

## INTRODUCTION

The history of astronomy has numerous points of contact with the general history of mankind; and it concerns questions which interest a wider class than professed astronomers.

Sir George Cornewall Lewis<sup>1</sup>

This book examines how Isaac Newton's reputation was utilized, and altered, by British men of science in biographies and historical studies published between 1820 and 1870.<sup>2</sup> A detailed analysis of these works and the contexts in which they were produced demonstrates the contemporary significance of these portraits for the scientific community. It is, therefore, among a number of recent 'Reputational studies' which argue that representations of historical figures reflect the circumstances in which they are created and that the reputations of such figures can be used to legitimate current interests.<sup>3</sup> Because of the fundamental importance of Newton as a scientific icon, uses of his posthumous reputation, whether in science, religion, biography, poetry, art or more popular genres, have long been subjected to analysis. However, this book focuses on the increase of knowledge about Newton's life and character within a fifty-year period and thus offers a far more detailed examination of the motivations and influences of writers on Newton than any of these previous works. The period under consideration is significant for three reasons. First, it saw a sudden expansion in the amount of material relating to Newton that was available to researchers and readers; second, it saw a series of debates in which Newton's personal and scientific character was either central or used as a resource; and third, it was a period that saw important changes for science and its practitioners. These texts appeared against the background of the increasing professionalization, specialization and secularization of science and it is not coincidental that a period that saw the creation of modern science also featured an identifiable debate about the life and character of the most famous of British natural philosophers.

## Background

Some writers have identified a 'second scientific revolution' as occurring around the turn of the nineteenth century, ushering in a recognizably 'modern' form of science. The period covered by this book was one of growing specialization for practitioners of an increasingly mathematicized and objectified science. It saw the creation of new scientific disciplines and radical transformations in the existing sciences. By the 1820s, the 'analytical revolution', which brought Continental mathematical techniques to Britain, was almost complete. Also transmitted were the techniques and vision of mathematical physics that produced the wave theory of light, which gained ascendancy in Britain during the 1830s. The use of new mathematical techniques in astronomical theory led to notable triumphs for both Newton's theory and its subsequent enlargement, including the successful prediction of the orbit of Neptune in 1846. Astronomy also saw the development of a new rigour in observation and standardized international co-operation. Such techniques meant that increasing numbers of individuals with diverse skills were included among the scientific community. This transformation in the role of the practitioner of science was symbolized by the coining of the word 'scientist' in the 1830s but begged questions about what qualities were most appropriate for this new figure, who represented an increasingly fragmented field.<sup>4</sup>

The large number of specialist scientific societies that appeared in the early nineteenth century is another indicator of these developments, as is the rise of specialist journals and disciplinary divisions within more popular works such as encyclopaedias. Such factors have been read as indicating the professionalization of science during the nineteenth century, although applications of this term have been criticized in recent decades. Studies of institutions that have been seen as signposts on the path of professionalization, such as the British Association for the Advancement of Science (1831) and the Geological Survey (1835), have shown the very different motivations of those most directly involved in their foundation and have underlined the continuing dominance of an amateur and gentlemanly ethos.<sup>5</sup> A more recent and nuanced study, by Ruth Barton, investigates how men of science chose to define themselves and their community, and convincingly demonstrates the complexity of the issue. There was, however, a clear sense of the existence of a scientific community and corresponding notions of inclusion and exclusion.<sup>6</sup> One means by which both this wider group and the disciplinary and other communities of which it consisted were consolidated was through the invention of a scientific tradition, and disciplinary histories 'proliferated as part of the process of staking out boundaries and establishing legitimacy'.<sup>7</sup> Also required were heroic, emulative forbears and the notion of a national scientific heritage able to rival that of the Continent.

The nineteenth century has long been discussed in terms of the relationship between the scientific enterprise and religious belief and has been characterized as a time when the 'investigation of nature was changed from a "godly" to a secular activity'.<sup>8</sup> Within the British context, particular attention has been given to the tradition of natural theology and its decline in the second half of the century. Early in the century, however, the tradition received a new impetus with the Evangelical Revival and an intensification of religious feeling and practice in the wake of the French Revolution. Newton's science was a key element of eighteenth- and nineteenth-century natural theology. Equally, Newton himself – his religious faith and positive personal characteristics – was a resource. As Susan Cannon has said, 'Sheltered under Newton's great name, science and religion had developed a firm alliance in England, symbolized by that very British person, the scientific parson of the Anglican Church.'<sup>9</sup> Historians of science have in addition demonstrated the extent to which natural theology existed to support the political status quo and the establishment of the Anglican Church rather than to legitimate science.<sup>10</sup> The adherence of important scientific figures to orthodox religious values was a key element in this defence.

It was against this background that the publications examined in this book appeared. However, the period has been dictated by the boundaries of an identifiable debate about the life and character of the most famous of British natural philosophers that was, in turn, largely shaped by the publication of hitherto little-known or unknown materials. This book therefore considers the reciprocal relationship between Newtonian studies and the development of a new expertise in the history of science that drew on developments in contemporary historiography, especially in the critical use of manuscript sources. The increase of knowledge about Newton did not occur in isolation but echoed wider developments in historical and biographical writing. The nineteenth century's fascination for and utilization of history has frequently been acknowledged, as the past began to be 'cherished as a heritage that validated and exalted the present'.<sup>11</sup> This interest in the past was linked to a new belief in progress and unprecedented recent change. John Stuart Mill's 'The Spirit of the Age' (1831) argued that the idea of comparing the past and present could only have become popular at a time when people had become conscious of living in a changing world and looked to the past as a guide to future development.<sup>12</sup> With science viewed as the most clearly progressive of human activities, its history became a topic for study in the hope that lessons could be learned and further successes ensued.

While some historians hoped that, like a science, the study of history might reveal general laws, there was an opposing trend that also claimed authority from comparison with the sciences. Rather than searching for patterns and laws, history was to be a collective enterprise, based on the gathering of historical 'facts'

and the study of the particular. In the 1860s, historians, beginning to enter the academic world, pointed to the German school of history, and especially Leopold von Ranke, as their guide for having taught the importance of the critical reading of primary sources.<sup>13</sup> While Ranke's interest in the availability, use and care of source materials was not as innovative as was sometimes claimed, he did come to represent a new historical style.<sup>14</sup> Although the position of the former as a 'founding father' of academic history was largely created in retrospect, from the 1830s Ranke and Barthold Niebuhr were frequently referred to in Britain with esteem. However, an interest in historical texts came before widespread knowledge of German historical writing, as demonstrated both by a burgeoning market for autograph manuscripts and by initiatives to make the nation's archives available to the public. Although not uncontested, the presentation of increasing amounts of archival evidence was, from the beginning of the century, seen as the most valuable means of understanding past events and lives.<sup>15</sup>

Biography became the dominant genre in history of science, and its flowering from the late eighteenth century has received particular attention from historians.<sup>16</sup> However, commentators have frequently been impatient of nineteenth-century biography, seeing it as lacking either historical credibility or artistic merit, abandoning the good example of earlier works like Boswell's *Johnson* in favour of uninspired *Lives and Letters* or hagiography. The former of these trends, which saw the inclusion of large amounts of manuscript material within biographies, was celebrated in the *Edinburgh Encyclopaedia* as a means by which 'the narrative of the historian is supported, and elucidated'.<sup>17</sup> The latter trend, the presentation of the subject as a moral exemplar, has been described by historians as universal within nineteenth-century biography. The tension between these two factors, especially when the contents of the manuscripts undermined the story's moral, has been noted, as has the acceptability of a resolution involving the suppression of difficult evidence. Recently, biographies of scientific figures have received particular attention, and academics who have produced biographies of scientists have meditated on the benefits and dangers of their approach.<sup>18</sup> Others have studied biography in order to highlight its importance in the creation of a collective identity, the justification of the scientific enterprise and the changing and competing identities of scientific heroes. This approach has demonstrated that biographies of men of science and histories of science can be invaluable tools for revealing the author's views about the scientific enterprise, but it can blind the historian to reading such works as contributions to a nascent field of the history of science.

In general the history of science produced before the subject was professionalized in the twentieth century has received inadequate consideration.<sup>19</sup> While the potential of examining early writings has been recognized there has tended to be a focus on ambitious conceptions of the progress of science. Historians

have therefore given prominence to the ideas of writers such as Auguste Comte and William Whewell, treating their work in isolation from other approaches. This book therefore aims to highlight an understudied style of history of science, which focused on manuscript sources, bibliography and narrow topics rather than narrative. Not only were more individuals engaged in this kind of enterprise but it was relied upon by writers such as Whewell, who carried out little original research. However, analyses of Whewell's historical work have produced useful discussions regarding, for example, the relationship between history and biography, showing that, while biographies could explore the individual's scientific character 'as a means of showing its conformity with existing models of virtuous behaviour and for explicating its distinctive features', histories frequently emphasized the role of scientific method and progress. However, Whewell's history contained 'biographical' concepts, such as 'the relation between intellectual and moral character', and the works considered in this book also muddy the distinction.<sup>20</sup> Those that are furthest from straightforward life narratives, for example published collections of correspondence, might still demonstrate an overriding interest in personal character.

Ideas about biography and histories of science have been included within studies that explore how Newton's reputation was forged. Of greatest significance is Richard Yeo's valuable essay on images of Newton between 1760 and 1860, which identifies the main strands in the debates about Newton, neatly summed up in a title that links perception of genius to ideas about scientific method and personal morality.<sup>21</sup> Patricia Fara's recent *Newton: The Making of Genius* gives the 'afterlife' of Newton more sustained examination in a popular format. As the title suggests, she also explores the intermeshed history of ideas regarding scientific genius. Both works are immensely useful in understanding the background to the debates under consideration here but, because they cover a broad period and topic, they do not give detailed consideration to the reasons why particular individuals expended time on researching and writing about Newton's life.<sup>22</sup> Their work suggests that, if more space is devoted to the examination of these motivations, an enormous amount can be revealed regarding the individual's position within the scientific community, their understanding of the manner in which science advances and their beliefs about the place of science within contemporary culture. In both accounts, however, the emphasis is on the changing perception of genius that developed with the later eighteenth-century interest in the individual and originality. The narratives, therefore, hinge at the turn of the eighteenth and nineteenth centuries. While this development is undeniably important to understanding the writings considered in this book, it is not the crux of the narrative.

The British debate about Newton, commencing in the late 1820s, helped construct 'a new image of scientific genius, with Newton as its central example'.<sup>23</sup>

It was, however, a by-product of the already-awakened interest in understanding the life and discoveries of a generally acknowledged genius. By shifting the focus of the narrative to this later period, my story is dictated instead by the processes of historical research. This book is, therefore, about the development of expertise in writing about Newton and is much less concerned with popular or artistic portrayals than other 'reputational' studies. Although a number of the works under consideration were aimed at a popular audience, even these were written with a sophisticated knowledge of previous accounts and current developments in the field of Newtonian scholarship. Because of the release of an unprecedented amount of information from manuscript collections, the gap between popular and 'historical' understandings of Newton's life widened dramatically in this fifty-year period. This information was mediated by individuals who had detailed knowledge of the period in which Newton lived and worked and who were in communication with each other regarding the available sources. From this point of view, other studies about the reputations of deceased men of science pay too little attention to the practice of writing history and biography and frequently treat biographical writings in isolation from related developments within the field of history of science. In this book I show that interest in Newton led the way in writing about the history of science in Britain, for he was the first figure to be discussed in such depth and in relation to such a wide range of sources. *Recreating Newton* reveals why the contributions to the debates over Newton's reputation were, in these fifty years, conducted in this manner and why the status that Newton was commonly accorded at the beginning of the century was defended by some and undermined by others. Individuals from both groups were, for differing motives, to become the first community of experts in Newtonian scholarship.

### Science and Genius

This book highlights the themes of the use of Newton's reputation in support of various interests within the scientific community, the increasing use of his archives and the role of political and religious commitments in defining attitudes to the revelation of foibles in the illustrious dead. In addition, the writings on Newton examined in the following chapters elucidate another significant theme that relates to the nature of science and how it advances. Consideration of a figure such as Newton begs the question: are scientific discoveries the result of a moment of inspiration or the product of the application of a scientific method? Related questions are: is scientific theory or practical observation and experimentation more important to scientific progress? Is science a solitary or a communal enterprise? Is individual character and morality or the adherence to a set of communal norms more admirable in the man of science? More widely,

we might ask if the answers to such questions are altered by the branch of science under consideration, or if different fields or different tasks require different types of ability. During the early and mid-nineteenth century these questions were widely debated and were made all the more contentious by the recent evolution in the understanding of the word 'genius'.

The importance to Newton's posthumous reputation of the eighteenth-century evolution of the understanding of creativity and 'genius' has been highlighted by Yeo and Fara. Conversely, they note the extent to which Newton's image affected the developing concept of genius. By the latter half of the eighteenth century, the term had come to imply an innate quality of mind: it 'grows, it is not *made*.'<sup>24</sup> This innate quality was thus likely to become apparent in childhood and it was, indeed, frequently connected with the vigour of youth rather than the experience of age. While some writers emphasized 'poetic' over 'philosophical' genius, the moral and natural philosopher Alexander Gerard discussed both, claiming 'A GENIUS for science is formed by *penetration*, a genius for the arts, by *brightness*.' To Gerard, 'Diligence and acquired abilities may assist or improve genius: but a fine imagination alone can produce it.'<sup>25</sup> This individual imagination was the key element of the new conception of genius, and the suggestion that this was true of philosophic genius had important implications for scientific methodology. If imagination is accorded a role in the process of discovery, the individual scientist is given greater status but the concept of a universally applicable methodology is undermined. Likewise, if discovery is attributed to inspiration or an imaginative leap, the pedagogical utility of a genius's biography is decreased. However, in Gerard's understanding, although a methodology existed to enable the collection of facts, it was the imagination, controlled by judgment, that made connections and drew analogies from those facts. He used the story of Newton and the apple as an example of the philosophic genius at work, allowing him to make the leap from ordinary circumstance to universal concept.<sup>26</sup>

Others, however, rejected this attribution of scientific progress to the individual and his imagination. Joseph Priestley believed that genius had little role to play in discovery, and promoted science as an egalitarian enterprise, comprehensible to all.<sup>27</sup> He claimed that Newton deliberately obscured his path to discovery, making it seem mysterious and inaccessible:

Were it possible to trace the succession of ideas in the mind of Sir Isaac Newton, during the time he made his greatest discoveries, I make no doubt but our amazement at the extent of his genius would a little subside. But if, when a man publishes discoveries, he, either through design, or through habit, omit the intermediary steps by which he himself arrived at them; it is no wonder that his speculations confound others, and that the generality of mankind stand amazed at his reach of thought.<sup>28</sup>

Priestley therefore considered Newton's texts elitist and useless for teaching science. A related fear surrounding the concept of genius was the possibility that it would discourage ordinary men from striving to better themselves while convincing the gifted that they need not work to achieve their potential.<sup>29</sup>

Discussions about genius and methodology had clear moral implications. On the one hand, if success was due to the painstaking application of a particular method, this dedication was to be admired and imitated. On the other, an individual who made a discovery in a moment of inspiration might be assumed to have a connection with the Creator. If a moral example existed here, it must be assumed that the genius lived an exemplary life that made him worthy of such an honour, and Newton was portrayed within the British natural theological tradition as a paragon of all virtues with a god-like understanding of nature. However, by the beginning of the nineteenth century, the image of the genius was increasingly problematic. Although the Romantic movement might involve a rejection of science, the image of the Romantic, poetic genius was also applied to the scientific genius.<sup>30</sup> Older ideas of the great philosopher's other-worldliness, melancholy, absent-mindedness or eccentricity were reinterpreted within newer frameworks, where genius might involve dissoluteness, drunkenness and even madness.<sup>31</sup> These were commonly seen to be an accompaniment to, and sometimes even a cause of, inspiration, and might be linked to the notion that creation demanded personal sacrifice. By the 1830s such phenomena were discussed as medical symptoms of either an overdevelopment of the mental at the expense of the physical, or an inherent weakness of born geniuses. J. M. Gully, later Charles Darwin's doctor, lectured on this theme in 1830 and displayed the ambiguities surrounding this concept. How far, he asked, are we 'called upon to admire and esteem the brilliancy of genius and talent' and how far are we 'authorized to despise and condemn its infirmities'?<sup>32</sup> The nineteenth-century revision of Newton's character began with revelations that he had suffered such infirmities, thus raising the spectre of this dark side of genius.

### Sources for Newtonian Biography

No full-length biography of Newton was produced in the eighteenth century, but those that appeared in biographical dictionaries and encyclopaedias were based largely on the 'Éloge' produced by Bernard le Bovier de Fontenelle in his capacity as secretary to the Académie des Sciences.<sup>33</sup> The main source for this account was a memoir by John Conduitt, the husband of Newton's niece Catherine (née Barton). The 1728 English translation of Fontenelle's 'Éloge' went through five printings and this, together with the debt owed to it by later accounts, made it the best-known account of Newton's life until the 1830s.<sup>34</sup> Rupert Hall has published several eighteenth-century biographies of Newton that demonstrate

this lack of originality and adherence to standard biographical formulae. Some did include additional material – Thomas Birch’s 1738 article for the *General Dictionary* contained a significant amount of correspondence from the collection of the Earl of Macclesfield, the Royal Society and elsewhere – but this was not analysed or used to modify the account.<sup>35</sup>

These articles repeated a basic narrative of Newton’s life, heavily influenced by standard ideas about the lives of thinkers inherited from classical and Renaissance models. Newton, the posthumous child born on Christmas Day 1642, was described as having shown ‘early tokens of an uncommon genius’ that made him unsuited to the work of managing the family estate at Woolsthorpe. He was presented as an autodidact, even after his arrival in Cambridge:

A desire to know whether there was anything in judicial astrology first put him upon studying mathematics; he discovered the emptiness of that study, as soon as he erected a figure, for which purpose he made use of two or three problems in Euclid, which he turned to by means of an index, and did not then read the rest, looking upon it as a book containing only plain and obvious things. He went at once to Descartes Geometry and made himself master of it, by dint of genius and application, without going through the usual steps, or having the assistance of any other person.

The major discoveries of the heterogeneity of white light, the method of fluxions and universal gravitation were placed around 1665/6 and he ‘had laid the foundation of all his discoveries before he was twenty-four years old. The famous apple anecdote was reported by Catherine Conduitt: ‘in the year 1665 when he retired to his own estate, on account of the plague, he first thought of his system of gravity, which he hit upon by observing the fall of an apple from a tree.’<sup>36</sup> Conduitt did not mention the delay in Newton’s announcement of his discoveries, but his dislike of publication and preference for a quiet life were mentioned by Fontenelle and later writers.<sup>37</sup>

Because early sources for Newton’s biography – the Conduitts, William Stukeley, Henry Pemberton – knew Newton in later life, there was a greater focus on Newton as Master of the Mint and President of the Royal Society, who, in London, ‘always lived in a very handsome generous manner, tho’ without ostentation or vanity; always hospitable, & upon proper occasions, gave Splendid entertainments’. He was, however, also said to be ‘generous and charitable without bounds’ with a ‘contempt of his own money’ but a ‘scrupulous frugality of that w<sup>ch</sup> belonged to the publick, or to any society he was entrusted for’.<sup>38</sup> This portrait of the public man is tempered by a brief portrait of Newton the scholar. We are told that even in London ‘he was hardly ever alone without a pen in his hand & a book before him – & in all the studies he undertook he had a perseverance & patience equal to his sagacity & invention’. Setting the pattern for

the early biographers of Newton, Conduitt made little of the other studies that Newton undertook, noting merely that at Cambridge Newton had:

spent the greatest part of his time in his closet & when he was tired with his severer studies of Philosophy his only releif [*sic*] & amusement was going to some other study, as History Chronology Divinity & Chymistry[,] all w<sup>ch</sup> he examined & searched thoroughly as appears by the many papers he has left on those subjects.<sup>39</sup>

The final section of Conduitt's memoir follows the pattern of classical eulogy by including a peroration, which traditionally summarized the emulative qualities that might be associated with the subject, whether or not in strict accordance with the truth, or indeed the preceding pages. In this case Conduitt provided an extravagant description of the commendation of Newton's work by the Princess of Wales, a note of Newton's great humility, his 'meekness and sweetness', 'innate modesty and simplicity' and the conclusion that 'his whole life was one continued series of labour, patience, charity, generosity, temperance, piety, goodness, & all other virtues, without a mixture of any vice whatsoever'.<sup>40</sup> Before a description of his final illness, naturally endured with patience and fortitude, we are told that both physically and mentally Newton had remained in remarkable health and 'to the last had all his senses & faculties strong & vigorous & lively & continued writing & studying many hours a day'.<sup>41</sup>

Conduitt's original memoir, together with a few other papers from the collection of Newtonian manuscripts held by the Earl of Portsmouth, was first published in 1806 by Edmund Turnor, an antiquary and MP whose family had bought Woolthorpe Manor in 1732.<sup>42</sup> John Conduitt had been dissatisfied with Fontenelle's 'Éloge', calling it 'a very imperfect attempt', adding 'I fear he had neither abilities nor inclination to do justice to that great man, who had eclipsed the glory of [the French] hero Descartes'.<sup>43</sup> His response was to collect material to furnish a more suitable biography, but it was never completed. Turnor's publication included Stukeley's response to Conduitt's request for information, extracts from the Royal Society's Journal Books, and the record of 'A remarkable and curious conversation' with Newton.<sup>44</sup> Turnor's book therefore recorded at least some key anecdotes about Newton's early life, including reports of the mechanical devices Newton made as a child, of him as a 'sober, silent, thinking lad' and of his preference for reading to rural labour.<sup>45</sup> Turnor also added in a footnote Conduitt's record of some of Newton's words which were oft repeated in the nineteenth century as displaying the true Christian philosopher:

I do not know what I may appear to the world; but to myself I seem to have been only like a little boy, playing on the sea-shore, and diverting myself, in now and then finding a smoother pebble or a prettier shell than ordinary, whilst the great ocean of truth lay all undiscovered before me.<sup>46</sup>

Likewise Turnor quoted from the first of Newton's letter's to Richard Bentley, in which he not only claimed his successes were 'due to nothing but industry and patient thought' but also that he 'had an eye upon such principles as might work with considering men for the belief of a Deity'. However, one dark note was perhaps sounded by the strangeness of the views that Conduitt reported in the 1725 'curious conversation'. Although Conduitt began by stating that on that day Newton's 'head [was] clearer, and memory stronger than I had known them for some time', this seemed to undermine the claim in his 'Memoir' that Newton suffered no weakening of his faculties and to back rumours that he had ceased to understand his own book.<sup>47</sup>

As scholarship, Turnor's book provided a reasonably accurate transcription of what were considered important documents, included some useful footnotes and was informative regarding sources. It was not part of his brief to analyse the contents of the manuscripts that he printed; they told their own story, and this did not, as in Birch's article, conflict with a formulaic narrative or contain obvious factual discrepancies. It was to be the task of writers in the following decades to attempt to include such material within a revised narrative of Newton's life. Turnor's publication, which demonstrated a reverence for manuscripts, places and objects connected to Newton and an interest in his formative years, is illustrative of contemporary attitudes towards the memory of great men. The Portsmouth Papers were deemed to be of 'public importance', of inherent interest and requiring neither analysis nor narrative.<sup>48</sup> Turnor was clearly also desirous of advertising Newton's connection with Woolsthorpe and Grantham and, by extension, with himself.<sup>49</sup> This reverence for great men and their remains must be understood within the context of the newly developed emphasis on individuality and originality. It lent a new interest to personal recollections of that increasingly mysterious creature, the gifted individual. Stukeley's anecdotes of Newton's youth were well received at a time when promise of childhood and the effects of early experience began to form an important part of biography, while Conduitt's report of a conversation with Newton carried the impression of actual contact with the elderly sage.

This interest in the manuscript record of Newton gathered pace through the nineteenth century. Biographers of Newton were to add to these existing accounts through the discovery or rediscovery of a range of sources, a process which largely forms the narrative of this book. The main collections of correspondence, scientific papers and notebooks were to be found at the Portsmouth Estate, Hurtsbourne Park, and at Trinity College, Cambridge, and began to be examined much more fully and systematically from the 1830s. To these were added items relating to or reporting on Newton among the papers of his contemporaries. These included the manuscripts of John Flamsteed, the first Astronomer Royal, at the Royal Observatory in Greenwich and the collections in the hands

of Lord King (correspondence of John Locke), the Earl of Macclesfield (including correspondence and mathematical papers collected by William Jones) and Lord Braybrooke (correspondence of Samuel Pepys). These, together with a variety of smaller collections and individual items, provided new information about Newton's life or, very often, acted to confirm previously existing rumours. The publishing of such material to investigate aspects of Newton's heritage that had been, at least among certain circles, long suspected as problematic was the key feature of the period under consideration. These resources were given a new status that challenged that of existing narratives. Their importance was ultimately confirmed by their incorporation within the collections of large institutions, a process that began in the later nineteenth century, most significantly with the arrival of the scientific portion of the Portsmouth Papers at Cambridge University Library and the cataloguing of the whole collection.

### Outline of Contents

The following six chapters are arranged chronologically. Four take a single publication as their focus, examining the origins of each work, the novelties they introduced, the authorial aims and concerns, and their reception. Chapters 4 and 6 both deal with a number of biographical and historical writings, interpreted as either part of a broader historical movement or as contributions to a particular debate. The authors under examination form an important part of the subject matter of this book. They were active and often well-known members of the scientific community whose influential opinions frequently reflected issues of immediate concern. As Fara has suggested, the 'story of Newton's shifting reputations is inseparable from the rise of science itself'.<sup>50</sup> However, the authors' responses to the unfolding Newtonian archive could also be personal and emotional. In reviewing two modern biographies of Newton, B. J. T. Dobbs wrote, 'Newton has become something of a Rorschach inkblot test or a thematic apperception test for historians. What we already have in our psyches and intellects we tend to find in Newton.'<sup>51</sup> The following chapters bear out both of these statements and, in much greater depth than previous studies, demonstrate that the scientific, personal, religious and political concerns of writers on Newton are reflected in their publications.

The story begins with Jean-Baptiste Biot's article on Newton in the *Biographie universelle* (1822) and its English translation, published by the Society for the Diffusion of Useful Knowledge (SDUK; 1829).<sup>52</sup> This was the first significant retelling of Newton's life and the first to contain evidence regarding Newton's putative breakdown in 1692–3. The problematic and recently developed notion of scientific genius, and its presentation to different audiences, is central to this chapter. This work promoted a Romanticized image of Newton

that, once translated, proved to be controversial and potentially awkward as a production of the utilitarian SDUK in London. Biot (1774–1862) was a key figure within the Parisian scientific establishment and a member of the circle surrounding Pierre-Simon Laplace, a group that had achieved conspicuous successes in extending Newton's work but that was undergoing an eclipse in the 1820s. Biot's biography therefore illustrates the use of Newton's reputation to support a particular scientific approach. In addition he presented Newton as a consistent advocate of the corpuscular theory of light at a time when he felt this was under increasing attack from the supporters of the alternative wave theory of light. Because of this aspect of his work it was welcomed in Britain by advocates of the Laplacians and the corpuscular theory. These included Henry (later Lord) Brougham (1778–1868), the Whig politician who was founder and Chairman of the SDUK.

The controversial nature of Biot's biography led David Brewster (1781–1868), a close friend of Brougham, to respond with *The Life of Sir Isaac Newton* (1831).<sup>53</sup> Brewster, an Edinburgh-based researcher in the field of optics, wished to defend Newton from Biot's 'attack' because of personal reverence but also because of the religious and moral implications of Newton's 'madness'. As well as countering Biot's interpretation of the evidence, Brewster used his account of Britain's premier scientific hero to contribute to the contemporary campaign against the 'Decline of Science'. As a result the biography contains some contradictions regarding Brewster's image of Newton and his ideas on the progress and support of science. He believed that the process of scientific discovery involved the inspiration of unique minds but was at pains to point out that successful discoverers should be useful members of society rather than cloistered scholars. Likewise, he played an important part in the formation of the British Association for the Advancement of Science (BAAS) but rejected the 'Baconianism' that it came to represent. Brewster's views on all these points were informed by his own career disappointments, which fed his view that he, Newton and British science in general had been neglected by the authorities. The emphasis on these areas was recognized by his reviewers, who also chided him for his uncritical hero-worship of Newton. In countering this, the reviewers, who can be linked to the reformist and non-demoninational SDUK, advocated an 'impartial' and source-based approach to history.

Chapter 3 centres on the 1835 *Account of the Revd. John Flamsteed*, by Francis Baily (1774–1844), the President of the Royal Astronomical Society (RAS). This publication consisted largely of the manuscript correspondence and papers of Flamsteed, which depicted Newton in a radically different manner from earlier biographies and was to be a major impetus to subsequent research.<sup>54</sup> Baily's interest in Flamsteed, and his acceptance of Flamsteed's criticisms of Newton, were provoked by his appreciation of Flamsteed's careful, book-keeping

approach to astronomy. Flamsteed's virtues in this area were echoed by Baily's own approach to astronomy – and to historical research, for he appropriated the objective techniques of scientific data-recording to the presentation of a controversial historical subject. However, the seventeenth-century argument between Flamsteed and Newton had a wider contemporary relevance that revealed divisions between the scientific constituency represented by the RAS, at which Baily aimed his book, and that which centred on Oxbridge and the unreformed Royal Society. The different abilities of Newton and Flamsteed and the values attached to these – individual genius or laborious collective enterprise – were key elements of the debates. However, the letters sent to Baily regarding the *Account of Flamsteed* suggest that responses were also dictated by political and religious commitments. Those who approved of Baily's publication, together with those who criticized Brewster's *Life of Newton*, indicate a reformist/radical critique of the idolization of Newton. The chief tactic at their disposal was the dissemination of documents that undermined that idealized image.

A number of publications that were fundamental to the increase of knowledge about Newton are discussed in Chapter 4, which places all the writings examined in this book within the context of the developing expertise in the history of science. There is a discrepancy in the existing literature, which has devoted significantly more attention to broad, narrative histories than to the primary-source based works of writers such as Baily, Stephen Rigaud (1774–1839), Joseph Edleston (c. 1816–95) and the contributors to the short-lived Historical Society of Science (founded in 1840). Their publications brought new evidence to readers but refrained from developing grand schemes regarding scientific development and frequently avoided all interpretation and theorizing. Their focus on original sources was in tune with contemporary developments in general historiography, but can also be viewed as a particularly 'scientific' technique. In his critical studies, Augustus De Morgan (1806–71) likewise insisted on the need for citing original authorities and an 'impartial' approach. His stance, like that of Brewster's reviewers and Baily's supporters, reflected his religious Non-conformity and political reformism. While rejecting the overt moralizing of hagiographical biography, these approaches embodied their own moral values, whether in the 'inductivist' approach demonstrated by Baily, Rigaud and Edleston or the 'impartial' judgments of De Morgan.

Despite the links between Baily, Rigaud, Edleston and De Morgan as experts on the life of Newton and the sources for the history of science, they had very different political and religious opinions, which are revealed in their attitudes to Newton. Baily, a former stock-broker, was the only one of these four who was not university educated. It was only after making his fortune in the business world that he was able to retire and concentrate on his scientific work and the welfare of the RAS. His approach to astronomy, as to history, was similar to

that of Rigaud, but they existed in very different milieus. Baily lived among metropolitan circles of middle-class reformers and Nonconformists while Rigaud was Savilian Professor of Astronomy at Oxford and a conservative in both politics and religion. Like William Whewell (1794–1866), the Master of Trinity College, Cambridge, Rigaud felt an urgent need to protect Newton from the revelations that were published in the 1830s. Edleston, a Fellow of Trinity College who later became a vicar in County Durham, likewise aimed to protect the reputation of his alma mater's most illustrious inhabitant. De Morgan was also educated at Trinity but moved to London, where he became a Fellow of the RAS and a close friend of Baily. He was Professor of Mathematics at the University of London, the non-denominational, or 'godless', response to the monopoly on learning of Anglican Oxford and Cambridge. In his teaching and writing, De Morgan was devoted to the idea of the separation of science and scholarship from religious interests.

The writings of Baily, De Morgan and others encouraged Brewster to mount his defences once more. Chapter 5 therefore considers his extended life of Newton, which appeared as the two-volume *Memoirs of the Life, Writings and Discoveries of Sir Isaac Newton* (1855).<sup>55</sup> Brewster's correspondence with other 'experts' on the life of Newton provides valuable information about his original research and his desire to find material with which he could defend Newton against these perceived attacks. His attempts to tackle problematic areas in Newton's biography have been commended by historians, but these points had all been raised first by others. Brewster examined the Portsmouth Papers in the hope of refuting these writings but found instead that much of the contents of this archive required him to make painful admissions. This standard biographical work must therefore be understood as the product of an individual's struggle between fidelity to an idealized image and to the historical sources, that is, between suppression and revelation. However, while Brewster occasionally resorted to suppression, the new evidence contained in the *Memoirs* – particularly from the Portsmouth Papers – ensured that the depiction of Newton within the reviews of this book was significantly different from that of 1831.

By the second half of the nineteenth century, the gap between the 'historical' Newton, created by the expert community, and the 'mythical' Newton, celebrated by men of science and the public at large, was clear. De Morgan criticized the latter in print and attempted to propagate a more nuanced picture, opposing the hero-worship that led to the erection of Newton's statue in Grantham. His campaign against Brewster and all those who adopted Newton as a hero and moral exemplar was continued in his *Newton: His Friend: And His Niece* (written c. 1856–70), which has been misread by most historians, who have erroneously presented it as a defence of Newton's morals. The battle was once more revived in a response to the uninformed reaction to an apparent attack on Newton's

scientific status in 1867, when a series of forged documents was revealed that claimed Pascal had discovered universal gravitation. This occasion provoked the last words of both De Morgan and Brewster on Newton and saw the final flaring of their sporadic argument. As well as highlighting the ability of ‘experts’ to deal with anomalous manuscripts, this episode serves to demonstrate that more popular views of Newton were not significantly affected by either the biographies produced over the preceding decades or by new historical standards. The rhetorical importance of the ‘mythical’ Newton proved – and still proves – to be more appealing and enduring than carefully constructed historical accounts.

### Conclusion

*Recreating Newton* provides examples of individuals whose biographical and historical works linked Newton’s authority to their own positions within contemporary scientific debates. A particularly strong case can be made regarding the writings of Biot, and subsequently Brewster, which sought to maintain the prominence of a corpuscular theory of light at a time when this was being successfully challenged, first in France and then in Britain. It likewise demonstrates in greater detail than other studies that debates regarding scientific methodology and the role of individual genius were played out in these and the other works under consideration. However, it shows that the question of Newton’s personal morality was at the root of the controversy and that the primary choice facing his biographers was whether to continue the convention of Newtonian eulogy or to provide a critique of this tendency. The move towards Newton’s archives was not a necessary product of the debates about his character and the nature of his genius and this book shows how and why this became the chief resource of the disputants. The growth of Newtonian studies, which contributed significantly to subsequent developments in the history of science, was stimulated initially by those who objected to eulogy and thereafter maintained by both defenders and critics of an idealized image of Newton.<sup>56</sup>

The attitude of the writer to Newton’s position within the natural theological tradition was a key element in dictating this decision. He remained an icon for Oxbridge, Anglican science but, as Nonconformists began to achieve official toleration – through the 1828 repeal of the Test and Corporation Acts and the 1829 Catholic Emancipation Act – and developed educational niches such as University College London (UCL), this could not remain uncontested. Attempts to divorce Newton from establishment interests led to a rejection of the assumption that he had led an incomparably virtuous life. This peculiar interest in Newton’s character lessened later in the century, when the question of the moral and religious authority of individuals was of less immediate import. This was the result of three key factors. First, the major revelations from the

Newtonian archives had ceased in the 1850s.<sup>57</sup> Second, as scientific practitioners became more numerous and were more frequently trained and paid for their work, trust was increasingly placed in scientific methodologies and techniques rather than the individual's personal integrity. Third, the breakdown of natural theology both lessened Newton's importance as a resource in the support of Church and State and the need for opposition to this strategy.

This book is unusual in being able to point to a number of works that criticized the use of the biographical subject as a moral exemplar. It therefore challenges simplistic accounts of nineteenth-century biography and suggests that alternative moral strategies could replace the provision of an emulative hero. Such accounts should also be modified by a greater awareness of the links between biography and history, especially when considering biographies of a historical figure. This book highlights the use of new styles of historical writing, especially the printing and criticism of manuscript sources, within publications that can be broadly described as biographies.<sup>58</sup> The conscious transferral of such methods to biography gave works authority but might also be used to place the individual within a historical setting, to undermine an existing idealized image, or to argue against critics. Ultimately, although faith was placed in the possibility of reaching the 'truth' about the past through the archives, it is clear that manuscripts could be used to support widely differing positions.

Therefore, as well as attempting to understand these publications on Newton as products of individuals with particular scientific or personal concerns, they are considered as examples of differing trends within the history of science. In many cases the loyalties of the author might be to the development of that field rather than to the promotion of a particular view of contemporary science and its practitioners. Although there was antagonism between those using Newton's authority to support contradictory positions, these men were in frequent communication, seeing themselves as engaged in the same enterprise. *Recreating Newton* exposes the existence of networks of 'experts' in the history of science and highlights a neglected contribution to nineteenth-century historical-scientific writing by drawing attention to those who focused on the publication of manuscript sources, redefining the Newtonian collections of colleges and private individuals as objects of national importance. These men, like the first 'professional' historians identified by Phillippa Levine, included librarians and archivists, and, just as Levine's group differed from much-studied narrative historians such as Thomas Babington Macaulay and Thomas Carlyle, their backgrounds and concerns were different to those of better-known contributors to the field.<sup>59</sup>

Although Newton remained an iconic figure in the later nineteenth century, available to scientific and non-scientific communities alike, research by biographers and historians of science had created an alternative understanding of his

character and achievement. This more complex depiction, which included the darker side of Newton's character and a more sophisticated grasp of the intellectual context in which his ideas developed, served to undermine assumptions regarding the relationship between genius and morality and between the successful pursuit of science and divine favour. This secularization of his legacy was welcomed by those who wished to break the link between Newton and Anglicanism but left an open question about how Newton's achievement and the history of science should be interpreted in the future. As in general history, specialists chose to pay greater attention to details and specifics and, once Newton's scientific papers were made available to scholars in Cambridge, research efforts were directed into uncovering the details of his discoveries. Although biographical forms remained important in the history of science, efforts were increasingly devoted to understanding Newton's ideas within their intellectual or social context. His moral character, or his personality, has remained an object of fascination but it is no longer matter for impassioned debate.

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