, 743–4; Brewster, *Memoirs*, vol. 2, pp. 165–6.

faults in all mankind bear great injurys without resentment and resolve to maintain a real freindship with ingenious men to assist them what Lies in my power'.[20]

Flamsteed continued to attempt to find ways of being Newton's friend. In an extraordinary letter of May 1700 he told his friend John Lowthorp about a conversation he had had with Newton about his own proposal of publishing a catalogue, adding that the discussion showed that he 'had no reason to have any tenderness in respect of him but onely on Consideration of Christianity'. He recounted that Newton had asked him how things stood with the catalogue, to which Flamsteed had replied that he had completed a substantial number of observations, including a further two hundred of the moon's position. However, he had told Newton (in what was to be the main sticking point for Flamsteed throughout the later dispute) that the catalogue of the fixed stars could not be published before the lunar and planetary observations, 'as being the ground on which it was built and from which it was derived'. He tantalized Newton by saying that he planned to publish a book of tables, at which Newton became agitated 'and ask't me what Tables, and if I would publish any for the Moon'. Flamsteed, still outraged that Newton had passed on to Gregory and Halley the places Newton had calculated from the raw data given to him by Flamsteed, merely replied that whether this were so or not was in Newton's hands.[21]

Flamsteed saw Newton's willingness to keep the calculated places from him as reprehensible and noted that Newton 'detracts from himself by this Reservedness, and does that which his flatterers would perswade him I doe; dureing this discourse he once complain'd that I was reserv'd I answer'd I had not been so in the Least; as my many Communications would testifie'. He had asked if Newton and Wren could visit Greenwich one morning and discuss how the publication of the observations and the catalogue might best be expedited but Newton 'ask't me a little Quick, what for?'. Flamsteed answered that his work was like the construction of St Paul's, and needed labour and time to perfect. This Newton grudgingly accepted and Flamsteed wrote that they parted 'as good Friends': 'I believe him to be a good Man at the Bottom. but through his Naturall temper suspitious and

20 Flamsteed to Newton and Flamsteed to Wallis, both 10 January 1698/9, and cf. a lengthy unsent draft from Flamsteed to Newton, 16 January 1698/9, see *Correspondence of Isaac Newton*, vol. 4, pp. 302–3, 304; and *Correspondence of John Flamsteed*, vol. 2, pp. 746–7, 748–9, 751–73, esp. p. 762. Flamsteed's notes on Newton's letter of 6 January 1698/9 are reproduced in ibid., vol. 2, p. 745.

21 Flamsteed to Lowthorp, 10 May 1700, *Correspondence of Isaac Newton*, vol. 4, pp. 331–2; *Correspondence of John Flamsteed*, vol. 2, pp. 817–18.

too easy to be possesst with calumnies especially such as are imprest with Raillery.'[22]

## Flamsteed: Newton as Man of Sin

The events in the preface to Flamsteed's *Historia* start chronologically with Newton's visit to Greenwich in April 1704 (p. 25). Internal evidence (pp. 44, 50) suggests that the main text was composed in April 1717, but he seems to have composed various histories of his own work at the Observatory over a number of years and the text is to some extent a reworking of passages in these narratives. In other places it obviously draws from his own correspondence and, if it is possible, Flamsteed seems to have spent almost as much time as Newton in repeatedly raking over and annotating old letters in order to justify a point or to remind himself of certain facts. When it came to publishing Flamsteed's *Historia* after his death on 31 December 1719, his 'editors' (Joseph Crosthwaite and Abraham Sharp, with the assistance of James Hodgson) decided on grounds of taste and propriety to excise the substantial portion of the 'Preface' that reflected badly on the current President of the Royal Society. This notwithstanding, Crosthwaite told Sharp in the summer of 1722 that he thought Newton and Halley had 'been tampering' with James Pound, who was translating Flamsteed's English preface into Latin, and had successfully dissuaded him from any further involvement.[23]

In his 'Preface', Flamsteed drew upon the correspondence surrounding the comet of 1680–1 and the lunar theory. By the late 1710s he had long been convinced that Newton possessed all the malignities – with many more that were not possessed by either – that had characterized the behaviour of Hooke and Halley. He wasted little time in depicting Halley and Gregory as people of 'very ordinary skill' in astronomy, hell-bent on 'crying up' Newton's performances 'to oblige his friendship, who had then a great Interest in a Great Courtier' (p. 24). On the other hand, there were virtuous courtiers such as George, Prince of Denmark (the husband of the Queen), who could offer benign patronage in the case of Flamsteed's public

22 Flamsteed to Lowthorp, 10 May 1700, *Correspondence of Isaac Newton*, vol. 4, p. 332; *Correspondence of John Flamsteed*, vol. 2, p. 818. See also Manuel, *Portrait*, pp. 307–8. For Locke's view of Newton as 'a nice man to deal with, and a little too apt to raise in himself suspicions where there is no ground', see Peter King, *The Life of John Locke, with Extracts from his Correspondence, Journals, etc.* (London, Henry Colburn, 1829), p. 259.

23 See Baily, *Account*, pp. 71–103, 351 (for the letter from Crosthwaite to Sharp); Chapman, *Preface*, pp. 160–79.

undertaking. In Flamsteed's narrative, the repeated use of key words and his sensitivity to local geography split off the hard-working and virtuous godly from the insincere and unskilful sycophants (p. 25). Flamsteed saw himself as working alone and away from the City, fighting with some trusty assistants (and his rarely mentioned wife) against the baneful influence of the power-crazed despot who was President of the Royal Society after 1703, and two years later, a knight of the realm.

When Flamsteed's own friends were 'impressed upon by the false & malitious suggestions of some few busy arrogant & selfdesigning people' (p. 27), he drew up an 'Estimate' of what it would cost to publish all his observations. However, under the guise of friendship, Newton formed a committee of 'Referees' charged with overseeing the project. Flamsteed thought the recompense due to him agreed by the committee was ridiculously low and in his own narrative took this to be the crucial evidence that Newton was an enemy whose 'designe was either to gaine y$^{e}$ honor of all my paines to himselfe, to make me come under him as D$^{r}$ Arbuthnot some time after expresst it, or to spoyle or sinke it which it was my chiefe concern & businesse, if possible to prevent' (p. 28). Screened by his referees, Newton 'began to act his [part]' while Flamsteed 'dealt honestly & openly w$^{th}$ him' (p. 29). Newton engaged a publisher, Awnsham Churchill, to produce the work. Flamsteed was the last to know and predictably thought that the terms of the agreement were unbalanced in favour of Churchill.

Flamsteed saw Newton's behaviour as diabolical and his lieutenants as 'godless persons', and after 1705 there was a profound resonance in referring to him as 'SIN'. However, there were occasionally grounds for hope and in late 1705 Flamsteed believed that once printing started the referees would not concoct 'new tricks or pretences' to avoid repaying him for the work undertaken by his assistants. However, Newton's 'disingenuous & malitious practices' soon showed that he was mistaken (p. 31). Newton persuaded Flamsteed to hand over his undigested 'Night Notes', on the understanding that they would remain sealed. As Flamsteed saw it, all these moves were machinations intended to bring him under the President of the Royal Society, but 'I would not yet cry up S$^{r}$ Is. as others did to bring me to that baseness' (p. 32). Between 1706 and 1708 Newton allegedly held up the press, acting arbitrarily 'to keep things wholly in his own power' (p. 35), but in March 1708 Flamsteed delivered 175 sheets of observations, nearly all made with the Mural Arc between 1689 and 1705, that would constitute the second volume of the *Historia*. The committee, however, continually obstructed and made unreasonable demands upon him. For example, at a meeting of the referees in March 1708, Flamsteed was requested to ensure that the observations then being printed for volume

one were properly corrected, and he was also asked to retrieve the star catalogue then in Newton's possession, insert the correct magnitudes of the stars, and hand them back. Only then would he be paid.

In October 1708 Flamsteed lost one of his chief patrons, the Prince of Denmark, and Flamsteed commented that his physician (John Arbuthnot) had been 'influenced & gouverned' by Newton. Nevertheless, Flamsteed remained relatively undisturbed until towards the end of 1710, when he found that a board of 'Visitors' had been constituted, ostensibly ordered by Queen Anne and to be overseen by the Royal Society. The President of the Royal Society was entrusted with requiring that the Astronomer Royal deliver a fair copy of Annual Observations once a year, and he was further authorized to 'order and direct' Flamsteed 'to make such astronomical observations as you in your judgment shall think proper' (p. 43). Flamsteed compared his situation with that of Tycho, who was subjected to harassment by 'unskilful' individuals. Worse still, he soon heard that his catalogue was being continued without his permission. Flamsteed thought this 'one of the boldest thinges y$^{t}$ ever was attempted' (p. 45) and was further chagrined when he found that Arbuthnot had lied about the state of the printing: Halley was editing an unauthorized edition and now had access to the sheets Flamsteed had entrusted with Newton, while boasting that he had found many errors in his work (p. 46).

When Flamsteed was shown the printed sheets of the bastard edition in June 1711, he believed that Halley had completely bungled the job. In rushing to publish a project that required meticulous care in checking and re-checking, Newton had presided over an immoral and completely inadequate farrago of jumbled data. It was at this point that Flamsteed undertook to produce his own version of the *Historia*, which finally appeared posthumously in 1725. However, there was still time for the famous meeting at Crane Court in October 1711, where Newton exploded with rage at Flamsteed's insolence (p. 48). As Flamsteed's narrative shows, by the time he composed his 'Preface', he had long developed a pose of serene, Christian disengagement (or presented himself as such), and he claimed to be aloof from the wiles of his enemies. Privately he occasionally expressed outrage to Sharp at the levels of chicanery to which Newton and Halley would stoop, but even then he balanced this with a comment that he would continue to treat them 'civilly'. The lowest point in his fortunes was undoubtedly the preface to Halley's edition of the *Historia* (which appeared in 1712), in which Halley was lauded for rescuing the edition when the Astronomer Royal 'seemed so far, only to have worked for himself or at any rate for a few of his friends'.[24]

24 For Halley's 'Preface' see Chapman, *Preface*, pp. 189–95.

The change of political administration that followed the accession of George I in 1714 allowed Flamsteed to acquire all the unsold copies of Halley's work. These, as he told Sharp in March 1716, he was to sacrifice to 'TRUTH' save for some that he was to give to Sharp and other 'herty lovers of truth that you may keep them by you as Evidences of the malice of Godlesse persons and of the candor and sincerity of the freind that writes to you' (cf. p. 52). From Flamsteed's perspective, the destruction of copies of the immoral production represented a triumph, and he was left in relative peace for the remainder of his days trying to produce his own version of the *Historia*. Fortunately he was not to know that Halley became the second Astronomer Royal. Nevertheless, despite continuing provocation from Newton's flatterers, his own lieutenants defended Flamsteed's legacy by seeing his *Historia* through to publication in 1725.[25]

## William Stukeley: Newton's 'Experimental way of Philosophizing'

The appreciation of Newton composed by William Stukeley in 1727 and 1752 provides a fascinating account of the springs of Newton's intellectual development in a text packed with information drawn from the small band of Newton's contemporaries who were still alive in the last two years of his life, and from descendants of long dead acquaintances. Stukeley was born at Holbech in the *Principia* year of 1687, and in early life became engrossed in scholarly pursuits and 'simpling' (examining, collecting and learning the medicinal use of plants). He developed a life-long predilection for astrology, which he practised for many decades afterwards, and 'became so considerable a mechanic, that when any Poppet shows came to Town I presently imitated them, & made Scenes, Figures with moveable Legs, & Arms, & Strings to them, & used to perform very notably before a great spectators of my School fellows on a holiday'. Other interests included collecting ancient coins, taking regular exercise and constructing miniature buildings.[26]

William's father encouraged him to join the family legal business, and when Stukeley was only thirteen, treated him as an equal: he 'often flattered me that he had ever conceived thoughts of my Being a Great Man, which I

25 *Correspondence of John Flamsteed*, vol. 3, p. 785.

26 See David Haycock, *William Stukeley: Science, Religion and Archaeology in Eighteenth Century England* (Woodbridge, Suffolk, Boydell Press, 2002), pp. 30–2; Stuart Piggott, *William Stukeley: an Eighteenth-Century Antiquary* (London, Thames and Hudson, 1985), pp. 26–8; and Stukeley, *Memoirs*, vol. 1, pp. 6, 8–9, 12, 15, 16.

always wondered at'. Showing little inclination for the study of law, he purchased scientific instruments and bought numerous books in astronomy, anatomy and physic, and while on a trip to St Paul's Cathedral, then unfinished, he 'took particular delight in, & would clamber up the scaffolds & ladders among the workmen to observe their arts & Engines'. His father facilitated his entry to Corpus Christi College Cambridge in November 1703. Corpus was quicker than most to embrace the new philosophy and in the following three years Stukeley was exposed by one of his tutors, Robert Dannye, to central texts in natural and experimental philosophy. He maintained a practical bent in his studies, and was especially interested in the philosophical and chemical demonstrations performed during their lectures by some of the foremost practitioners of the day. These included the experimental philosopher and fellow of Corpus (between 1703 and 1719) Stephen Hales, with whom Stukeley went simpling, and the chemist Francis Vigani, whose chemical experiments Stukeley and Hales witnessed in Newton's old 'laboratory' in Trinity. Both of these became close personal friends while Stukeley was in Cambridge. Stukeley's is one of the most detailed accounts of university instruction in natural philosophy during this period.[27]

Stukeley's plans received a severe blow when his father and uncle died unexpectedly at the start of 1706, followed just over a year later by his mother and brother. Although he was now obliged to pay off his father's outstanding debts, he did return to Cambridge in the autumn. By now Roger Cotes had taken up the Plumian Professorship in astronomy, teaming up with the Lucasian Professor William Whiston to perform a number of experiments as part of a course in experimental philosophy. However, financial considerations forced Stukeley to think of a career in medicine and, having gained a degree in the subject, he travelled to London in the summer of 1709. He worked at St Thomas's hospital under the eye of Richard Mead, then already one of the fastest rising physicians in the capital, but in February 1710 he returned to live in Boston in Lincolnshire. Stukeley became a member of the Spalding Society, newly founded by his friend Maurice Johnson, and he kept up correspondence with the antiquaries Roger and Samuel Gale. He built up a substantial practice and kept the family solvent, but during the summer he travelled widely around Britain,

27 William Stukeley, *The Family Memoirs of the Rev. William Stukeley, M.D. and the Antiquarian and other Correspondence of William Stukeley, Roger & Samuel Gale, etc.*, ed. W. Lukis, 3 vols (Durham, London and Edinburgh, Surtees Society, 1882–7), vol. 1, pp. 17, 20–2, and esp. pp. 133–4 (for Hales); Haycock, *Stukeley*, pp. 32–8; Piggott, *Stukeley*, pp. 29–32; and John Gascoigne, *Cambridge in the Age of Enlightenment* (Cambridge, Cambridge University Press, 1989), pp. 159–63.

engaging in the detailed examination of British antiquities that was published in his *Itinerarium Curiosum* of 1724.[28]

By 1717 he was anxious to return to the capital, writing later that he wanted 'to lead a life of study & curiosity. I thought it not worth while to spend my whole time in getting money. I chose to do it in the improvem[t] of my mind.' He set up practice in Ormond Street and immediately threw himself into the most elite social and intellectual circles. Mead's patronage gave him access to luminaries such as Newton and Halley, and although he was to criticize the apparently lucre-orientated medical careers of Mead, Sloane and Radcliffe, the energetic Stukeley was hardly devoid of ambition. At the start of 1718 he helped create the Society of Antiquaries with Johnson and the Gales, and was its first Secretary. He rose fast in Augustan intellectual circles, becoming a fellow of the Royal Society in March 1718, and being elected to Council (by means of the support of his 'countryman', Newton) at the end of 1719. He took his doctorate in medicine in the same year and was elected a fellow of the Royal College of Physicians in 1720, reading the Gulstonian lecture (on the function of the spleen) in 1722. The year 1719 witnessed Stukeley's momentous first visit to Avebury and Stonehenge, both of which he toured in May, and he discussed the significance of their structures on various occasions with Halley over the following two years. In early 1721 he became a freemason and in the summer of the following year he helped found the Society of Roman Knights, dedicated to restoring 'Roman glory'.[29]

His spectacular ascent was halted in November 1721 when he was put forward to stand as a replacement for Halley as Secretary of the Royal Society, the latter now devoting himself more fully to being the second Astronomer Royal. Despite initial support, Stukeley found to his horror that he was standing against James Jurin, fellow physician, graduate of Trinity College Cambridge, and member of the 'mathematical party', who amongst others was backed by Newton, Mead and Halley. Compromised by his antiquarian leanings, Stukeley was roundly defeated ('13 who had promised me did not appear'), and Newton behaved coolly to him for a few years. It was shortly after this that Thomas Hearne, no friend of the Society of Antiquaries, described Stukeley as 'a very fancifull man, and the things he hath published are built on fancy … a man of no great authority, and his reputation dwindles every day, as I have learned from very good hands'.

28 Stukeley, *Family Memoirs*, vol. 1, pp. 28–46, 111–12, 149; Piggott, *Stukeley* pp. 33–78; Haycock, *Stukeley*, pp. 42–7, 116.

29 Stukeley, *Family Memoirs*, vol. 1, pp. 51–2, 62–3, 122; Haycock, *Stukeley*, pp. 47–52, 59–60, 67–70, 82–4, 117–18, 121–3.

Undeterred, Stukeley continued to work on projects such as the origin and function of Stonehenge (which he held to be druidic) and of Solomon's Temple, which he discussed with Newton in April 1726. Partly due to a desire to continue these travels, partly on account of his propensity to gout (which he took to be an urban disease) and partly because of increasing distaste for the Metropolitan lifestyle, Stukeley surprised his friends by deciding to quit the 'Town' in 1726. He moved to Grantham, a location that was ideal for finding the few surviving people who had known Newton as a boy. This was crucial for procuring information when Stukeley was asked by Mead in the spring of 1727 to send him any material he had on Newton for passing on to John Conduitt, and a few months later Stukeley sent Conduitt the letters reproduced in this volume. He married at the end of 1727 and, having apparently foresworn his earlier lifestyle, was ordained by William Wake, the Archbishop of Canterbury, in July 1729.[30]

In 1733 Stukeley published a cure for gout; the success of this, along with a lucrative second marriage in 1739, left him free to perform his role as a parson and pursue his antiquarian studies. Foremost among his published works during this period were *Palaeographia Sacra* (1736), in which he argued that pagan mythology was derived from Scripture, and his seminal works on Stonehenge and Avebury, which appeared in 1740 and 1743 respectively. In the last two he pressed home his radical belief that the ancients had known of the Trinity and that the structures of the monuments at these sites depicted it in a hieroglyphic form. In 1747 his friend and patron, the Duke of Montagu, offered him the living of St George's at Queen's Square in London and Stukeley accepted, writing significant papers on earthquakes and cosmology in the following years. Among his other interests, in August 1752 he attempted to transform his letters to Conduitt into a 'Life'. Thereafter, Stukeley played an increasingly minor role in the intellectual world and he died in 1765.[31]

## Stukeley's 'Memoirs'

Mead wrote to Stukeley on 4 April 1727 requesting any pieces of information that he might have relating to Newton. Mead, who had attended Newton in his final hours, remarked to Stukeley that he had not heard

30 Ibid., vol. 1, pp. 52–3, 65, 110, 169 (for Hearne's comment), 105–8 (for his reasons for leaving London); Haycock, *Stukeley*, pp. 154–5, 189–91.

31 Stukeley, *Family Memoirs*, vol. 1, pp. 81, 109, vol. 2, pp. 361–72; Haycock, *Stukeley*, pp. 181–8, 192–4, 200–16, 224–5; Piggott, *Stukeley*, pp. 79–109, 124–51.

whether Newton had said anything of a future state before he died, but 'this much I think I know of his Opinions, that he was a Christian, believd Revelation, though not all the doctrines which our Orthodox Divines have made Articles of Faith'. As it happened, Stukeley had for some time been recording the subjects of his meetings with Newton in various notebooks, as well as some other information about Newton's background. In addition to this, he now examined local records and got material from his friend Peter le Neve concerning Newton's ancestry. By far the most significant data came from interviews with schoolfellows or old friends of Newton, although he felt that the most mundane information was unworthy of record (pp. 68–9). In early July Mead told Conduitt (in forwarding Stukeley's first three letters) that 'You will find a great deal of impertinent low stuff in 'em, but something I believe that may be to the purpose' (p. 84).[32]

Stukeley was hampered by the fact that many of Newton's old friends had recently died, but he was fortunate that the sister of Edward and Arthur Storey was still alive, all three being step-children of the apothecary Clark with whom Newton lodged while studying in Grantham. He also benefited from talking to his friend Ralph Clark, grandson of the same man. His first letter was mainly taken up with information about Newton's background and the wonderfully fertile land – the 'Montpelier of England' – that gave rise to 'the greatest genius of the human race' (p. 70). Newton and his youthful deeds were legendary in Grantham (p. 72), and from locals he learned how Newton became an accomplished draughtsman, made model windmills, kites with lanterns attached, a dolls' house, clocks and an ingenious hopper, which worked by means of a mouse kept in perpetual motion by the tantalizing prospect of food. Momentously, Humphrey Babington, senior fellow at Trinity while Newton was there, and brother to Mrs Clark, appears to have taken interest in Newton's burgeoning mechanical prowess (pp. 73, 77).

Stukeley collected material from willing interviewees with the skill of an accomplished natural historian, carefully distinguishing his own interpretation from the data he had collected. Clearly the reminiscences of octogenarians and the traditions surrounding Newton's behaviour were not completely reliable as sources, a fact of which Stukeley was keenly aware. Nevertheless, independent evidence from Newton's reading of John Bate's *Mysteries of Nature and Art* – the source of many of his earlier devices – shows that their memories were remarkably accurate. The tales of Newton's self-neglect – many of which came from his former amanuensis

32 Mead to Stukeley, 4 April 1727, Bodleian Library MS Eng. misc. c. 114, f. 50, cited in Haycock, *Stukeley*, p. 3.

Humphrey Newton, who was living in Grantham at the time – were almost certainly coloured by standard tropes about scholarly asceticism. It should also be said that aspects of Stukeley's narrative were often similar to his account of his own life, with Newton either matching or surpassing milestones in his own development. So, like Stukeley, Newton was obsessed with mechanical devices almost to the point of ignoring his schoolbooks, although in his case mastery of texts (and his peers) could come at will (p. 73). Unknown to Stukeley, many of Newton's inventions were straightforward manifestations of contrivances found in Bate, but in any case he rightly saw these early feats as the font of Newton's later experimental and mathematical skill (p. 78). He also noted that Newton had early on demonstrated a predilection for simpling, again like himself, and he speculated that 'being brought up in an apothecarys shop, might in some measure, inspire him with a love of natural enquirys & promote his rising genius' (p. 78, and cf. p. 282). Even in the disjointed form of the letters sent to Mead, his analysis of the material wellsprings of Newton's achievement, based on a mixture of play, ambition, determination and mechanical and intellectual prowess, has not been bettered by modern historians.[33]

A key witness to Newton's early character was Mrs Vincent, the Storey sister with whom Newton had lodged as a boy (pp. 74–5). Mrs Vincent did not deny rumours that Newton had once 'entertained a love for her', though in later life his affection extended only to financial gifts to her and her husband. Ralph Clark was probably the direct source of the story about Newton's predilection for study and neglect of the family business, and with Mrs Vincent is the likely source for information about the background to Newton's decision to go to Trinity College. Apart from that, Stukeley recycled notes from his commonplace books and diaries concerning Newton's artful if evasive responses to questions from the painter Godfrey Kneller (see p. 81), and conversations on various topics such as Solomon's Temple, the new-fangled fashion for operas, and what Newton ate for breakfast.

Stukeley later mentioned that Richard Bentley, John Colbatch, Roger Cotes and Edmond Halley had information relevant to Newton's life; indeed Halley 'had wrote a considerable quantity of papers relating to this subject. but he w$^{d}$. not communicate them to M$^{r}$ Conduit' (p. 279). However, nothing beyond Pemberton's *View*, Whiston's *Collections* and

33 See G. L. Huxley, 'Newton's boyhood interests', *Harvard Library Bulletin*, 13 (1959), pp. 348–54. Newton's notes from Bate are now in the Pierpont Morgan Library in New York. Roger North recorded that Newton was famous at Trinity 'for his insensate behaviour in the college hall. He would stand at the heath, and warm his hands at midsummer; and if one changed his meal for a dry bone, he would be satisfied, thinking he had dined, and the like'; see North, *General Preface*, p. 176.

Fontenelle's 'Éloge' appeared publicly in the decade after Newton's death. When John Conduitt died in 1737, Stukeley retrieved the information he had sent a decade earlier and set out to write the appreciation of his hero that Conduitt had failed to complete (p. 261). He did not finish the task until August 1752, when he wrote out two drafts of 'Memoirs', the first of which is now in Grantham Museum, and the second of which is in the Royal Society. As he wrote in his 'Preface', a 'life' requires the bare facts about the upbringing of its subject, but in the case of such a man as Newton, 'every reader burns with a desire of knowing somewhat of the primordia, & the preparation & presages of his extraordinary abilities' (p. 245). Stukeley the naturalist saw human nature as possessing a 'vital principle in itself', but it required a botanic care to bring potential to perfection. His task was to uncover those organic elements that fated Newton's genius to 'early break out, & down, ag$^{t}$ any obstacle' (p. 247). As he had told Conduitt, he lamented the fact that his task had been made more difficult by the death of those who had been to school with Newton, such as the Mr Crichloe to whom Stukeley's brother had been apprenticed (p. 260).[34]

For Newton's works, Stukeley referred in the 1752 'Memoirs' to Pemberton's *View* and to the more recent (1748) *Account of Newton's Discoveries* by Colin Maclaurin. Foreigners had long awaited an English biography, and accordingly Stukeley began by recounting his own personal acquaintance with Newton, situating Newton's rise in the broader rise to power of Britain. All of the anecdotes sent originally to Conduitt were reproduced in the 'Memoirs', with only slight amendments, although Stukeley now made reference to the fall of an apple as a central factor in the development of the theory of Universal Gravitation, a tale which had apparently been told to him by Newton in their meeting of 15 April 1726 but which surprisingly had not been mentioned in the original letters to Conduitt (compare pp. 69, 258, 306). He reproduced material from local parish records but launched into a tirade against their neglect, the abuse of such material being a cause of the decline of religion and morals (pp. 262–3). Where Stukeley had earlier spoken of the 'pregnancy of his parts as a boy' in describing Newton's precocious behaviour, he now referred to the 'extraordinary pregnancy of his genius' (pp. 72, 268). He slightly embellished the description of Newton's windmill (pp. 73, 269), and added the information that Newton carved his name all over the garret in which he lodged to Ralph Clark's story about his prowess in drawing (pp. 75, 272). He was more effusive about Newton's

34 For the date of Stukeley's revision of his letters see Haycock, *Stukeley*, p. 216, n. 132. Stukeley's original letters remain part of the Conduitt collection in the Keynes papers in King's College Cambridge.

expert penmanship than in the original, but on the whole, Stukeley retained the content and phrasing of the early letters.

The famous story of Newton's absence of mind while about the family business (pp. 75–6, 275–8) was given some botanico-druidical padding in the later account. As for the reaction of Newton's mother and her servants to this behaviour, in the Conduitt letters and Grantham MS the latter pronounced the boy foolish and useless for business, while in the last version they said he was a 'silly boy'. To the rescue came the headmaster of Grantham Grammar School, John Stokes, whose foresight Stukeley extolled in more detail in the early 1750s. Stokes implored Mrs Smith to let her son return to school and 'never ceasd remonstrating to his mo$^{r}$. what a loss it was to mankind, as well as a vain attempt, to bury so ~~extraordinary~~ <uncommon> a talent, in rustic business'.[35] In another addition found only in the final draft of the 'Memoirs', Stukeley used almost identical terms to those his own father had employed of himself, to the effect that Stokes 'was sufficiently satisfy'd, that he w$^{d}$. become a very extraordinary man' (p. 278). Finally, he rewrote the story of Stokes shedding tears at Newton's departure from Grantham, adding that the other pupils had also been lachrymose and that the servants had 'rejoic'd at parting with him, declaring, he was fit for nothing but the 'Versity' (p. 279).[36]

Stukeley expanded the section on Newton's relationship with the first Lucasian Professor Isaac Barrow (pp. 78, 280) to make it clear that Barrow – whom he took to be Newton's tutor – was soon outstripped by the extraordinary and unstoppable natural force of his pupil's intellect. It was here that Stukeley displayed his analytic *tour de force*, an extraordinary account of the role played by Newton's early immersion in drawing, designing and building mechanical objects. Beyond, or perhaps behind, this, Newton 'was in reality born a philosopher' (p. 282). To his earlier comments on Newton's chemical work he added that it could be presumed

35 Thomas Maude, author of *Wensleydale* in 1780, had known Stukeley personally and the latter apparently suggested that Maude become Newton's 'memorialist'. By the time Maude published *Wensleydale*, some of the stories that Stukeley had gleaned from locals had become hazy. Maude recorded that local lore now linked Newton's absent-mindedness with the recognition of his great mathematical talent and an anonymous offer of financial support, Stokes's role in the last having now disappeared. Nevertheless, he was aware of the existence of Stukeley's papers on Newton and noted that material from these had been 'collected by a good hand' for the November 1772 *Gentleman's Magazine* article on Newton's genealogy. See Maude, *Wensleydale*, pp. 29–31, n.

36 Stukeley noted that towards the end of his life his father 'would frequently insist upon his former declarations how much he verily believd I should live to be a considerable Man, & an ornament to his Family, which I could scarce take any otherwise than a Delirium, owing to his Illness', *Family Memoirs*, vol. 1, p. 27.

that Newton had made a number of significant discoveries therein 'w$^{h}$ had need enough of his masterly skill, to rescue it from superstition, from vanity, & imposture; and from the fond inquiry of alchymy, & transmutation'. Of course, Stukeley did not know that Newton left over a million words of alchemical writings, the vast bulk of which were notes taken from the sort of authors Stukeley readily condemned (pp. 80, 285).[37]

As licentiousness threatened to overwhelm Britain in the 1740s and 1750s – or so Stukeley believed – he became deeply concerned that Newton's religiosity be recorded for posterity. In the 'Memoirs' he wrote that Newton 'was a man of real piety, & strict attendance on the sabbatical duty; knowing the necessity, as well as the expediency, of the public profession of religion' (p. 291), and in the final draft he added that Newton 'could not excuse himself from the weekly solemn adoration of the supreme being; both out of principle, & a regard to his influence, & example: he was sensible, that many persons were attentive to his conduct, in that respect' (pp. 291–2). In both drafts Stukeley launched into an attack on the lack of religion in contemporary society, not least among infidel philosophers. Yet 'S$^{r}$. Isaac was an intire christian, upon fundamental principles. he knew the evidences of it were as strict demonstrations in thir way as his principia.' Newton had studied the Bible as much as anyone, and knew that the same 'Sovereign Architect' who had made the natural world had left behind a moral law. However, Stukeley continued, it was his public profession of religion that made him a perfect Christian (p. 292).

Given this stance on Newton's attitude to public prayer, subtle changes were made to Humphrey Newton's earlier testimony about his attendance at the college chapel. In 1727 he had recorded Humphrey's assertion that Newton 'constantly went to church on Sundays, tho' not often to the College chappel' (p. 77), while two and a half decades later this had become 'not always to the college chapel'. Although Humphrey had explained this apparent laxity as being due to Newton's appetite for study, in 1752 Stukeley removed a sentence from an earlier letter to Conduitt in which he had Humphrey attesting that 'the attachment to his studys equally hindered him frequenting the chappel in the evening too' (p. 77). If Stukeley was pre-

37 Roger North recorded that, 'being made by nature and inclination for mathematical studies, [Newton] had much encouragement and assistance therein from Dr. Barrow who, some say, first hinted to him the plan of his great cosmological system'. North noticed however, that Barrow got no mention in any of Newton's writings: 'This being so, old Aristotle himself, consulting his own fame, could not have done better'. Two later drafts recast this opinion; see North, *General Preface*, pp. 129–30, 186. When it suited him to backdate his education in infinitesimals during the priority dispute with Leibniz, Newton did tell people who wanted to hear it that he had learned a great deal from Barrow; see the testimony of Conti (this volume, p. 239); and also Feingold, 'Newton, Leibniz and Barrow too', *Isis*, 84 (1993), pp. 310–38.

pared to make use of the neglect-of-self narratives, and justify their pecularity by invoking the almost 'angelical' contemplations (p. 286) in which Newton indulged, this did not fully extend to neglect of the house of prayer. So where Humphrey had originally suggested that burning the candle at both ends had rendered Newton too tired to get up in the morning to go to chapel, Stukeley ignored this and merely asserted that 'in the mornings he was up at study' (pp. 77, 285). On the other hand he could excuse Newton's less than regular attendance at chapel by dint of the study that he performed on Sundays, 'when he turned over the sacred volumes, with great diligence, and full conviction of the divine Sp$^{t}$. that dictated them' (p. 287).

Only in the final draft of the 'Memoirs' did Stukeley note that Newton had left behind a prophetic lexicon and dissertations on the form of the tabernacle and the dimensions of the cubit (p. 285), but in both versions of the 1752 treatise he was keen to emphasize Newton's work on chronology and prophecy. The latter was praiseworthy on the grounds that Newton realized 'that the Divine lays his mysterious plan of future things, in the scenes of the Jewish temple, & service', but on other topics, such as Newton's dating of the voyage of the Argonauts, Stukeley thought he was skating on thin ice (p. 287). As for confessional allegiance, Stukeley insisted in the 'Memoirs' that Newton's 'public acts of adoration' were in the service of the Church of England. Above all other religions, he claimed, this 'most certainly, & most strongly affects, & influences a rational person, one of learning, & solid piety' (p. 292). He noted that several people – most notably Whiston – had tried to make out that Newton was an Arian, 'but in vain, & absolutely <clearly> without any color of pretence for it'. Perhaps fancifully, he pronounced in the Grantham MS that the Church of England 'justly & intirely claims him, as hers. he was an absolute fr$^{d}$. to reveald religion as professed by her, in all points of faith & in practice' (p. 293).

As for his character, Stukeley repeated verbatim the earlier testimony he had acquired from Humphrey Newton about Newton's sense of humour, but added that he thought Newton was capable of more levity than Humphrey had allowed (pp. 77, 283). Ignoring the unfortunate events of the early 20s, when Newton had been decidedly cool towards him, Stukeley noted in the 'Memoirs' that Newton was good-natured, witty (or rather he had a repertoire of sayings that 'bordered on wit') and was even inclined to the occasional bout of laughter (p. 283). His longevity was due, wrote Stukeley, to his natural constitution coupled with a prudent conduct that was maintained throughout his life. Nevertheless, Stukeley, a stickler for exercise as a way of counteracting gout, somewhat contradicted this by insisting that Newton's great age was 'far beyond what one c$^{d}$. have expected in one so intirely for the better part of his life, immersd in soli-

tude, inactivity, meditation & study' (pp. 81–2, 290). He repeated the tales of Newton's great charitableness (pp. 82, 290–1) and in the later text he added that when Newton attended the marriages of his relations, he 'w$^{d}$. on those occasions, lay aside gravity, be free, pleasant & unbended'.[38]

The 'Memoirs' concluded with material that almost wholly postdated the earlier letters. Stukeley now recorded a conversation he once had with Newton about the nature of the Milky Way, and about the role of each star within it. As for what Stukeley called the 'macrocosm', he thought that the incessant human ambition for creating new things was a particle of divinity 'implanted in us, for good purposes: that we may be active, & busy' (p. 294). Stukeley shared the view of Newton and many others that there was life on other planets, and added that God continually created new worlds 'to multiply the infinitude of his beneficiarys, & extend all happiness beyond all compass & imagination' (pp. 294–5). Regarding the Milky Way, he was one of the first people to grasp the implications of the visible heavens for situating the Earth in a flattened system of stars, which (as he saw it) was analogous to the plane of the planets in the solar system, or to Saturn's rings (pp. 295–6). Newton seemed to agree to this, Stukeley wrote, despite various objections that could be made against it. Otherwise, Stukeley mentioned attempts by people such as Robert Greene and John Hutchinson to overthrow Newton's system, whose 'superstructure' he considered to be 'too compact to be overturn'd' (p. 298), and waxed nostalgic over the galaxy of individuals who had graced England while Newton was still alive. Finally he provided the basic details surrounding Newton's death, and mentioned a number of portraits and busts that were in existence, adding the fact that nearly all Newton's relatives had squandered the fortunes they got from him (p. 303).[39]

## John Conduitt: Newton as National Man

If Stukeley's account of Newton's early life is an unrivalled source for understanding the origins of his practical acumen, historians have long

38 The Cambridge Platonist Henry More told John Sharp in August 1680 that Newton's countenance was 'ordinarily melancholy and thoughtfull, but then mighty lightsome and chearfull', see Marjorie Hope Nicolson (ed.), *Conway Letters, The Letters of Anne, Viscountess Conway, Henry More, and their Friends*, revised edn, intro. Sarah Hutton (Oxford, Clarendon Press, 1992), p. 482.

39 Newton discussed other creations with Conduitt in March 1725 (see this volume, pp. 166–7) and left open the possibility of the same in his second letter to Richard Bentley of February 1693, see *Correspondence of Isaac Newton*, vol. 2, pp. 253–5.

known that the so called 'Conduitt papers' are the richest resource for comprehending his personal life and his intellectual development after arriving in Cambridge. John Conduitt married Newton's favourite niece Catherine Barton on 26 August 1717 and in so doing he set up house with a woman who had known Newton closely for nearly two decades. The daughter of Newton's half-sister Hannah, Catherine was born in 1679. When her father Robert Barton died in 1693, Newton seems to have taken on a paternal role in caring for Catherine and her two siblings; at any rate, she came to live with her uncle some time after he moved to London in 1696. Catherine was a well-known figure in social circles by the end of the first decade of the eighteenth century, by which time she had come under the watchful eye of Newton's patron, Charles Montagu (Earl of Halifax after 1700). Halifax had married the much older Countess of Manchester in 1688, though this relationship was terminated by her death ten years later; he certainly knew Catherine Barton by 1703 and, remarkably, within three years he had added a codicil to his will in which he left her £3,000 and all his jewels. In 1713 Halifax drew up another codicil to his will, granting Catherine bounty to what, when Halifax died in May 1715, the jaundiced Flamsteed believed was in the region of more than £20,000.[40]

The closest relative of Britain's most prominent genius was not long without a suitor, and Catherine married John Conduitt at the end of August 1717. Born in 1688 and nine years younger than his wife, Conduitt entered Trinity College in 1705 but was in the army for the bulk of the years between leaving Cambridge and his marriage. A wealthy man by the time of his wedding, he purchased a country estate, Cranbury Park, near Winchester in 1720. He read papers on the possible site of the Roman town Carteia at the Royal Society in December 1716, March 1717 and June 1717, by which time he presumably knew Ms Barton. Their only child, Catherine ('Kitty'), was born in 1719, and Conduitt became a Member of Parliament for Whitchurch in Hampshire in 1721, although he decided to represent Southampton from 1734. It is not known how frequently he and Newton met, though the Conduitts managed Newton's move to Kensington in early 1725, and it is possible that Newton stayed for a while at Cranbury Park. Conduitt performed some of the functions of Newton's role as Master of the Mint in the last two years of Newton's life, and took over the position after Newton's death, although Whiston recorded that it was offered to Samuel Clarke and that Conduitt had bought the office from him.[41]

40 See Flamsteed to Sharp, 9 July 1715, *Correspondence of John Flamsteed*, vol. 3, p. 752; Westfall, *Never at Rest*, pp. 594–600, and the relevant texts reprinted in Volume 2 of this work.

41 Westfall, *Never at Rest*, pp. 846–50, 865, 873; William Whiston, *Historical Memoirs of Samuel Clarke* (London, F. Gyles and J. Roberts, 1730), pp. 135–6.

Conduitt was incapable of following difficult arguments within the more abstruse regions of Newton's natural philosophy, but despite his other business he was indefatigable in doing right by his hero. The results of his labours are by no means restricted to the loose sheets that make up the texts in this volume, and he was concerned that Newton's unprecedented stature should be represented in literature, art, sculpture and indeed throughout European culture as a whole. Newton's death brought him a great deal of administrative work, and his attempts to act as a more scholarly-minded administrator of the estate seem to have been rebuffed by a group of relatives. All Newton's possessions were to be assessed, and experts were brought in to determine the suitability for immediate publication of various treatises that Newton had in his papers. In comparison with the £4,000 that each of the eight relatives in question had been left by Newton, the sums realized as a result of publishing those works passed by Thomas Pellet as 'fit to be printed' was small. One of these, the *Chronology of Ancient Kingdoms Amended* (published in 1728), had been readied for publication by Newton himself and with the furore that was then raging over his entry into the sacristy of chronological dispute, a longer version of his views was expected. According to Zachary Pearce, the source of most of the information about Newton's attitude to the *Chronology* in the last two years of his life, Pellet worked with Martin Folkes in preparing the text for the press, and it appeared at the end of 1727.[42]

Where Stukeley's vision of Newton's genius was more prosaically organic, Conduitt reached at every moment to classical sources to place Newton on a pedestal. Along with Newton himself, Conduitt had for some time been preparing the basis of future accounts of Newton's greatness. That is surely in part the reason for the brief memoranda of conversations that appear in this volume, although the evidence of independent sources for many stories suggests Newton required little prompting to proffer tales of his early days. Three days after Newton's death, Thomas Mason, Rector of Colsterworth, responded to a request from Conduitt (pp. 57–8) for information, mentioning rumours that he had talked about founding and endowing a school in Woolsthorpe. The mathematician and cleric John Craig replied early in April (pp. 63–6) to a similar request, writing that 'Astronomy remain'd <still> in the dark till the immortal Newton gave us his Philosophical Principles of Natural Philosophy', and adding that Newton thought that the Cartesian philosophy had been deliberately created to be the foundation of infidelity.

42 See Richard de Villamil, *Newton the Man* (London, G. D. Knox, 1931), pp. 50–61 (for the inventory of the estate); and Zachary Pearce, *A Commentary, with Notes on the Four Evangelists and the Acts of the Apostles …* (London, T. Cadell, 1777), p. xli.

On 27 March, Conduitt drafted letters (in French, presumably in his own hand) to Bernard de Fontenelle, the eminent Secretary of the Académie Royale des Sciences in Paris. Conduitt remarked (pp. 58–60) that the task of composing the traditional éloge would fall to Fontenelle, and that he would do his best to supply him with requisite material if Fontenelle gave him directions. He also told Fontenelle that he was himself preparing a life, but that it would take some time. Fontenelle replied a week later (pp. 66–7) to say that he did not wish to usurp the work that Conduitt was preparing but would be grateful for any information he could use in preparation for the éloge, which would be read to the Académie on 12 November (1 November O.S.). He wanted details about Newton's family, and about any traits of brilliance that revealed themselves in Newton's infancy. What were his favourite books, and how did he first gain entry into mathematics and optics? What prizes had been showered on him by princes? What were his moral views, and what did he do in his private life? What did he do in his old age, and what was the manner of his death?

In his covering letter (pp. 85–7) to the 'Memoir' as it was sent, Conduitt apologised for the delay in sending the material, and told Fontenelle that he still planned to compose a life of his uncle and if he succeeded in doing so, it would be by 'walking in your footsteps and profiting from the light that shines from all of your works'. The rest of the letter concerned Conduitt's partiality for his relative in the priority dispute, and he asked Fontenelle to excuse him if he was over-zealous in this regard. He deleted a sentence intimating that British mathematicians disagreed with the alleged view of the Marquis de l'Hôpital regarding the superiority of the Leibnizian notation, and replaced it with another, in which he stated that Newton had told him that he had heard that the Marquis believed Leibniz had taken the method from him. Finally, he requested that a passage he had sent praising Caroline should be inserted in the éloge, and asked Fontenelle to send an extra copy for her.

Although it was an obviously partisan document, Conduitt's 'Memoir', presented in two English versions in this volume (pp. 89–97, 98–106), conformed to Fontenelle's request for basic information. He repeated Stukeley's error regarding the date of the death of Newton's mother and was incorrect in stating both the name of Newton's stepfather and the year of his entry to Cambridge. Nevertheless, it provided the factual backbone for Fontenelle's 'Éloge', which itself played the same role for all subsequent eighteenth-century biographies. As Hall points out, this was the case notwithstanding the substantial amount of new information that appeared throughout the period, and even Stukeley's 1752 essays show no signs of awareness of any newly published biographical material. Apart from some

novel genealogical information, the publication by Edmond Turnor of Conduitt's 'Memoir' in his *Collections for the History of the Town and Soke of Grantham* in 1806 added little to what was known from Fontenelle's 'Éloge', although as Rebekah Higgitt shows in the second volume, Newton scholarship was to evolve dramatically in the following decades.[43]

Much of the material used by Conduitt in his 'Memoir' came 'de la bouche du Chevalier' (p. 85), drawn either from his own or Catherine Conduitt's conversations with Newton, or via his own researches into Newton's archive. The key source was a series of notes from a conversation in the summer of 1726 (pp. 161–4), while the theological contents of an earlier tête-à-tête (pp. 165–6) may have been too extreme to appear in Conduitt's proposed work. He had access to many of Newton's disciples, such as Halley and Machin, and also to a manuscript version of Pemberton's *View*, though the treatment of Newton's natural philosophy in the 'Memoir' is remarkably superficial. As he had told Fontenelle, he was extremely busy in a number of other areas and in any case, as he also reminded the Secretary of the Académie, the latter had ample public sources to tell the story of Newton's scientific achievements. He made almost no use of Stukeley's material, but urged Fontenelle to do Newton justice in the matter of the priority dispute with Leibniz, and to mention the great regard in which Newton was held by the new monarchs, George II and Queen Caroline. Conduitt related that early on at Cambridge Newton had read Robert Sanderson's *Logicae Artis Compendium* as well as Kepler's *Optics* and Descartes's *Géométrie*, the latter after being turned on to Euclid via an interest in judicial astrology. The apple story first appeared in Conduitt's account as an addition to the first draft (compare pp. 90, 99, 174); although Fontenelle made no use of it, it cropped up in a number of ostensibly independent narratives at this time. He wasted little time in directing Fontenelle to the *Commercium Epistolicum*, and wrestled with how to present the thorny issue of the priority dispute with Leibniz. He pointed to Bernoulli's duplicity and also, as he saw it, to Newton's capacity to solve the major mathematical problem of orthogonals that was presented by Leibniz and Bernoulli as challenges to English mathematicians in 1715. In fact, Conduitt conflated Newton's response to this problem with the latter's much more successful approach to the brachistochrone problem set by the same mathematicians in 1697, leaving completely obscure the fact that Newton had solved the latter but had completely failed to deal with the problem of orthogonals.[44]

43 Hall, *Isaac Newton: Eighteenth Century Perspectives*, pp. 7, 13–26.

44 Ibid., pp. 16–18; Newton, *Mathematical Papers of Isaac Newton*, vol. 8, pp. 425–41; and Westfall, *Never at Rest*, pp. 582–3. For the description of the apple story in the French translation of the 'Memoirs' see Keynes MS 129(C), f. 2 v.

Conduitt added (p. 99, and cf. p. 90) that Newton had bought a prism in 1664 to test some experiments in Descrates's 'book of colours', but soon found that they were erroneous. Fontenelle did not include this information in his 'Éloge'. Conduitt laid out what he took to be the facts of Newton's priority in discovering the calculus, bearing in mind that in his éloge of de l'Hôpital Fontenelle had asserted that the Leibnizian calculus had been devised at the same time. It was now clear, Conduitt urged, that Leibniz had taken the method from Newton and his guilt was revealed by his obfuscatory and duplicitous conduct in the wake of the *Commercium* (p. 99). Bernoulli's conduct was even worse, and indeed the Swiss mathematician had resorted to bare-faced lying in denying that he was the author of the letter in the *Charta Volans* that had been attributed to him. Conduitt struggled with the issue of whether the differential calculus was more useful than employing fluxions. In the covering letter to Fontenelle and in the second draft of the 'Memoir' (pp. 86, 100) he worried lest the unwary reader think there was any doubt about Newton's priority in inventing the calculus, and he argued that the issue of whether the differential calculus was more 'useful' than the fluxional method – which Fontenelle had asserted in the éloge of Leibniz – was an independent subject. In any case, Conduitt concluded, while Leibniz 'pretended to be the first inventor of the differential <method> of fluxions he <not only was not an inventor but> never understood it enough to apply it to the system of the Universe w$^{ch}$ was the great & glorious use S$^{r}$ Isaac made of it' (p. 100).[45]

Apart from personal details relating to Newton's career, Conduitt acceded to Fontenelle's request for information about accolades and marks of esteem that had fallen Newton's way. More significantly, he emphasized that his character was 'pure & unspotted in thought word & deed' (p. 104). Newton was exceptionally generous to others, and 'always lived in a very handsome generous manner tho$^{u}$ without ostentation or vanity, always hospitable & upon proper occasions gave splendid entertainments' (p. 102). He was humble, and did not seek applause for his works, content to let others shepherd them into the light of day. If this paean were insufficient, Conduitt offered an even more expansive palette of adjectives for Fontenelle's delectation (p. 104). Moreover, Newton was 'exceedingly courteous & affable even to the lowest & never despised any man for want of capacity' and had a tendency to become tearful at sad stories. He was

45 For the account of Newton's use of the prism to counter Descartes's theory recounted in the French translation for Fontenelle, see Keynes MS 129 (C), f. 2 r.–v. The *Charta Volans* was the reply to the *Commercium Epistolicum* by Leibniz that was distributed at the end of July 1713 in which he indicated that there was no evidence that Newton was aware of the calculus before Leibniz's publication of the rules of calculus in 1684.