AUGUSTUS DE MORGAN, POLYMATH

EDITED BY KAREN ATTAR, ADRIAN RICE AND CHRISTOPHER STRAY

https://www.openbookpublishers.com

Karen Attar, Adrian Rice and Christopher Stray (eds), *Augustus De Morgan, Polymath: New Perspectives on his Life and Legacy*. Cambridge, UK: Open Book Publishers, 2024, https://doi.org/10.11647/OBP.0408

ISBN Paperback: 978-1-80511-326-3
ISBN Hardback: 978-1-80511-327-0
ISBN Digital (PDF): 978-1-80511-328-7
ISBN Digital eBook (EPUB): 978-1-80511-329-4
ISBN HTML: 978-1-80511-330-0
DOI: 10.11647/OBP.0408

Cover image: Portrait of Augustus De Morgan, in Sophia Elizabeth De Morgan, *Memoir of Augustus De Morgan (1882)*, https://commons.wikimedia.org/wiki/File:Augustus_De_Morgan_1850s.jpg. Background: Nico Baum, White round light on gray textile (2020), https://unsplash.com/photos/white-round-light-on-gray-textile-xZroI5V_dxc.
Cover design: Jeevanjot Kaur Nagpal.

I told Airy of your topsy turvy views about Orion: he declares he will stand upon his head the first fine night and look at it. I think I shall suggest to him a generalization upon the Greenwich method of observing. Let an observer take transits in a direct and reversed position on successive nights, and there must be a ± destruction of personal equation, and his determinations would be very valuable

and effective, particularly that of blood to the head.

And now a very good night to you, and finer weather than we have had. Such a succession of rain has not occurred for a long time

Pray remember me kindly to Maclear and C Smith

Yours very sincerely

A De Morgan

5 Upper Gower St
Feb. 20/37

Fig. 15 This letter, now housed in the archives of the Royal Society, was sent by De Morgan to the astronomer Sir John Herschel in 1837, while Herschel was in South Africa surveying the skies of the southern hemisphere. The cartoon is De Morgan's tongue-in-cheek suggestion as to how the Astronomer Royal, George Airy, might obtain similar 'topsy turvy views' of the Orion constellation from Greenwich. (HS/6/183, reproduced by permission of the Royal Society.)

11. Augustus De Morgan: The Archival Record

Karen Attar, Alexander Lock, Katy Makin, Jane Maxwell, Virginia Mills and Diana Smith

> The history of science is almost entirely
> the history of books and manuscripts.
> — Augustus De Morgan[1]

Introduction

There is no single De Morgan archive, and, tantalisingly, much of Augustus De Morgan's activity is unrecorded. Few drafts of publications remain, for example, and no documentation about his library in terms of accessions records—if he ever kept a list of acquisitions—or invoices. However, as the *Oxford Dictionary of National Biography* notes, De Morgan 'was a prolific correspondent, often adorning his letters with well-drawn caricatures and sketches'.[2] His correspondence with a wide range of scientific luminaries and other acquaintances, together with some mathematical manuscripts, grace libraries in England, Scotland, the Republic of Ireland, and the United States of America, easily locatable from the list of repositories ending the entry for De Morgan in the *Oxford Dictionary of National Biography*.

1 Augustus De Morgan, 'On the Earliest Printed Almanacs', in *Companion to the Almanac for 1846* (London: Charles Knight, 1846), pp. 1–31 (p. 1).

2 Leslie Stephen & I. Grattan-Guinness, 'De Morgan, Augustus (1806–1871)', in *The Oxford Dictionary of National Biography* (Oxford: Oxford University Press, 2004–), online edn., https://doi.org/10.1093/ref:odnb/7470.

 https://doi.org/10.11647/OBP.0408.11

Electronic catalogues and websites of the holding institutions provide further details of what precisely is available and how to access it. Helpful as they are, in themselves these are arid. They cannot give a flavour of the correspondence or, through it, the man. They indicate the fact of De Morgan's broad scholarly network, but not its nature. Publications of De Morgan's letters do achieve this, but cover only a fragment of the extant material.[3] This chapter looks more closely at the archival records pertaining to Augustus De Morgan held in his chief areas of residence, Cambridge (as a student) and London.[4] It complements these with two sets of records held elsewhere, in Edinburgh and in Dublin, and attempts to show how the archives reveal the man.

The British Library (BL)

The British Library holds some sixty manuscripts by or about Augustus De Morgan across several collections. These can be identified by examining the printed *Index of Manuscripts in the British Library* or by searching the Library's online manuscripts catalogue.[5] The manuscripts range from private correspondence on both personal and professional matters through to a biographical note in the 'Original, letters, with corrected proofs of memoirs, etc., addressed to Charles Griffin,

3 See *The Boole-De Morgan Correspondence*, ed. by G.C. Smith (Oxford: Clarendon Press, 1982); Sophia Elizabeth De Morgan, *Memoir of Augustus De Morgan* (London: Longmans, Green, 1882); Sophia Elizabeth De Morgan, *Threescore Years and Ten: Reminiscences of the Late Sophia Elizabeth De Morgan, to which are Added Letters to and from her Husband, the Late Augustus De Morgan, and Others*, ed. by Mary A. De Morgan (London: Bentley, 1895); James Smith, *The Quadrature of the Circle: Correspondence between an Eminent Mathematician and James Smith* (London: Simpkin, Marshall, 1861).

4 Only the Royal Astronomical Society (RAS) is excepted, because De Morgan's astronomical activity, which mines the RAS records, is covered thoroughly in Chapter 3 of this volume; moreover, its letters are primarily to, not from De Morgan. The catalogue of the RAS archives is available at: https://ras.ac.uk/library/archives/introduction-to-archives. The RAS archive includes correspondence with multiple astronomers, of whom Richard Sheepshanks (68 letters, 1842-1852) stands out. Particularly distinctive in the RAS archives are twelve De Morgan-authored biographies of scientists reprinted from Charles Knight's *Gallery of Portraits* (1833–1837), with De Morgan's annotations and drawings.

5 *Index of Manuscripts in the British Library* (Cambridge: Chadwyck-Healey, 1984–1986); British Library, 'Explore Archives and Manuscripts', http://searcharchives.bl.uk/.

publisher of the "Handbook of Contemporary Biography," (London, 1861)'.[6] Most of the material is correspondence, and the largest number of letters are found among the papers of De Morgan's friend and fellow mathematician Charles Babbage. Other letters by De Morgan can be found in the collections of several distinguished nineteenth-century figures, including the social reformer Sir Rowland Hill; the antiquary, book collector and university administrator Philip Bliss; the clergyman and campanologist Rev. Henry Thomas Ellacombe; the army officer Sir Charles Pasley; and the naturalist Alfred Russel Wallace.[7]

Letters include a number of De Morgan's playful pictures alongside more serious mathematical sketches. The surviving correspondence is largely good-humoured and the topics discussed are wide-ranging and well informed, demonstrative of the breadth of De Morgan's expertise and interests. As one biographical note held in the British Library confirms, De Morgan 'was a voluminous writer on branches of mathematics ... history and bibliography' and these are largely the topics discussed in the letters.[8] In his letters to Babbage, De Morgan frequently commented on Babbage's published work and on occasion—having 'read the book through (God's blessing be on you for writing a short book)'—had cause to question Babbage's logic (with equations) or point out a 'mistake' in his 'figures'.[9]

Elsewhere De Morgan corresponded with the Principal Librarians at the British Museum, writing to Sir Henry Ellis, regarding the Domesday Book and the length of 'the old English mile'. With Ellis's successor, Anthony Panizzi, of whom De Morgan was a friend and

6 British Library, London (henceforth BL), Add MS 28509, f. 421r.

7 See BL, Add MS 31978, Letters to Rowland Hill, 1837–1879; Add MS 33206, Correspondence with the Rev. H. T. Ellacombe, 1824-1882; Add MS 28509, Letters with corrected proofs of memoirs, etc. addressed to Charles Griffin, publishers, 1860; Add MS 22786*, Letters from Augustus De Morgan to Antonio Panizzi; Add MS 34578, Correspondence of Rev. Philip Bliss, 1806–185; Add MS 36717 and 36724, Correspondence and papers, literary, political and general, of Antonio Panizzi, 1823–1877; Add MS 37185, 37186-94 and 37199-200, Correspondence of Charles Babbage, 1806–1871; Add MS 38514, Correspondence and papers of Sir Henry Ellis, 1757–1850; Add MS 41964; Correspondence, letter-books, diaries, and note-books of Gen. Sir Charles William Pasley, 1764–1861; Add MS 46439, Alfred Russel Wallace Papers, 1848–1914.

8 BL, Add MS 28509, f. 421r.

9 BL, Add MS 37190, f. 167 and Add MS 37189, ff. 142r.-142v, Letters from Augustus De Morgan to Charles Babbage, n.d.

staunch supporter,[10] De Morgan discussed the activities of the Italian mathematician and manuscript thief Guglielmo Libri as well as the authorship and provenance of manuscripts, including one by Galileo.[11] When unfamiliar with a subject, De Morgan would correspond with experts to learn more, and was willing to share his own perspective. This was the case with the 'subject of the oscillation of buildings' that housed and rang bells, a topic which De Morgan had 'never turned my attention to' but which he found 'curious in a mathematical point of view'.[12] He discussed the matter over a series of letters with Henry Thomas Ellacombe, suggesting they compose 'a collection of facts ... for very little is known about the matter.'[13]

The Royal Society (RS)

Augustus De Morgan never sought to become a Fellow of the Royal Society. His name appears on no Candidates lists, and he never attended a meeting,[14] for he felt that, despite steps by Fellows to reform the Society in the 1840s, it continued to favour privilege over scientific

10 Their acquaintance had begun in 1828 when they were among the first professorial appointees at the new London University, later University College London: De Morgan as professor of mathematics and Panizzi as professor of Italian. For evidence of friendship with Panizzi, see De Morgan's note in his copy of J. Rogg, *Handbuch der mathematischen Literatur vom Anfange der Buchdruckerkunst bis zum Schlusse des Jahrs 1830* (Tübingen, 1830; Senate House Library, University of London, [DeM] CC4L [Rogg]) about him and Panizzi examining the book together. Note also De Morgan's support of Panizzi's arrangement of the British Museum catalogue, *Report of the Commissioners Appointed to Enquire into the Constitution and Government of the British Museum* (London: William Clowes and Sons, 1850), pp. 377–78; noted in P.R. Harris, *A History of the British Museum Library, 1753–1973* (London: British Library, 1998), p. 170, and described in Edward Miller, *Prince of Librarians: The Life and Times of Antonio Panizzi of the British Museum* (London: British Library, 1988), p. 181.

11 BL, Add MS 38514, f. 159, Letter from Augustus De Morgan to Sir Henry Ellis, 15 Oct. 1838; Add MS 36724, ff. 287v. –288v, Letter from Augustus De Morgan to Anthony Panizzi, 18 Aug. 1867; Add MS 22786*, Three letters from Augustus De Morgan to Antonio Panizzi, 18 Apr., 27 Apr., and 2 May 1859.

12 BL, Add MS 33206, ff. 66r.–67v, Letter from Augustus De Morgan to Rev. H. T. Ellacombe, 2 Nov. 1863.

13 BL, Add MS 33206, f. 69v, Letter from Augustus De Morgan to Rev. H. T. Ellacombe, 4 Nov. 1863.

14 As a non-Fellow his name would have been recorded in the ordinary meeting minutes as a 'stranger' given leave to be present at a weekly meeting, or in the visitors' book if he had attended on another occasion.

attainment and was therefore at odds with his own professionalising principles.[15] Yet some valuable records of De Morgan entered the archive of the organisation he held in such low regard, largely through the correspondence and agency of his friends Sir John Herschel and Francis Baily.

Some 250 letters from De Morgan form a small but significant part of the Herschel papers, a vast collection of letters received by the astronomer and polymath Sir John Herschel from his extensive network of learned correspondents.[16] One hundred and thirty-four letters from Herschel to De Morgan also survive in the collection in the form of amanuensis copies (HS/23-25), and very occasionally as unsent drafts (HS/6): the presence of both sides of the correspondence arises from the fact that after De Morgan's and Herschel's deaths, the widows copied and sent each other many of the letters that passed between their husbands.[17] The correspondence spans the 1830s to the 1860s without significant breaks, concluding in 1870 shortly before both men died. It covers primarily the two men's shared interests in astronomy and mathematics, but also extends into personal matters.

De Morgan wrote his earliest letters to Herschel (1831) in his capacity as Secretary of the Royal Astronomical Society (RAS), requesting papers for their publications and Herschel's opinions on Society business. (Herschel was an RAS founder, oftentimes Council Member and

15 For further discussion see Rebekah Higgitt, 'Why I don't FRS my Tail: Augustus De Morgan and the Royal Society', *Notes and Records*, 60 (2006), 253–59, available at http://doi.org/10.1098/rsnr.2006.0150.

16 Royal Society, London (henceforth RS), HS/6/174-434. See the Royal Society, 'Search Archives', https://catalogues.royalsociety.org/. Summaries of Herschel's correspondence can be found at the Adler Planetarium, Calendar of the Correspondence of Sir John Herschel, http://historydb.adlerplanetarium.org/herschel and on Cambridge University Library, Epsilon [Nineteenth-Century Scientific Correspondence], https://epsilon.ac.uk. The digitised letters are available through the Royal Society archive catalogue and through the Royal Society, *Science in the Making*, https://makingscience.royalsociety.org.

17 Several of these letters are reproduced in Sophia De Morgan's *Memoir* of her husband. For correspondence between Sophia De Morgan and Lady Herschel and one of her daughters, see RS, HS/6/437-443. The discrepancy with the number of letters he received from De Morgan suggests that not all Herschel's outgoing correspondence was copied or retained for this collection though there are no obvious gaps identified. The flow of correspondence between them may have been originally unbalanced, with De Morgan as the more prolific letter writer, quite possible as Herschel had several protracted periods of illness which made him less able to write.

sometime President, or, in De Morgan's words, one of its 'wisest heads'.) Initially formal and administrative, the letters soon began to display De Morgan's trademark wit, neat turn of phrase and what Herschel called his 'punning humour'. When Herschel was in the Cape, De Morgan sent self-confessed 'gossipy letters' about their scientific acquaintances. Their letters are an exchange both of intellectual equals and of friends. Topics include Herschel's work in astronomy, contemporary astronomical discoveries by others, further aspects of Herschel's broad-ranging work and publications such as his treatise on sound and noise, and his theory of perspective, and, briefly, Herschel's photographic processes (1846).[18] In 1844-1845 Herschel, then engaged in establishing a benefit society for the mutual insurance of artisans, sought and received extensive actuarial and policy advice from De Morgan on running and financing friendly societies. The two men also commented on politics, psychology and recommended reading, including the occasional novel.

The letters became increasingly familiar in tone, and De Morgan sometimes included responses in illustration form. For example, Herschel's comments on having made some 'topsy turvy observations of the constellation Orion' whilst in the southern hemisphere were answered with an illustration of an acrobatic astronomer looking through a telescope whilst standing on his head.[19] In another letter De Morgan replies tongue in cheek to Herschel's comments on the need to reform stellar nomenclature by suggesting that he might like to name any newly mapped nebulae observed in the Southern Hemisphere after the president and officers of the RAS. Others are written in verse, contain thanks in sonnet form, riddles (why is Sir John Herschel as good as two astronomers – because he's a double star gazer), mathematical puzzles such as magic squares, equations 'fattened' for the festive season and gentle jibes about 'the great moon hoax', a series of articles published in an American newspaper in 1835 claiming Herschel had discovered civilisation on the moon.[20]

De Morgan also shared his own chiefly mathematical interests and current research with Herschel, covering algebra, probability, functions,

18 For letters on Herschel's treatise on sound and noise, see, e.g., RS, HS/6/184, 284 and 420; for his theory of perspective, see RS, HS/6/424.

19 RS, HS/6/183.

20 See e.g. RS, HS/6/188–89.

calculus, trigonometry, differential equations, partial differentials, infinity in physics, Euclid and resolving fractions. He sometimes included lengthy explanations of his theorems, equations and puzzles for comment, or notified Herschel that he was sending him his latest publications or critiquing Herschel's. Other notable subjects include logic and reasoning and the nature of absolute truth, the Augustan and Julian calendars and new- and old-style dates. Only Augustus and Sophia De Morgan's investigations into spiritualism seem to be lacking.

In the 1850s De Morgan's 'plot regarding the introduction of the decimal coinage' was a recurring topic, for which he sought and gained Herschel's advice and support. The subject dropped after the government decided in 1859 against introducing decimal coinage. De Morgan's interest in history of mathematics and scientific biography is also evident in his correspondence with Herschel. It also brought him into limited direct contact with the Royal Society and some accounts of this are retained in the Society's administrative records.

De Morgan was one of the first writers to draw attention to the seventeenth-century dispute between Isaac Newton and Gottfried Leibniz over the priority for the calculus, and to Newton's use of cronyism to secure a decision in his favour. In preparing an article on the dispute in 1845–1846 De Morgan corresponded with the Secretary of the Royal Society, Charles Weld, requesting access to documents and details of the case against Leibniz as presented by Newton's friends in the *Commercium Epistolicum* (1712). The Royal Society's outgoing letter books contain copies of Weld's replies.[21]

The Royal Society further holds drafts of two papers De Morgan submitted to be considered for publication in one of its journals:

21 See RS, MS/426. For De Morgan's publication on the matter, see 'On the Additions Made to the Second Edition of the *Commercium Epistolicum*', *London, Edinburgh and Dublin Philosophical Magazine and Journal of Science*, 3rd ser., 2 (1848), 446–56; 'A Short Account of Some Recent Discoveries in England and Germany Relative to the Controversy on the Invention of Fluxions', *Companion to the Almanac for 1852*, pp. 5–20. Weld's original letters are bound into De Morgan's copy of 'On the Additions Made' and related articles: see Senate House Library, University of London, [DeM] L (B.P.1) SR. For a discussion of De Morgan's contribution to the dispute, see especially Rebekah Higgitt, *Recreating Newton: Newtonian Biography and the Making of Nineteenth-Century History of Science* (London: Pickering & Chatto, 2007), and Adrian Rice, 'Vindicating Leibniz in The Calculus Priority Dispute: The Role of Augustus De Morgan', in *The History of the History of Mathematics*, ed. by Benjamin Wardhaugh (New York: Lang, 2012), pp. 89–114.

'Description of a Calculating Machine, invented by Mr Thomas Fowler of Torrington in Devonshire' (1840) and 'Comparison of the First and Second Editions of the *Commercium Epistolicum*' (submitted in 1846).[22] Although these papers were ultimately rejected, the Society did publish one paper by him, entitled 'On a Point Connected with the Dispute between Keil and Leibnitz about the Invention of Fluxions', in its *Philosophical Transactions* in 1846. These were De Morgan's only communications with the Royal Society, aside from the donation of five eighteenth-century letters of historical significance, found in Baily's collection after his death.[23]

Senate House Library, University of London (SHL)

The archival material pertaining to De Morgan at Senate House Library falls into three distinct categories. Firstly, there is the correspondence: one archival box, chiefly of letters written by Augustus De Morgan. Secondly, there are letters written primarily to De Morgan connected with the books he owned, filed within the books. Thirdly are manuscripts by De Morgan, or printed works of his so heavily annotated by him as to occupy a grey area between archives and printed books.

The letters inside books came to the University of London in 1871 with the books themselves. Some are listed in a booklet by Maxine Merrington.[24] The online book catalogue notes the presence of letters in books in the records for the relevant books, with writer and date, and books with letters in them are brought up most easily by doing a keyword search on 'Augustus De Morgan' in conjunction with 'ALS', for

22 See RS, AP/23/24 and AP/29/2 respectively. A review of the latter by George Peacock, recommending that the paper be printed only in abstract, is also present, at RR/1/57. See also Rice, 'Vindicating Leibniz', p. 104.

23 See RS, EL/M3/60a. The letters donated are Royal Society, EL/I1/183, Letter from Pierre Maupertuis to James Bradley concerning the figure of the earth, the first announcement confirming Newton's theory from the Lapland expedition; EL/I1/183–86, Four letters from William Jones and James Hodgson regarding the determination of longitude.

24 Maxine Merrington, *A List of Certain Letters Inserted in Books from the Library of Augustus De Morgan (1806–1871) now in the University of London Library* ([London]: University of London Library, 1990). As the De Morgan library was partially dispersed at the time of compilation and later reconstituted, some classmarks and details of location are no longer applicable.

'autograph letter(s) signed'.[25] To establish the content of any letter, it is necessary to read the letters themselves.

Correspondents include the mathematical and other scientific luminaries whose letters to and/or from De Morgan are preserved in other repositories: Sir George Biddell Airy, Charles Babbage, Sir William Rowan Hamilton, Sir John Herschel, William Whewell, as well as people whose letters are not held elsewhere, among them the mathematicians Thomas Galloway and George Salmon. A full-text database, *The Augustus De Morgan Collection*, is currently in the process of online publication by Brill; by capturing the content of all books within De Morgan's library from cover to cover, it will publish all letters in the context of the books in which they are contained.

The letters show above all the widespread respect in which De Morgan and his knowledge were held. Some also show his kindness, such as a letter from Thomas Weddle inserted in his *Solving Numerical Equations of All Orders* informing De Morgan of his successful application for a mathematical professorship at Sandhurst and thanking him for his reference, and one from Carel J. Matthes of Amsterdam giving De Morgan Willem Kersseboom's *Kort Bewys* ... (1738) as 'a slight mark of my gratefulness for the many kindnesses you showed me during my stay in London'.[26] Other writers ask De Morgan to recommend or publicise their writings: 'Your good opinion of my work will so much enhance its value, that I must ... excuse the liberty I am taking', explained William Henry Oakes, in a letter in his *Table of the Reciprocals of Numbers* (1865).[27] Still others request De Morgan's elucidation of mathematical matters, as when Isaac Todhunter, a former student of De Morgan and fellow early member of the London Mathematical Society, requested elucidation on a couple of points in a paper about least squares, in a letter in Todhunter's *A History of the Mathematical Theory of Probability* (1865).[28]

25 Senate House Library catalogue, https://catalogue.libraries.london.ac.uk/search~S1.

26 Senate House Library, University of London (henceforth SHL), [DeM] L.2 [Weddle] fol. and [DeM] L.4 [Kersseboom] SSR respectively.

27 SHL, [DeM] L.8 [Oakes]. David Bierens de Haan, in a letter in his *Nouvelles tables d'intégrales définies* (1867), wrote in a similar vein ([DeM] L.3 [Haan] fol. SSR).

28 SHL, [DeM] L.2.1 [Todhunter].

The De Morgan manuscripts are catalogued in Senate House Library's archival database.[29] The only pure manuscript, which entered the University of London with his library, is the text of his *Elements of Arithmetic*, 169 leaves in an oblong (landscape-format) book.[30] Although numerous words and phrases have been crossed out, De Morgan's handwriting in it is unusually large and neat. He later annotated it: 'This is the MSS [*sic*] of the first separate work I ever wrote. A. De Morgan. May 10, 1853'. Interleaved printed copies are present of his *Formal Logic* (1847), with De Morgan's notes and diagrams, press cuttings and letters on the blank leaves and his pencilled annotations within the text,[31] *Syllabus of a Proposed System of Logic* (1860) and *Arithmetical Books from the Invention of Printing to the Present Time* (1847).[32] Correspondence, sometimes drawing De Morgan's attention to additional works, corrections to the text and verifications make clear that *Arithmetical Books* is work in progress towards a second edition, never published. Some correspondence also entered the University, possibly with the library, and definitely by 1921, when the first catalogue of manuscripts and autograph letters was published. Most copious is a group of letters to De Morgan, bound together, mostly from the French mathematician Jean-Baptiste Biot, dating from 1855 to 1858.[33] Several of these pertain to Biot's article on Isaac Newton in the *Biographie Universelle* and his controversy with Sir David Brewster, about whose scholarship on Newton De Morgan had reservations.[34] From an educational viewpoint, the most remarkable is a draft of De Morgan's letter to the council of the University of London (i.e. University College London) of 24 July 1831, resigning his Chair in protest against Granville Sharp Pattison's removal from the Chair of Anatomy: '… I should think it discreditable to hold a professorship under you one moment longer.'[35]

29 SHL archival catalogue, https://archives.libraries.london.ac.uk/home.

30 SHL, MS165.

31 SHL, MS776/1-2. See Joan Richards, 'Augustus De Morgan, *Formal Logic: or, The Calculus of Inference, Necessary and Probable*', in *Senate House Library, University of London*, ed. by Christopher Pressler and Karen Attar (London: Scala, 2012), no. 40.

32 SHL, MS776/3.

33 SHL, AL6.

34 See Paul Theerman, 'Unaccustomed Role: The Scientist as Historical Biographer: Two Nineteenth-Century Portrayals of Newton', *Biography*, 8 (1985), 145–62.

35 SHL, AL45. The autograph letters are described in Reginald Arthur Rye, *Catalogue of the Manuscripts and Autograph Letters in the University Library at the Central*

The University acquired further miscellaneous correspondence—letters both to and from De Morgan, apparently gathered by De Morgan's great-niece Joan Antrobus—from an auction at Christies in November 1990 (catalogued as MS913). Sophia De Morgan had solicited at least some of it for her memoir of her husband, as shown by a letter to her from Lord Brougham, dated 24 August 1874, accompanying letters from De Morgan to him from 1851 to 1857, stating: 'I send herewith all the letters of the late Mr De Morgan I have been able to find. You are perfectly welcome not only to publish them, but to keep them'.[36] Correspondents include various mathematicians or other scientists, among them George Airy, Peter Hardy, Olinthus Gregory, George Boole, John Lubbock, George Peacock, and John Graves. The letters mix personal and mathematical matters, as De Morgan writes about what absorbs him, including his work, while the correspondents send best wishes to each other's wives and refer to their health. Some letters concern books, such as one to W.H. Smyth about the merits of quarto versus octavo volumes, concluding: 'Except for expence [sic] I am myself a quartist'.[37]

What distinguishes the De Morgan correspondence at Senate House Library from most of that elsewhere is the inclusion of family letters: letters from De Morgan to his father-in-law, William Frend, and to his mother, correspondence with his wife before and during their marriage, and letters to and from his children. They reveal an affectionate father, as in a scrap from De Morgan addressed to 'Miss Alice De Morgan, Upstairs' and saying:

> I want to see if you can read writing; so mind you try and remember every word of this, and find it out by yourself. Your Mamma cannot write to night, so I write instead. Mr. Baily has sent us two wood pigeons.[38]

The affection was clearly reciprocated, as shown, for example, by a letter from De Morgan's daughter Christiana telling him about a fracas in which her brothers were involved at school and siding with them against 'old Keys', namely headmaster Thomas Hewitt Key.

Building of the University of London ... (London: University of London Press, 1921).

36 SHL, MS913A/2/10.

37 SHL, MS913A/2/5. Letter dated May 1852.

38 SHL, MS913A/1/3.

University College London (UCL)

Material relating to various aspects of De Morgan's life and work is scattered throughout University College London's special collections, mainly classified under the umbrella of 'additional manuscripts', and partly among the first archives the College acquired.[39]

The presence of lecture notes is a unique feature of the UCL archives, most notably De Morgan's handwritten copy of his introductory lecture delivered at the opening of classes in mathematics at UCL in November 1828.[40] This is especially important because, unlike several of his professorial colleagues, De Morgan chose not to publish his inaugural lecture soon after delivery. Rough notes also survive for a couple of his other lectures, such as one he gave in October 1862 at the opening of UCL's academic year.[41] Again, since this lecture was never published, these notes in De Morgan's hand give the only clues as to its content.

Lecture notes taken by De Morgan's students complement his own. In the original college notebook of John Golch Hepburn, a UCL student from the late 1840s, are transcribed details of mathematics classes as they happened.[42] The manuscript contains notes from twenty-one of De Morgan's lectures on algebraic geometry and differential calculus, delivered between 11 March and 13 May 1847, thus giving us a rare insight into what De Morgan's students would have experienced in his lecture room more than a century and a half ago.

One of the most interesting mathematical manuscripts is 'Elements of Statics', a draft of an unfinished, early book De Morgan began at the request of the Society for the Diffusion of Useful Knowledge (SDUK).[43] De Morgan recorded, surely for posterity, opposite the first page:

> Elements of Statics
>
> Written in the Summer of 1827

39 See University College London (henceforth UCL) archives catalogue, https://archives.ucl.ac.uk/.

40 UCL, MS ADD 3.

41 UCL, MS ADD 2; see Chapter 6 in this volume.

42 UCL, MS ADD 5.

43 UCL, MS ADD 27. See Adrian Rice, 'Inspiration or Desperation? Augustus De Morgan's Appointment to the Chair of Mathematics at London University in 1828', *British Journal for the History of Science*, 30 (1997), 257–74 (pp. 270–71).

> This is the first attempt I ever made at writing for publication. It was commenced at the proposal of the Useful Knowledge Society in its earliest days - but was never published, nor even completed. I sent it in with my testimonials when I was a Candidate for the Maths chair in the Univ. of London in 1827, and I think it was as useful as the testimonials.
>
> A De Morgan
>
> May 10/53

The date is the one on which De Morgan annotated his manuscript copy of *Elements of Arithmetic* in a similarly nostalgic fashion (see above); comparison of the annotation of the two manuscripts, now in two separate repositories, sheds light on De Morgan's habit of browsing in his study, marking books long after the time of creation or acquisition.[44] The volume consists of around one hundred folios in De Morgan's hand, interspersed throughout with his neat diagrams. Additions and amendments on spare pieces of paper are attached to the relevant page with red sealing wax. As the College acquired the manuscript before records of archive donations were routinely kept, the depositor is unknown.

UCL is also a major repository of material pertaining to the De Morgan family, holding in particular a volume of family history and a folder of associated ephemera.[45] Entitled 'Memorandums on the Descendants of Captain John De Morgan' it was compiled by Augustus De Morgan in the 1850s and 1860s, and opens in his usual witty style:

> Such account as I can give of my family is contained in two books. The first is well known by the name of Genesis, ascribed by Jewish tradition to Moses. The second is this book itself, which my own handwriting will identify as compiled by me. Moses gave no account of his materials: I have given what I could. Moses wrote in Hebrew: I in English. Moses was a public writer, I am a private one. Many are the oppositions between me and Moses ...

44 On De Morgan's marking of books, see Karen Attar, 'Augustus De Morgan (1809–71), His Reading and His Library', in *The Edinburgh History of Reading: Modern Readers*, ed. by Mary Hammond (Edinburgh: Edinburgh University Press, 2020), pp. 62–82, especially p. 69.

45 UCL, MS ADD 7.

Beginning with his paternal great-grandfather, who served in the British Army in India, the book goes on to explore numerous subsequent branches and generations of the family, including its connection with the eighteenth-century mathematician James Dodson, Augustus De Morgan's maternal great-grandfather. The ephemera folder contains a note and letter by Dodson, while the volume contains a host of information on the various strands of De Morgan's family, featuring family trees, genealogical information, stories, anecdotes, articles, witticisms and drawings, including two frequently reproduced cartoons of De Morgan, one of him lecturing in 1865 and an undated 'Sketch of Professor De Morgan in the Pillory'.

UCL additionally holds a small number of letters of Augustus De Morgan and Sophia Frend (subsequently his wife), to and from family and friends.[46] It includes one undated letter from De Morgan to Miss Frend and one from her to him from 1836, the year before their wedding. Miscellaneous notes and papers include the scripts of two comic plays by an unknown author (possibly William Frend), in the hand of his daughter Sophia, perhaps performed by friends and family in the mid-1830s. The first manuscript, bearing the title *The Comet*, is a witty play written in verse, set amidst the excitement of the British astronomical community during the re-appearance of Halley's Comet in 1835. Centred around the Royal Astronomical Society, of which De Morgan was a prominent member, it gently mocks both him and his scientific fellows. The second manuscript, probably written slightly later, contains another satirical sketch, this time a short play in prose sending up De Morgan's views on algebra and the style of teaching at UCL.[47]

Like other repositories, UCL holds correspondence between De Morgan and other intellectuals: the logician George Boole, philosopher John Stuart Mill, fellow mathematician and book-collector John Graves and others.[48] UCL also holds the archive of the Society for the Diffusion of Useful Knowledge (SDUK), with which De Morgan was heavily involved, and this archive includes over one hundred letters from De Morgan written between 1827 and 1844. The college also owns a

46 UCL, MS ADD 163.

47 Helena M. Pycior, 'Early Criticism of the Symbolical Approach to Algebra', *Historia Mathematica*, 9 (1982), 392–412.

48 UCL, MS ADD 97. The letters date from 1842 to 1871.

substantial collection of the papers of the lawyer, statesman, and UCL co-founder, Lord Henry Brougham, which contains several letters from De Morgan on scholarly matters, such as their common interest in the life and work of Isaac Newton. Also housed at UCL are manuscripts from the early years of the London Mathematical Society (LMS). Among them are a few letters from De Morgan (its first president) to fellow LMS member and vice-president, Thomas Archer Hirst, who was to succeed him as UCL's professor of mathematics in 1867.

The College's own records provide valuable information about De Morgan's professional life at UCL, including his initial application for the mathematics professorship in 1827 and the circumstances leading to his two resignations.[49] These documents show his strained relationship with the College Council throughout his tenure at UCL, culminating in his final resignation in 1866, which left De Morgan feeling so let down by the College that he never returned. It therefore seems unlikely that he would have sanctioned the subsequent donation of his manuscripts to the college library—a circumstance seemingly forgotten half a century later, when at least one item in the archives was 'Presented to University College London by Mrs. William De Morgan'.[50]

Cambridge University Library (CUL)

'Airy is the prince of *method*ists…. My theory is that when he tries his pen on blotting-paper, he makes a duplicate by the pressing machine, files, and indexes it', wrote Augustus De Morgan to William Rowan Hamilton in 1852.[51] De Morgan exaggerates, but not by much. The papers of his friend and colleague George Biddell Airy, Astronomer Royal from 1835 to 1881, at Cambridge University Library occupy twelve cubic metres: a voluminous collection which, in fairness to Airy, is a fine record of his life and work rather than a frustrating mix of important papers obscured by unworthy blotting papers.[52] The copy press letters are in fact there,

49 UCL, UCLA/CORR/1912; UCLA/CORR/729.

50 UCL, MS ADD 2.

51 Trinity College, Dublin, TCD MS 1493/610; Quoted in Anne van Weerden, *A Victorian Marriage: Sir William Rowan Hamilton* (Stedum: J. Fransje van Weerden, 2017), p. 333.

52 Cambridge University Library (henceforth CUL), GBR/0180/RGO 6. The papers are described in Cambridge University Library, ArchiveSearch: https://

representing Airy's outgoing letters. De Morgan's papers at Cambridge University Library are primarily to be found in this collection, which is part of the archive of the Royal Greenwich Observatory. Airy's archive retains his original arrangement by subject matter, with catch-all miscellaneous correspondence files divided into short date spans, such that finding all instances of a correspondent's letters and works in his collection is not straightforward. De Morgan is represented by an estimated two hundred letters or more, housed in seventy-eight different boxes. One scholar is of the opinion that 'due to the extensive nature of the collection, large parts of it have remained unexplored by historians' thus far.[53]

The papers initially appear to be of a narrow cast, of a mathematician corresponding with an astronomer. Airy's headings include: 'Papers relating to the Astronomical Society', 'Miscellaneous astronomical papers', 'Correspondence on scientific institutes', 'Papers on engineering and inventions' and 'Mathematical theories and calculations'. Both men excelled in their fields, and there are indeed pleasingly intricate mathematical workings and explanations, discussing partial differential equations, probabilities, mathematical principles and current and historical mathematicians and their works. However, just like the De Morgan-Herschel letters at the Royal Society, the correspondence extends beyond their shared vocations and Airy's headings to reflect their close friendship and wide range of interests. De Morgan moves easily from mathematics, astronomy and logic to history, bibliography and literature: he describes his articles for the *Penny Cyclopaedia*, advises on bell tuning, confers on writing memorials for their mutual friend Richard Sheepshanks, shares doggerel inspired by Longfellow and Tennyson, 'irate with their transcendental egoism',[54] refers to the 'aereals' and 'aerunculae' (the Airy children), shares puns and wordplay that delight him, and discusses the work of others. De Morgan's close friendship with Airy is not always unquestioning, and in a letter from 31 December 1857 he sounds particularly forward-thinking: 'Some friend of Babbage sneers at you in the Lit: Gaz: for not wanting Scheutz's

archivesearch.lib.cam.ac.uk/.

53 Daniel Belteki, 'Papers of George Biddell Airy', Cambridge Digital Library page: https://cudl.lib.cam.ac.uk/collections/rgo6/1

54 CUL, RGO 6/376, 15 Nov. 1855.

[difference] machine at the observatory. Why do you not want it? You are to remember the people who did not want to see Jupiter's satellites & those who did not want to be vaccinated &c &c'.[55]

Three other collections at the library feature De Morgan's letters, of which two mainly concern De Morgan's writing of reviews and articles for journals. The William Thomson, Lord Kelvin papers include ten letters written from 1845 to 1849 about contributions to *The Cambridge and Dublin Mathematical Journal*. The papers also include De Morgan's testimonial for Thomson from June 1846 for the chair of Natural Philosophy at Glasgow.[56] The letters from De Morgan to the journalist and writer William Hepworth Dixon feature nearly forty letters to Dixon on his reviews and articles for *The Athenæum* from the period 1856–1868, with one other letter concerning Dixon standing for Parliament in 1868.[57] Additionally, the papers of William Christie include a duplicate copy of a letter from De Morgan to Airy dated 1 January 1847 in a collection of letters regarding the existence of Neptune and the controversy over the name of the planet between 1846 and 1878.[58]

Trinity College, Cambridge (TCC)

De Morgan researchers consulting the William Whewell papers bequeathed to Trinity College, Cambridge follow in De Morgan's own footsteps. In early March 1847, De Morgan asked Whewell to look in his papers for a particular letter of his which might provide useful evidence in his argument with the Scottish philosopher Sir William Hamilton. On 16 March he wrote again, 'Your practice of keeping letters is most praiseworthy—and you shall rank next to Airy for extreme method….'[59]

Of the seventy-seven letters written by Augustus De Morgan in the Library's Modern Manuscripts collection, all but two have a connection to the William Whewell papers.[60] Whewell spent most of his life at

55 CUL, RGO 6/433, 31 Dec. 1857.
56 CUL, MS Add.7342 (William Thomson papers generally); MS Add.7342 Tm3 (testimonial).
57 CUL, MS Add 9428.
58 CUL, RGO 7/247. For the dispute, refer to Chapter 3 in this volume.
59 Trinity College, Cambridge (henceforth TCC), Add.MS.a.202/111.
60 The papers have been catalogued in the Library's archival database, AtoM, which may be found linked from the Library's main page, https://trin.cam.ac.uk/library.

Trinity College Cambridge, from his entrance as a sub-sizar in 1812 to his death in his twenty-fifth year as Master in 1866. His papers include over five thousand letters covering five decades of Whewell's varied mathematical, philosophical, scientific and literary career. This correspondence contains much information on the shared intellectual world inhabited by Whewell and De Morgan, and is anchored by two particularly large runs of letters from their mutual friends Sir George Airy and Sir John Herschel.

The De Morgan letters date from 1832 to 1866, mainly the period from 1845 to 1863. All but seven are addressed to Whewell.[61] The letters document a long friendship and shared interests in mathematics, philosophy, etymology and the work of various scientific organisations, and are notable for their deep dives into mathematics and logic, particularly syllogistic reasoning and the concept of infinity. De Morgan often writes at length about his work in these fields, sharing his latest findings, commenting on the works of Sir William Hamilton and others and requesting Whewell's help in finding appropriate words to express concepts in syllogism. He also actively engages with Whewell's texts, with comments ranging from a proposal that a mathematical problem Whewell thinks he has solved could in fact have an infinite number of answers, to his own theories on the pluralities of worlds and the concept of multipresence.[62] De Morgan's interest in historical research also surfaces, with queries relating to the life of Newton and Bacon, often referring to his own library and asking for information from books in Trinity College Library. There is whimsy, too: the depth and focus of many of De Morgan's letters is often leavened by instances of his love of puns. Concerning a marginal note of Whewell's on a Smith's Prize paper, 'Hast thou appealed unto Caesar &c', De Morgan points out that Whewell has spelled Caesar's name wrongly: 'when an experimental geometer appeals to his geometry it is to "See, sir!" not to Caesar'.[63]

Sixteen of De Morgan's letters to Whewell are printed in Sophia De Morgan's *Memoir*, including one from April 1863 discussing Aristotle on

---

Searching for WHWL in the database will find the collection-level record for the papers.

61 See especially TCC, Add.MS.a.202/95-156.

62 TCC, Add.MS.a.202/115, 126-7 and 147 respectively.

63 TCC, Add.MS.a.202/99.

the infinite, which she regrets is incomplete but which sits complete in the collection.[64] Many of the printed letters have ellipses to indicate lacunae, but the letter of 12 July 1850 silently omits De Morgan's sharpest words about Sir William Hamilton: 'I sum up the argument as follows—Sir W., not knowing how obscure his programme was, took it for granted that I had copied from it—that is, he thought I was the Father of Lies because he did not know that he himself was the Prince of Darkness.'[65]

A volume in Trinity College Library of copies of William Whewell's letters made by his biographer Isaac Todhunter includes excerpts from eighteen letters written to De Morgan between 1841 and 1864. Many of these letters relate to the De Morgan letters in the Whewell collection, and only one of them is published in Todhunter's memoir.[66] The collection also includes two letters to Robert Leslie Ellis concerning the four-colour problem and spherical triangles, and four letters about Ellis to his sister, Whewell's wife, Lady Affleck.[67]

Two letters from De Morgan appear in two other collections in the Modern Manuscripts collection. A congratulatory letter to George Peacock on his marriage demonstrates De Morgan's playful nature, with a logical argument in favour of ladies listing both maiden and married names on wedding cards:

> Let AB represent the duration of the lady's life and M the point of marriage ... now, because by common courtesy, a lady is not a discontinuous function, it follows that what is true up to the limit is true at the limit: Therefore, at the instant M, her name is Selwyn. But, for a similar reason, her name at the same moment, is also Peacock. Therefore, at the moment M, she has both names, whence both ought to appear on the wedding cards, Q.E.D.[68]

In addition to the letters, Trinity College has a volume of printed material and letters relating to Richard Sheepshanks created by Augustus De Morgan.[69] Sheepshanks's *A Letter to the Board of Visitors of the Greenwich*

64 S.E. De Morgan, *Memoir*, p. 319; cf. TCC, Add.MS.a.202/149.
65 TCC, Add.MS.a.202/120; cf S.E. De Morgan, *Memoir*, pp. 212–13.
66 Isaac Todhunter, *William Whewell: An Account of his Writings, with Selections from his Literary and Scientific Correspondence* (London: Macmillan, 1876; repr. Cambridge: Cambridge University Press, 2011).
67 TCC, Add.MS.c.67/111-112 and Add.MS.a.202/139-142 respectively.
68 TCC, Add.MS.b.49.65. See S.E. De Morgan, *Memoir*, pp. 202–03.
69 TCC, Adv.c.16.32.

Royal Observatory in Reply to the Calumnies of Mr Babbage ... is represented in the 1854 and 1860 editions, which are closely annotated by De Morgan and bound with letters sent to him by George Airy, Francis Baily, John Herschel, Sheepshanks, James South, and W.H. Smyth, with one letter written by De Morgan to Sheepshanks, retrieved after Sheepshanks' death.

Although De Morgan was an undergraduate at Trinity College, little in the Trinity College Archives relates to De Morgan, and Venn's *Alumni Cantabrigiensis* has gathered almost all available information about him, as for many men of this period.[70] This publication mines the information to be found in the Admissions Book, including father's name, previous school and headmaster, omitting only the name of the assigned tutor, J. P. Higman. More information about De Morgan may conceivably come to light relating to his participation in the musical society CAMUS as an accomplished flautist. It is more probable that further cataloguing of papers in the Modern Manuscripts collections will yield more mentions of De Morgan by his contemporaries.

Edinburgh University Library (EUL)

The De Morgan letters at Edinburgh University Library are a subset of the correspondence to the antiquary and literary scholar James Orchard Halliwell, later Halliwell-Phillipps, some of whose enviable Shakespearean book collection also went to Edinburgh. The two men had known each other from the early 1840s, and in 1845 De Morgan intervened to put an end to the short-lived Historical Society of Science, of which Halliwell was Secretary, without undue pressure on Halliwell.[71] De Morgan purchased copiously from Halliwell's sale of mathematical books in 1840.[72]

---

70 John Venn and J.A. Venn, *Alumni Cantabrigienses: A Biographical List of All Known Students, Graduates and Holders of Office at the University of Cambridge from the Earliest Times to 1900*, 10 vols. (Cambridge: Cambridge University Press, 1922–1954; repr. 2011), pt. 2, vol. 2. Also available online as University of Cambridge, *ACAD: A Cambridge Alumni Database*, https://venn.lib.cam.ac.uk.

71 S.E. De Morgan, *Memoir*, p. 124. For further examples of contact between the two men, see Marvin Spevack, *James Orchard Halliwell-Phillipps: The Life and Works of the Shakespearean Scholar and Bookman* (London: Shepheard-Walwyn, 2001).

72 *Catalogue of a Selected Portion of the Scientific, Historical and Miscellaneous Library of James Orchard Halliwell* ... ([London: S.L. Sotheby, 1840]); see De Morgan's copy of

The twelve letters at Edinburgh from De Morgan to Halliwell date chiefly from 1858 to 1867, with one from 1840. Whereas most of De Morgan's extant non-familial correspondence is with scientific figures, the Halliwell letters are interesting as an example of correspondence with a man who devoted most of his adult life to other areas. The correspondence is cordial. In a letter of 13 November 1859, De Morgan wrote: 'I am greatly pleased to see your handwriting after so many years'.[73] Halliwell may have written about family matters, to judge from a hope in a letter of 3 October 1867 that Halliwell had settled to his satisfaction with his father-in-law, the irascible Sir Thomas Phillipps.[74]

A couple of letters are introductions to Halliwell of other scholars, one of them the Italian mathematical historian Prince Baldassarre Boncompagni: an indication of the far-flung mathematical circles in which De Morgan, without leaving England, moved.[75] In some he thanks Halliwell for a book or tract; such letters add a dimension to the material evidence of the objects in De Morgan's library.[76] A couple are requests to Halliwell to delve into the use of particular words. A couple refer to the 'Macclesfield correspondence', namely *Contents and Index of the Correspondence of Scientific Men of the Seventeenth Century*, compiled by De Morgan (1842). Two mention book circulation, with the sale of Samuel Maynard's books (a few of which De Morgan bought), and books falling into the hands of the booksellers Davis & Dickson. Some letters, like those among De Morgan's correspondence elsewhere, make clear his broad and close reading. He refers to Shakespeare and specifically to Samuel Ayscough's 1790 glossary of Shakespeare, and compares a preface to an almanac with Chaucer's preface to *A Treatise on the Astrolabe*. Perhaps most interesting are comments which document De Morgan's attitude towards books: 'I suppose every book has a history,

---

the catalogue at Senate House Library, University of London, [DeM] Z (B.P.354).

73 Edinburgh University Library (henceforth EUL), LOA 70/8.

74 EUL, LOA 125/37.

75 EUL, LOA 46/15.

76 See Edward Cocker, *Cocker's Arithmetick*, ed. by John Hawkins, 20th edn (London: E. Tracey, 1700), with a letter from Halliwell to De Morgan, n.d., tipped in (SHL, [DeM] L.1 [Cocker] SSR); Christian Wurstisen, *The Elements of Arithmeticke Most Methodically Deliuered*, trans. by Thomas Hood (London: R. Field, 1596), with a letter from Halliwell to De Morgan, 4 Mar. 1865, tipped in (SHL, [DeM] L.1 [Wurstisen] SSR); this latter is the subject of De Morgan's letter to Halliwell of 6 Mar. 1865 (LOA 98/15).

if it was but looked for'; his belief in pasting cuttings into books, on the basis that 'Little things of this kind are often useful in history, in ways which cannot be conjectured until they arise in fact'; and his complaint about finding items within volumes of tracts: 'O these volumes of tracts! They keep safe—and so does the grave!'[77]

Trinity College Dublin (TCD)

De Morgan enters Trinity College Dublin through his correspondence with the Irish astronomer and mathematician Sir William Rowan Hamilton, the discoverer of quaternions. There are over 250 letters from De Morgan in the Hamilton collection in Trinity College, which includes one or two copies of letters sent to him by Hamilton.[78] In date they range from 1841 to 1865, the year of Hamilton's death; the first refers to the two men having met twelve years previously in London, the only time they met. De Morgan eventually wrote Hamilton's obituary.[79]

The scientifically most important texts among the De Morgan-Hamilton correspondence are well known, having been used frequently in publications about both men, their influence on one another, and the manner in which their thinking developed.[80] Reading the entire series of letters, without focusing on scientific nuggets only, reveals something of the sweep of De Morgan's conversational style to the reader. The letters show many of De Morgan's attractive personal traits. His clarity of expression can be understood as being spontaneous and not limited to prepared texts; his kindness and concern for Hamilton, whom he advises against overwork, shines out; his wit and humour, albeit sometimes rather leaden to modern ears, remains. These qualities have

77 EUL, LOA 98/15, 95/49 and 25/37, respectively.

78 Trinity College, Dublin, TCD MS 1493. See Manuscript and Archive Online Catalogue (MARLOC), https://manuscripts/catalogue.tcd.ie/CalmView.

79 Augustus De Morgan, 'Sir W.R. Hamilton', *Gentleman's Magazine and Historical Review*, n.s. 1 (1866), 128–34; accessible online at: https://www.maths.tcd.ie/pub/HistMath/People/Hamilton/Gentmag/GentMag.html. De Morgan helped Hamilton during his lifetime: see Charlotte Simmons, 'Augustus De Morgan Behind the Scenes', *College Mathematics Journal*, 42 (2011), 33–40.

80 See on the Hamilton side Robert Perceval Graves, *Life of Sir William Rowan Hamilton: Knt., LL.D., D.C.L., M.R.I.A., Andrews Professor of Astronomy in the University of Dublin, and Royal Astronomer of Ireland* (Dublin: Hodges, Figgis, 1882–89).

been attested to in print, but truly come alive when a reader immerses herself in the full and unedited experience of archival research. The energy in which De Morgan ranges from mathematical conundrum to literary quotation, to reported conversations with other scientists, to high-end gossip, combined with the buzz of seeing his *actual* ink on his *actual* paper, is a reading experience that remains attractive to even the most seasoned of researchers.

The De Morgan-Hamilton correspondence, like other epistolary exchanges, as a documentary genre, opens up various lines of research which do not depend completely on the biographies of the authors. The allusions used in personal, historical records reflect something of the cultural references shared among groups of individuals, and metaphorical agricultural references in the De Morgan letters provide an excellent example. Writing to Hamilton about avoiding anachronistic readings of pre-nineteenth-century scientists, De Morgan cautions Hamilton on 27 January 1853 that 'you have to see with his light' or 'plough with his heifer'.[81] Surprising perhaps to a modern reader, but probably unexceptional among the intelligentsia in what were still heavily agricultural countries.

A further line of research might focus on the editorial process. Right up until late in the twentieth century, the editorial approach to the publication of letters of important individuals favoured the omission of anything personal, as shown above for De Morgan in correspondence at Trinity College, Cambridge. Nowadays, that process itself is the subject of enquiry. In the De Morgan letters in Dublin, too, the blue pencil of the editor reveals what was considered not to be suitable for publication. For example, in the letter of 10 January 1854, following the death of De Morgan's 15-year-old daughter Alice, the reference to an autopsy, requested by De Morgan, has been crossed out. Such significant excisions highlight the possible value of going back to the archives rather than relying on value decisions taken in previous centuries.

Another increasingly important research strand, supported by historical epistolary exchange, is the role of letters in the dissemination of knowledge and in permitting the mapping of historical intellectual networks. Not only does De Morgan's reference to other people's work

81 See Graves, v. 3, p. 438. De Morgan further echoes biblical phraseology.

and conversations situate both himself and Hamilton in a constantly growing landscape of shared information, a virtual landscape in its own way, but he also shows his frustration when it does not work as efficiently as it might. In an important letter of 1844, responding to Hamilton's discovery of quaternions the previous year, De Morgan blames John Graves for his delay in engaging with Hamilton on the subject. Hamilton wrote to Graves first upon making his discovery but Graves, in speaking with De Morgan, failed to mention it. De Morgan wrote:

> He never dropped a hint about *imagining* imaginaries. On such little things do our thoughts depend. I do believe that had he said no more than "Hamilton *makes* his imaginary quantities" I should have got what I wanted.[82]

Conclusion

Within each institution and across the repositories, the De Morgan papers provide an important insight into the life, work and acquaintances of Augustus De Morgan. As letters in all the repositories show, they not only testify to his wide-ranging interests and expertise on a range of subjects from mathematics and logic to bibliography, but their style, at times playful, at times serious and questioning, provides a uniform key to his character. De Morgan's correspondents were some of the most prominent scholars in the nineteenth century in their chosen fields, and the nature of the letters reveals that he was on close terms with them. Thus the letters provide evidence of De Morgan's wider social networks and the respect in which his peers held him. They and other manuscript material left by him further demonstrate the importance of the archival record and the unreliability and incompleteness of print to convey it. The sheer quantity of the combined material makes one marvel, as for so many prolific Victorians, at De Morgan's prodigious productivity, especially as his epistolary activity was matched by his output of mathematical articles. The archival record furthermore illumines elements of Victorian culture that extend well beyond Augustus De Morgan, as well as pointing to further topics for research.

82 See Graves, v. 3, p. 256.

Bibliography

De Morgan, Sophia Elizabeth, *Memoir of Augustus De Morgan* (London: Longmans, Green, 1882).

—, *Threescore Years and Ten: Reminiscences of the Late Sophia Elizabeth De Morgan, to which are Added Letters to and from her Husband, the Late Augustus De Morgan, and Others*, ed. by Mary A. De Morgan (London: Bentley, 1895).

Graves, Robert Perceval, *Life of Sir William Rowan Hamilton: Knt., LL. D., D.C.L., M.R.I.A., Andrews Professor of Astronomy in the University of Dublin, and Royal Astronomer of Ireland* (Dublin: Hodges, Figgis, 1882–89).

Harris, P.R., *A History of the British Museum Library, 1753–1973* (London: British Library, 1998).

Higgitt, Rebekah, *Recreating Newton: Newtonian Biography and the Making of Nineteenth-Century History of Science* (London: Pickering & Chatto, 2007). https://doi.org/10.4324/ 9781315653068

—, 'Why I don't FRS my Tail: Augustus De Morgan and the Royal Society', *Notes and Records*, 60 (2006), 253–59. https://doi.org/10.1098/rsnr.2006.0150

Merrington, Maxine, *A List of Certain Letters Inserted in Books from the Library of Augustus De Morgan (1806–1871) now in the University of London Library* ([London]: University of London Library, 1990).

Miller, Edward, *Prince of Librarians: The Life and Times of Antonio Panizzi of the British Museum* (London: British Library, 1988).

Pycior, Helena M., 'Early Criticism of the Symbolical Approach to Algebra', *Historia Mathematica*, 9 (1982), 392–412.

Report of the Commissioners Appointed to Enquire into the Constitution and Government of the British Museum (London: William Clowes, 1850).

Rice, Adrian, 'Inspiration or Desperation? Augustus De Morgan's Appointment to the Chair of Mathematics at London University in 1828', *British Journal for the History of Science*, 30 (1997), 257–74. https://doi.org/10.1017/s0007087497003075

—, 'Vindicating Leibniz in the Calculus Priority Dispute: The Role of Augustus De Morgan', in *The History of the History of Mathematics*, ed. by Benjamin Wardhaugh (New York: Lang, 2012), pp. 89–114. https://doi.org/10.3726/978-3-0353-0261-5/7

Richards, Joan, 'Augustus De Morgan, *Formal Logic: or, The Calculus of Inference, Necessary and Probable*', in *Senate House Library, University of London*, ed. by Christopher Pressler and Karen Attar (London: Scala, 2012).

Rye, Reginald Arthur, *Catalogue of the Manuscripts and Autograph Letters in the University Library at the Central Building of the University of London …* (London: University of London Press, 1921).

Simmons, Charlotte, 'Augustus De Morgan Behind the Scenes', *College Mathematics Journal*, 42 (2011), 33–40. https://doi.org/10.4169/college.math.j.42.1.033

Smith, G.C., ed., *The Boole-De Morgan Correspondence* (Oxford: Clarendon Press, 1982).

Smith, James, *The Quadrature of the Circle: Correspondence between an Eminent Mathematician and James Smith* (London: Simpkin, Marshall, 1861).

Spevack, Marvin, *James Orchard Halliwell-Phillipps: The Life and Works of the Shakespearean Scholar and Bookman* (London: Shepheard-Walwyn, 2001).

Stephen, Leslie, and I. Grattan-Guinness, 'De Morgan, Augustus (1806–1871)', in *The Oxford Dictionary of National Biography* (Oxford: Oxford University Press, 2004–). https://doi.org/10.1093/ref:odnb/7470

Theerman, Paul, 'Unaccustomed Role: The Scientist as Historical Biographer: Two Nineteenth-Century Portrayals of Newton', *Biography*, 8 (1985), 145–62. https://doi.org/10.1353/bio.2010.0582

Todhunter, Isaac, *William Whewell: An Account of his Writings, with Selections from his Literary and Scientific Correspondence* (London: Macmillan, 1876; repr. Cambridge: Cambridge University Press, 2011). https://doi.org/10.1017/cbo9781139105415

Venn, John and J.A. Venn, *Alumni Cantabrigienses: A Biographical List of All Known Students, Graduates and Holders of Office at the University of Cambridge from the Earliest Times to 1900*, 10 vols. (Cambridge: Cambridge University Press, 1922–1954; repr. 2011); also available online as University of Cambridge, *ACAD: A Cambridge Alumni Database*, https://venn.lib.cam.ac.uk

Weerden, Anne van, *A Victorian Marriage: Sir William Rowan Hamilton* (Stedum: J. Fransje van Weerden, 2017).