NOTES AND RECORDS
Check for updates

Notes Rec.
doi:10.1098/rsnr.2023.0086
Published online

MOVING SCIENTIFIC KNOWLEDGE FROM THE LABORATORY TO THE THEATRE: HUMPHRY DAVY'S LECTURE PRACTICE AT THE ROYAL INSTITUTION, 1801–1812

by

FRANK A. J. L. JAMES*

Department of Science and Technology Studies, University College London, Gower Street, London WC1E 6BT, UK

During the first decade of the nineteenth century, it was (almost) universally acknowledged that Humphry Davy's lectures at the Royal Institution on chemistry, electro-chemistry and geology, among other subjects, were by far the most attractive scientific spectacle in London. Much has been written about the popularity, the fashionability, the attractiveness and the patriotism (in time of war) of Davy's lectures. When Davy, aged 22, arrived in London in March 1801 he had never previously delivered a lecture, but within two months he had made his mark in the Royal Institution's new large lecture theatre, so much so that he immediately repeated his first course. How did his experimental demonstrations, full of spectacular sensory experience (noise, smell, light, touch) convey his scientific rhetoric? What resources, material and human, did he draw on? In this paper I will seek to understand how Davy constructed his practice as a lecturer and how it related to his chemical researches. As well as using Davy's lecture notes (now available through the Davy Notebooks Project), I will draw on the notes taken by some of his auditors, their comments in diaries and letters as well as administrative records and contemporary newspaper accounts.

Keywords: Humphry Davy; Royal Institution; lecturing; chemistry; electro-chemistry; geology

Between 1801, when he arrived in London, and 1812, just before he married a wealthy widow, Humphry Davy (1778–1829) delivered just over 300 lectures in 25 or 26 courses[1] at the aristocratically run Royal Institution. Despite never having delivered a lecture before, he immediately established his pre-eminence as the leading scientific lecturer of wartime London. Much has been written about those who attended Davy's lectures, especially the presence of women, who, as far as can be determined, made up at least half his audience.[2]

*frank.james@ucl.ac.uk

1 The uncertainty is due to lack of clarity about whether or not Davy delivered a course on the history of science in 1805 for which some notes survive (discussed later in this article).

2 Harriet Olivia Lloyd, 'Rulers of opinion: women at the Royal Institution of Great Britain', PhD thesis, University College London (2018).

Their attending his (and other) lectures attracted much contemporary criticism with derisory references to blue-stockings and the perceived lack of seriousness of the lectures, and indeed of the Royal Institution.[3] While paying attention to the audience, here I will concentrate on aspects of Davy's lectures that have not received the same attention, including their evolving content, construction and delivery.

There is a tendency to homogenize the dozen years that Davy lectured at the Royal Institution into a single period as if nothing much changed during that time.[4] While that might be the case for the social make up of his audience, it certainly does not apply to his lecture content. Although Davy repeated, as we all do, lectures and indeed whole courses, my central argument in this paper is that throughout those years his lecture content evolved due in part to the outstandingly successful scientific discoveries he made in the Royal Institution's laboratory and, to a lesser extent, his field researches. Indeed, right from the start he lectured on his laboratory discoveries (discussed below). His results over time, documented in his notebooks, provided significant novel material for him to use in the lecture theatre. His brother and biographer John Davy (1790–1868), who lived in the Royal Institution from 1808 to 1810, learning chemistry and assisting Davy in the laboratory, made this point in his autobiographical recollections.[5] Even such an attractive and entertaining lecturer as Davy could not hope to retain his audience's attention by covering the same material year after year. Over the years he moved the results of his researches, recorded in the notebooks used in the Royal Institution's basement laboratory, into his lecture notebooks to present them (along with other material) in the lecture theatre on the first floor.[6] As reported at the start of the 1811 lecture season:

> in the course of the present Lectures he [Davy] should have the satisfaction of announcing some new and striking experiments, which he believed would throw considerable light on many of the obscure parts of chemical philosophy, and connect and explain the discoveries recently made.[7]

There is, however, little evidence (and what there is comes from shortly after his arrival at the Royal Institution) that Davy undertook any of his laboratory researches intending specifically to produce material for the lecture theatre.

Key to Davy successfully making this transfer of scientific knowledge from laboratory or field to the theatre were his lecture notebooks, which form a significant component of the Davy Notebooks Project. The snag is that for roughly the first third of his time at the Royal Institution none of his lecture notebooks have survived – that is for the period 1801

3 Some specifics are discussed below, but for a short summary see George A. Foote, 'Sir Humphry Davy and his audience at the Royal Institution', *Isis* **43**, 6–12 (1952). In this paper I will deal only with Davy's Royal Institution lectures, but not those to the Board of Agriculture, discussed in Frank A. J. L. James, '"Agricultural Chymistry is at present in it's infancy": the Board of Agriculture, the Royal Institution and Humphry Davy', *Ambix* **62**, 363–385 (2015), pp. 376–377, nor those he delivered to the Dublin Society during the autumns of 1810 and 1811 that have yet to be studied properly.

4 For example, Jan Golinski, *The experimental self: Humphry Davy and the making of a man of science* (University of Chicago Press, 2016), pp. 52–53.

5 John Davy, 'Some notices of my life', KU MS Raymond Richards M118/4/1 [19r]. These autobiographical notes have been transcribed and edited by Andrew Lacey and can be found at https://wp.lancs.ac.uk/litscimed/files/2018/06/John_Davy_Some_Notices_of_My_Life_Final.pdf (accessed 1 November 2023).

6 This expands on David Gooding's account of the same journey made by the later discoveries of Michael Faraday: David Gooding, '"In Nature's School": Faraday as an experimentalist', in *Faraday rediscovered: essays on the life and work of Michael Faraday, 1791–1867* (ed. David Gooding and Frank A. J. L. James), pp. 105–135 (Macmillan, London, 1985), especially p. 107.

7 *The Observer*, 3 February 1811, 2d.

to 1804.[8] The earliest of Davy's lecture notes to have survived, as John Davy appreciated, are those for the lecture he delivered on 7 February 1805 introducing the courses for that year.[9] After that, notes for 78 separate lectures (that is just over half of the lectures he delivered between 1805 and 1812) have survived. These figures are slightly misleading as Davy reused some notes over time, especially for his geological lectures.

So, to help understand Davy's lecturing during his entire time at the Royal Institution we need to also use other sources. These include his two printed syllabi (1802 and 1804) and the many letters, diaries and notes of those who attended his lectures. What is not available until the latter part of Davy's time at the Royal Institution are frequent and routine newspaper reports, though there were occasional newspaper articles and adverts, while reports of some lectures were published in two short-lived journals, discussed later. The reason why newspapers did not report early Royal Institution lectures can be attributed to it being a private proprietorial organization that admitted only its proprietors, subscribers and their guests to lectures.[10] Its lectures, despite the many contrary assertions made by historians and others, were not then public events.[11] Only when the Institution, following its second financial crisis in 1809, changed its structure to make it more easily accessible, did lectures begin to be systematically reported in the press (discussed below).

By the end of 1800, for political and possibly personal reasons, Davy, just 22, had become anxious to leave the Medical Pneumatic Institution established by the radical (Jacobin) physician Thomas Beddoes (1760–1808) in Bristol, where he had worked for just over two years.[12] There Davy discovered the extraordinary physiological properties of nitrous oxide and had begun experimentation using what he dubbed the electric battery recently invented by Alessandro Volta (1745–1827).[13] He also formed a close friendship with the poet and philosopher Samuel Taylor Coleridge (1772–1834), a member of Beddoes's circle.

By a complex set of circumstances, Davy came to the attention of Benjamin Thompson, Reichsgraf von Rumford (1753–1814), who undertook the day-to-day management of the new Royal Institution founded in early 1799.[14] Rumford had fallen out with the first professor at the Royal Institution, the very experienced lecturer Thomas Garnett (1766–1802), and ruthlessly plotted to force his resignation.[15] The young Davy must have struck Rumford as the ideal person to use to displace Garnett. The fact that Davy had no

8 The exception is the six notebooks used for his 1803 series repeating his Board of Agricultural lectures discussed below.

9 RI MS HD/2/A/1; John Davy (ed.), *The Collected Works of Sir Humphry Davy* (9 volumes) (Smith, Elder, London, 1839–1840), vol. 8, p. 155 (hereafter CWHD); Robert Siegfried and Robert H. Dott, *Humphry Davy on geology: the 1805 lectures for the general audience* (University of Wisconsin Press, Madison, 1980), pp. 3–9.

10 See Lloyd, *op .cit.* (note 2), p. 59, for the (changing) structure of membership.

11 For a contemporary example see https://www.rigb.org/about-us/our-history (accessed 13 April 2024). Instances from the historical literature include Christa Jungnickel and Russell McCormmach, *Cavendish* (American Philosophical Society, Philadelphia, 1996), p. 349; Jan Golinski, *Science as public culture: chemistry and enlightenment in Britain, 1760–1820* (Cambridge University Press, 1992), pp. 188–190; Jon Klancher, *Transfiguring the arts and sciences: knowledge and cultural institutions in the Romantic Age* (Cambridge University Press, 2013), p. 72. On the other hand, Sarah Zimmerman, *The romantic literary lecture in Britain* (Oxford University Press, 2019), pp. 1–2, fully appreciated the problems associated with using the term 'public'.

12 For detailed accounts of Davy's time in Bristol, see Frank A. J. L. James, 'Gas and poetry: Humphry Davy in Bristol, 1798–1801', *Essays in Romanticism* **26**, 131–157 (2019) and 'The Watt family, Thomas Beddoes, Davies Giddy, Humphry Davy, and the Medical Pneumatic Institution, Bristol', in *James Watt (1736–1819): culture, innovation, and enlightenment* (ed. Malcolm Dick and Caroline Archer-Parré), pp. 109–135 (Liverpool University Press, 2020).

13 *Ibid.*, p. 128.

14 For the details of Davy's appointment that have so far been uncovered, see Frank A. J. L. James, 'Sociability in the Early Royal Institution: Thomas Richard Underwood, Humphry Davy and Samuel Taylor Coleridge', *Romanticism*, forthcoming.

15 Robert Fox, *Thomas Garnett: science, medicine, mobility in eighteenth-century Britain* (Bloomsbury Academic, London, 2024), pp. 117–125, 140.

lecturing experience reflects Rumford's greater interest in promoting his own interests through the Royal Institution's other work, such as improving nutrition or using the model room to display the latest engineering achievements.[16] It is not clear whether Davy knew he was taking up employment in an institution where there were very different visions of what it should become.

Davy arrived in London on 7 February 1801 to discuss the possibility of his appointment. He met the Royal Institution's leaders, Rumford, Joseph Banks (1743[NS]–1820)—President of the Royal Society, who loathed Beddoes[17]—and the natural philosopher Henry Cavendish (1731–1810). The outcome was that at a meeting of Managers (the committee that ran the Royal Institution[18]), held on 16 February and chaired by Banks, Davy was appointed, among other roles, 'Assistant Lecturer in Chemistry', for which he would be paid £105 annually plus accommodation, heating and lighting.[19] After the meeting, Rumford wrote Davy an appointment letter copying the minute and adding (which was not minuted) that the Managers had also agreed that, provided Davy proved his fitness, he would be promoted to professor of chemistry with a £300 annual salary in the next two or three years.[20]

Davy returned to Bristol, probably for a couple of weeks, to settle his affairs, and on Wednesday 11 March 1801 arrived at the Royal Institution to commence the next stage of his career.[21] By then, after much building work, the large lecture theatre, designed to hold an audience of 900, had been completed at the northern end of the Royal Institution's building in Albemarle Street, off Piccadilly.[22] No systematic records for the numbers attending lectures were kept at this period, but there are occasional estimates to be found in various sources, which need to be taken as an impression rather than as reliable figures. In the new theatre, Garnett resumed the previous year's pattern of delivering a lecture daily (apart from Sunday), commencing at the beginning of February and continuing until some point in June.[23] It was probably during this season that Garnett delivered his lecture on the effects of nitrous oxide depicted by the annual subscriber James Gillray (1756–1815)[24] in his caricature 'Scientific Researches! – New Discoveries in Pneumaticks! – or – An Experimental Lecture on the Powers of Air' published a year or so later.[25] The previous March, Elizabeth Fox, Lady Holland (1771–1845), noted in her diary that during a lecture Garnett administered nitrous oxide to the Royal Institution's treasurer, John Hippisley

16 See Lloyd, *op. cit.* (note 2), pp. 91, 77.

17 Frank A. J. L. James, '"the first example … of an extensive scheme of pure scientific medical investigation": Thomas Beddoes and the Medical Pneumatic Institution in Bristol, 1794–1799', *R. Soc. Chem. Hist. Grp Occ. Pap.* **8**, p. 22 (2016).

18 The Managers' minutes are a key source for understanding the development of the Institution and Davy's lecturing. They are in RI MS AD/2/B/2/A. They will be cited here as RI MM followed by date of meeting, volume and page numbers. The minutes of nineteenth-century meetings were published in facsimile as *Archives of the Royal Institution, minutes of the Managers' meetings, 1799–1903* (15 volumes in 7) (Scholar Press, London, 1971–1976).

19 RI MM, 16 February 1801, 2, 134.

20 Reichsgraf von Rumford to Humphry Davy, 16 February 1801, RI MS Rumford (original copy); published in Henry Bence Jones, *The Royal Institution: its founders, and its first professors* (Longman, London, 1871), pp. 317–319.

21 RI MM, 16 March 1801, 2, 150–151.

22 Reichsgraf von Rumford, 'Report', *Journals RI* **1**, 17–28 (1801), p. 18. Frank A. J. L. James and Anthony Peers, 'Constructing space for science at the Royal Institution of Great Britain', *Phys. Perspect.* **9**, 130–185 (2007), pp. 143–146.

23 These lectures were advertised in *The Times*, 5 February 1801, 2a.

24 His election was recorded in RI MM, 7 April 1800, 2, 49.

25 For a discussion of the caricature, though it contains a number of errors, see Mary Dorothy George, *Catalogue of political and personal satires preserved in the Department of Prints and Drawings in the British Museum*, volume 8 (British Museum, London, 1947), pp. 112–114.

(1746–1825).[26] Garnett included nitrous oxide in his *Outlines of a course of lectures on chemistry*, published in mid March 1801,[27] the syllabus for his Royal Institution lectures. Judging from Gillray's cartoon, which of course may not be a reliable portrayal, Hippisley was willing to experience the gas once again during the 1801 lecture season. The occasion probably possessed additional significance due to the presence of the discoverer of its physiological properties.[28]

It is not clear whether Davy assisting at this lecture, as depicted by Gillray, was a one-off because of its subject matter or whether Davy aided Garnett with other lectures. The person who usually assisted Garnett was the chemist Frederick Accum (1769–1838), appointed 'Assistant Chemical Operator' in 1801.[29] He had replaced John Sadler (bp. 1779; d. 1838), who had previously worked for Beddoes in Bristol.[30] Accum became the first of several men to assist Davy (and others) deliver their lectures, forming a significant "support team". In addition to Accum, already working for the Royal Institution when Davy arrived, was Thomas Webster (1772–1844) and, although he soon left due to alleged medical issues,[31] Davy would use him on a freelance basis, an arrangement that applied to some other former employees. In 1801 Kenneth McCulloch (*ca* 1728–1808) was appointed as instrument maker and master of the workshop, but he retired after a year due to old age, though was re-employed in November 1803 but thereafter disappearing from the minutes.[32] In 1802 William Payne and Charles Royce were employed, the latter as 'Superintendent of the Workshops and Keeper of the Models'. Neither appointment was minuted (illustrating Rumford's dictatorial management style), and Payne may even have arrived in late 1801.[33] Both would serve Davy for several years and later Payne would accompany him on his mineralogical expeditions.[34] Royce went freelance in 1808, and on that basis continued working for the Royal Institution, which may explain why as late as 1812 he was still recorded in the *Royal Kalendar* as employed by the Institution.[35] Following Accum's departure in 1803,[36] Sadler was re-appointed for a year ending in mid 1804,[37] when George Farrant replaced him.[38] Davy dismissed him in 1806 for 'idleness & general neglect of his duty',[39] appointing instead his cousin Edmund Davy

26 Earl of Ilchester (ed.), *The journal of Elizabeth Lady Holland (1791–1811)* (2 volumes) (Longman, London, 1908), entry for 22 March 1800, vol. 2, pp. 60–61.

27 Thomas Garnett, *Outlines of a course of lectures on chemistry* (Cadell and Davies, London, 1801), p. 97. For its publication, see *The Morning Chronicle*, 18 March 1801, 2a.

28 For a recent, alternative, interpretation of this image, see Fox, *op. cit.* (note 15), pp. 140–142.

29 RI MM, 2 March 1801, 2, 142.

30 Sadler worked as Garnett's assistant at the Royal Institution from February to June 1800, when he was discharged while the lecture theatre was being constructed. RI MM, 17 February and 12 June 1800, 1, 128 and 2, 104.

31 RI MM, 26 April 1802, 3, 8.

32 RI MM, 18 May 1801, 2, 177–178; 10 May 1802, 3, 32; 7 November 1803, 3, 157. He also served for just under a year as house steward, 1 June 1801, 2, 186.

33 Payne's MS autobiographical notes. Private possession.

34 Frank A. J. L. James, 'Negative geology: Humphry Davy and the forming of the Royal Institution's mineralogical collection, 1803–1806', *Earth Sci. Hist.* **37**, 309–332 (2018), pp. 325–326.

35 RI MM, 25 April 1808, 4, 344; *Royal Kalendar for 1812*, p. 298.

36 RI MM, 5 September 1803, 3, 152.

37 RI MM, 11 June 1804, 3, 302

38 RI MM, 15 October 1804, 3, 339.

39 Humphry Davy to Grace Davy, 5 January 1807: Tim Fulford and Sharon Ruston (eds), Jan Golinski, Frank A. J. L. James and David Knight (advisory eds) and Andrew Lacey (assistant ed.), *The Collected Letters of Sir Humphry Davy* (4 volumes) (Oxford University Press, 2020), vol. 1, letter 135 (cited hereafter as CLHD followed by volume and letter number); see also RI MM, 22 December 1806, 4, 217.

(1785–1857).[40] The other person who occasionally assisted Davy was Samuel Bishop, though primarily the assistant librarian.[41] Some of these men are well known: Accum, Webster and Edmund Davy for instance, but others remain obscure. Furthermore, many of Davy's lecture notebooks were written by a number of amanuenses who may have included some of these assistants, but since no samples of their handwriting have been traced (because of their obscurity) specific hands have thus far not been identified. Nevertheless, without all this support in the theatre (and, one suspects, the laboratory), from preparing and executing experimental demonstrations to making and displaying images, it would have been impossible for Davy to have become the leading scientific lecturer of early nineteenth-century London.

Because of his research in Bristol on pneumatic chemistry and galvanism (as voltaic electricity was called) and probably due to their being novel, highly fashionable and popular topics, Davy unsurprisingly chose them for his debut courses in spring 1801. A couple of days after arriving at the Royal Institution he sketched out in a notebook the plan for his galvanism lectures.[42] Those two pages were followed by notes written from the 13th until the end of March describing various galvanic experiments, the earliest he performed in the Royal Institution.[43] Not only was he making practical preparations for his lectures, but this research also resulted in his first paper to the Royal Society of London.[44] As Coleridge shrewdly noted, Davy must have made further discoveries in galvanism since he, Coleridge, would 'be puzzled to conceive how that subject could furnish matter for more than one Lecture'[45]—the first example of Davy using his novel research in his lectures and which in this case he may have deliberately undertaken for that purpose.

Never having delivered a lecture before, Davy commenced two courses on galvanism. The first began on 25 April 1801 and comprised five lectures, delivered on Tuesday and Saturday evenings, while the second, also presumably five, was an afternoon series 'attended not only by men of science but by numbers of people of rank and fashion'.[46] The pharmaceutical chemist William Allen (1770–1843) described Davy's first lecture as 'A most capital one.- He bids fair to rise high in the philosophical world',[47] a view shared by the writer in the *Philosophical Magazine*, who also noted Banks's presence in the audience.[48]

Davy summarized his galvanic lectures in a paper dated 1 September 1801, though published in early 1802.[49] Throughout this paper, and presumably in the lectures themselves, Davy conveyed the scientific excitement of all his new galvanic research undertaken in the Royal Institution's basement laboratory. But towards the end he nodded towards the Royal Institution's utilitarian aspects by discussing galvanism's 'relations to the common wants of life'. Concentrating on the possibility of using it to procure pure

40 RI MM, 12 January 1807, 4, 223.

41 RI MM, 2 December 1805, 4, 120; assistant to Davy, 3 February 1806, 4, 143.

42 RI MS HD/22/B, pp. 137–138.

43 *Ibid.*, pp. 139–153.

44 Humphry Davy, 'An Account of some *Galvanic* Combinations, formed by the Arrangement of single metallic Plates and Fluids, analogous to the new *Galvanic* Apparatus of Mr. *Volta*', *Phil. Trans.* **91**, 397–402 (1801).

45 Samuel Taylor Coleridge to Humphry Davy, 20 May 1801: Earl Leslie Griggs (ed.), *Collected Letters of Samuel Taylor Coleridge* (6 volumes) (Oxford University Press, 1956–1971), vol. 2, pp. 733–735 (hereafter cited as CLSTC).

46 'Royal Institution of Great Britain', *Phil. Mag.* **10**, 86–87 (1801), on p. 86.

47 William Allen, *Life of William Allen, with selections from his correspondence* (3 volumes) (Gilpin, London, 1846–1847), diary entry for 25 April 1801, vol. 1, p. 54.

48 'Royal Institute [sic] of Great Britain', *Phil. Mag.* **9**, 281–282 (1801).

49 Humphry Davy, 'Outlines of a view of galvanism', *Journals RI* **1**, 49–66 (1802).

metals and on its medical uses, Davy concluded that 'a discovery so important as to excite our astonishment, cannot fail of becoming, at some period, useful to society'.[50]

The closing weeks of the lecture season brought a major re-organization to the Royal Institution's lecture programme. In February, Garnett had written to Rumford requesting an increase in salary in accordance with the terms of his appointment.[51] The Managers deferred making a decision until the annual accounts had been prepared and the Royal Institution's financial position ascertained.[52] When Garnett again pressed his case in mid May, a specially convened Managers meeting refused to increase his salary.[53] The following week the Managers, because he had 'given satisfactory proofs of his talents as a Lecturer', retitled Davy's position as 'Lecturer in Chemistry' without, it appears, a pay rise.[54] It might just be an unlikely coincidence, but two days later Garnett offered his resignation, which was accepted;[55] he delivered his farewell lecture on 9 June,[56] two weeks or so before the season ended.

It may have been the need to plug this gap that led Davy to provide a course on pneumatic chemistry, about which little is known other than it concluded on 20 June with a lecture attended by nearly 500 people. Continuing Garnett's practice, Davy in this lecture included yet another practical demonstration of the effects of nitrous oxide, an example of him using senses other than those of seeing and hearing to engage his audience.[57] Writing two days later, Davy was as nearly carried away with his own success as a lecturer as anyone who came under the influence of nitrous oxide. After describing the impact of his demonstration on the audience, Davy told a friend: 'I have been nobly treated by the managers, God bless us I am about 1.000.000 times as much a being of my own volition as at Bristol. My time is too much at my own disposal – So much for egotism – for weak glorious, pitiful, sublime, conceited egotism.– .'[58]

While Davy was enthusiastic about the lectures, their lack of importance to Rumford is suggested by the mere four lines he devoted to this aspect of the Royal Institution's work in his May 1801 report to the Managers.[59] He concentrated instead on the more practical aspects of what he wanted the Institution to do. His vision for it as a repository for practical inventions received a severe blow when, according to Davy, writing a few years later, 'one of the greatest practical mechanical philosophers of the age' refused, in Davy's hearing, to be involved with the Royal Institution on the grounds that it 'would destroy the value of the labour of the industrious, by laying open his invention'.[60] That is, engineers and industrialists were concerned that, by putting their inventions freely on display in the Royal Institution, it would allow others to copy them. Very soon after the Royal

50 *Ibid.*, p. 66.

51 Thomas Garnett to Reichsgraf von Rumford, 22 February 1801, copy in RI MM, 23 February 1801, 2, 136–138.

52 RI MM, 23 February 1801, 2, 138.

53 RI MM, 25 May 1801, 2, 180–181.

54 RI MM, 1 June 1801, 2, 185.

55 RI MM, 15 June 1801, 2, 189–190.

56 John Ayrton Paris, *The life of Sir Humphry Davy* (2 volumes) (Colburn and Bentley, London, 1831), vol. 1, p. 123.

57 *Op. cit.* (note 48), p. 282. Humphry Davy to John King, 22 June 1801, CLHD, 1, 42. For the use of all the senses, see Sarah Zimmerman, 'Taken by storm: multisensory learning in the lecture room', in *The Edinburgh companion to romanticism and the arts* (ed. Maureen McCue and Sophie Thomas), pp. 255–271 (Edinburgh University Press, 2023).

58 Humphry Davy to John King, 22 June 1801, CLHD, 1, 42.

59 Rumford, *op. cit.* (note 22), p. 18.

60 Humphry Davy, *A lecture on the plan which it is proposed to adopt for improving the Royal Institution and rendering it permanent* (Royal Institution, London, 1810), pp. 8–9.

Institution's founding this had become the position of the Boultons of Birmingham, who had previous history in their dealings with a less than straightforward Rumford.[61] For this reason, of maintaining commercial confidentiality, the large (44'×32') model room built on the ground floor at the northern end of the building, 'which was to be devoted to important inventions, remained almost empty'.[62]

But during June 1801, the Managers, presumably led by Rumford, and possibly mindful of leaving Davy too much to his own volition, 'propose[d] in the autumn to examine the state of the arts and to begin with the process of tanning'.[63] In wartime, leather was a critically important strategic material,[64] and by choosing this subject the Managers were probably navigating between the utilitarian and polite entertainment aspects of the Royal Institution. By the end of the month, Davy had agreed to deliver a course on tanning during November, but in exchange received three months' leave, starting in July, 'for the purpose of making himself more intimately acquainted with the practical part of the business of tanning'. Furthermore, the Managers also 'instructed' Davy to prepare lectures for delivery in December on dying, staining and printing various cloths.[65] With Garnett gone and Davy away for three months, there was evidently a need to quickly find a replacement for Garnett, and Davy hoped that the Managers would 'get some professor of mechanics'.[66] To this end, and perhaps also provide a balance against Rumford's ambitions, Banks suggested at the start of July that the physician Thomas Young (1773–1829), only five years older than Davy, should be appointed 'Professor of Natural Philosophy'.[67]

Davy had an enjoyable leave. He spent time first in Bristol, before moving on to Penzance, where he was joined by the artist Thomas Richard Underwood (1772–1835)[68] for a walking tour round the western Cornish peninsula.[69] Leaving Cornwall at the end of August, Davy spent three weeks in Bristol and Stowey, before returning to London, where he arrived on 20 September.[70] Presumably at Stowey he spent some time discussing with the tanner and Coleridge's close friend Thomas Poole (1766–1837) the chemistry and processes of tanning, thus justifying the leave the Managers had granted. It may have been such behaviour that prompted Rumford (writing from Dover on his way through France to Munich just as the preliminaries of what became the Peace of Amiens were being agreed) to comment to Banks that Davy 'may do very well, if he gets the better of his natural disposition to be idle and to procrastinate'.[71] A perfect example of this was the

61 Matthew Robinson Boulton to Matthew Boulton, March 1800, Library of Birmingham MS 3782/13/14/22. Michael Eckert, 'Inspired by British inventions: Joseph von Baader (1783–1835) – a Bavarian engineer fighting a losing battle', *Int. J. Hist. Eng. Technol.* **89**, 216–237 (2019), p. 221.

62 Davy, *op. cit.* (note 60), p. 8. Lloyd, *op. cit.* (note 2), p. 84; Morris Berman, *Social change and scientific organization: the Royal Institution, 1799–1844* (Cornell University Press, Ithaca, 1978), pp. 6, 76–77.

63 Thomas Poole to Josiah Wedgwood Jr, 25 and 26 June 1801, WM MS MC 55.

64 C. H. Spiers, 'Sir Humphry Davy and the leather industry', *Ann. Sci.* **24**, 99–113 (1968).

65 RI MM, 29 June 1801, 2, 198.

66 Humphry Davy to John King, 22 June 1801, CLHD, 1, 42.

67 RI MM, 6 July 1801, 2, 203. On Young's rather inglorious time at the Royal Institution, see Geoffrey Cantor, 'Thomas Young's lectures at the Royal Institution', *Notes Rec. R. Soc. Lond.* **25**, 87–112 (1970).

68 James, *op. cit.* (note 14).

69 Humphry Davy to Thomas Richard Underwood, 12 July 1801, CLHD, 1, 44. See Paris, *op. cit.* (note 56), vol. 1, pp. 125–126, which published Underwood's account of the walk.

70 Humphry Davy to Davies Giddy, 14 November 1801, CLHD, 1, 45.

71 Reichsgraf von Rumford to Joseph Banks, 21 September 1801: Neil Chambers (ed.), *The scientific correspondence of Joseph Banks* (6 volumes) (Pickering, London, 2007), vol. 5, p. 110 (hereafter SCJB).

(unminuted) decision to shelve Davy's lectures on tanning, which would probably have been difficult to have achieved but for Rumford's absence until the end of November.

Likewise, no minute exists recording the decision for Davy, or for that matter Young, to provide their lecture courses during the first half of 1802. In the closing months of 1801, they both prepared for the lectures by writing extended syllabi. In Davy's case he produced a 91-page printed *Syllabus* dated 5 January 1802 and published 10 days later.[72] As with the previous year, the 1802 lectures began in January; starting on 20 January, Young lectured in the afternoons on Mondays and Wednesdays and in the evening on Friday, while Davy lectured on Tuesdays at 8pm, and at 2pm on Thursdays and Saturdays.[73] This pattern continued until May, when Young delivered his final lecture on the 17th,[74] and Davy around the same time. Davy's afternoon lectures were on 'General Chemistry', while his evening lectures were devoted to 'the Connexion of Chemistry with the Arts'.[75] The relationship between the *Syllabus* and the delivered lectures was tenuous to say the least. We cannot tell from the former what the content of the latter might have been. We do, however, have other sources, such as reports in the *Journals of the Royal Institution*, as well as accounts and notes taken by Coleridge (among others).

Davy began his series at 2pm on Thursday 21 January 1802 with his famous *A discourse introductory to a course of lectures on chemistry*, which, as he put it in a note dated 26 April, he was requested to publish by some of his audience.[76] In this lecture Davy sought to reconcile the Royal Institution's various activities into a coherent whole emphasizing both the practical value of chemistry, but also the role of 'the beneficence of the Deity' in improving men.[77] Although this *Discourse* commenced his course on general chemistry, he gave much of it over to emphasizing that chemistry 'applies to most of the processes and operations of common life'.[78] He exemplified this by reference to agriculture ('intimately connected with chemical science'), metallurgy ('a branch of technical chemistry'), bleaching and dyeing ('purely chemical'), tanning ('chemical processes') and porcelain and glass ('chemical arts'), for which he asked to borrow a Wedgwood Portland vase.[79] It was these and other subjects, such as heating and lighting, that Davy covered in turn in the *Syllabus* of his evening lectures.[80] These commenced on 9 February, two weeks later than advertised, and his first lecture concluded with a peroration emphasizing the value of science, adopting a very Rumfordian rhetoric: 'The common workman when informed to a certain extent by science, must rise into a new state of existence. His moral character will be improved.'[81] But in the *Discourse* he also suggested that chemistry could address the

72 Humphry Davy, *A syllabus of a course of lectures on chemistry, delivered at the Royal Institution of Great Britain* (Royal Institution, London, 1802). For its publication, see *The Morning Chronicle*, 15 January 1802, 1a. See also Thomas Young, *A syllabus of a course of lectures on natural and experimental philosophy* (Royal Institution, London, 1802) published a few days later.

73 These were advertised in *The Morning Chronicle*, 15 January 1802, 1a.

74 *Journals RI* **1**, 220 (1802).

75 Davy, *op. cit.* (note 72), front cover.

76 Humphry Davy, *Discourse introductory to a course of lectures on chemistry delivered in the theatre of the Royal Institution, on the 21st January, 1802* (Royal Institution, London, 1802), p. 3. On the *Discourse*, especially in relation to Coleridge and Wordsworth, see Sharon Ruston, *Creating romanticism: case studies in the literature, science and medicine of the 1790s* (Palgrave Macmillan, Houndmills, 2013), pp. 20–27, 172–174; Golinski, *op. cit.* (note 11) pp. 195–200.

77 Davy, *op. cit.* (note 76), p. 16.

78 *Ibid.*, p. 11.

79 Humphry Davy to Josiah Wedgwood Jr, April 1802, CLHD, 1, 50.

80 Davy, *op. cit.* (note 72), pp. 69–91.

81 *Op. cit.* (note 74), pp. 110–112, esp. p. 111.

'unequal division of property and of labour', concluding that we might, through science, expect 'a bright day of which we already behold the dawn'.[82] Perhaps, rather bravely, he was trying to reconcile the views of the majority of his wealthy aristocratic audience with those of the small number of his friends from his radical Bristol (recent) past who were also in the lecture theatre. These included Coleridge, Poole and, probably, their friend James Webbe Tobin (1767–1814)[83] as well as the poet Robert Southey (1774–1843),[84] who had a difficult relationship with Davy. Since neither Coleridge nor Poole were Royal Institution subscribers (Tobin would shortly become a life subscriber,[85] and it is not known how Southey gained admittance[86]), it seems reasonable to assume that Davy gave them the two admission tickets that the Managers had granted him.[87] Until just before Davy's course began, Coleridge had been staying with Poole at Stowey, from where he wrote to his wife telling her that he intended to attend Davy's entire course.[88] Whether he did or not is impossible to tell. The only notes of Coleridge's to survive are those for Davy's afternoon lectures delivered on 4 and 6 February and these are quite long, being respectively three and six printed pages.[89] Their length supports the account that the lawyer James Losh (1763–1833) noted in his diary that Davy's lecture on oxygenated muriatic acid lasted two hours and 'was by very far the best Lecture I ever heard, clear, simple, well arranged, and the experiments all successful'.[90]

Experimental demonstrations were vital to Davy's lecturing. Allen made the point in his diary:

> went to the Royal Institution to Davy's lecture on galvanism. By means of the trough he showed some beautiful experiments on the deflagration of metals – exploded a mixture of hydrogen and oxygen gases, by galvanism – fired gunpowder, and heated iron wire red hot. I never saw the theatre so full. Albemarle Street was crowded with carriages[91]

And, as with Garnett the previous year, Davy encouraged audience participation, or at least Coleridge's. When with Davy in Bristol, Coleridge inhaled nitrous oxide (several times)[92] and so Davy had reason to trust him to participate effectively in the demonstrations. At the lecture on 28 January, Coleridge described the difference in the electric shock received from an electric machine compared with that from a Leyden jar.[93] At another lecture Coleridge recalled 'taking the nitrous oxide'.[94] Precisely when this occurred is not clear

82 Davy, *op. cit.* (note 76), pp. 21 and 22.

83 Samuel Taylor Coleridge to William Godwin, 22 January 1802, CLSTC, 2, 782–784.

84 Robert Southey to Charles Danvers, 26 January 1802, BL add MS 47890, fol. 169–170.

85 RI MM, 15 February 1802, 2, 237.

86 Although it is possible that his relative, John Southey Somerville, 15th Baron Somerville (1765–1819), a proprietor, might have obliged.

87 RI MM, 19 January 1802, 2, 228. Davy gave Coleridge an autographed copy of the *Syllabus*, recorded in Kathleen Coburn (ed.), *The notebooks of Samuel Taylor Coleridge: volume 1, 1794–1804* (Routledge and Kegan Paul, London, 1957), entry 1098 (the current location of this copy is not known). Cited hereafter as NSTC. See Ruston, *op. cit.* (note 76), pp. 22–23.

88 Samuel Taylor Coleridge to Sara Coleridge, 17 January 1802, CLSTC, 2, 779. See also Thomas Poole to Tom Wedgwood, 14 September 1803, WM MS MC 54.

89 NSTC, entry 1098.

90 James Losh, Diary, 25 February 1802, Carlisle Central Library, item 10. Davy's evening lectures seem to have lasted an hour, Losh, *ibid.*, 16 March 1802.

91 Allen, *op. cit.* (note 47), vol. 1, p. 60, diary entry for 23 March 1802. Such popularity would shortly lead to Albemarle Street being made one way during the lectures, which was enforced by the constabulary. See John Hickman, 'Warning to coachman', 6 September 1805, RI MS GB/1, p. 33.

92 James, 'Gas and poetry' *op. cit.* (note 12), p. 146.

93 NSTC, entry 1099.

94 Samuel Taylor Coleridge, 'Memorandum', undated, BL Egerton MS 2800, fol. 104v.

and, although Davy included the chemical properties of the gas in his *Syllabus*, [95] he did not there refer to its physiological effects, but he was never one to pass up a spectacular demonstration. However, he had a clear and serious message to get across to his audience, 'Chemistry is as yet but in its infancy', as he put it in his concluding lecture[96]—a trope he repeated frequently, of which beholding the dawn was a variation.

As Allen indicated two months into the courses, Davy maintained the size of his audience from where it had been the previous summer, and Davy thought that on occasion more than 500 people attended.[97] Such success was clear from near the start, when he told his mother after his second afternoon lecture that 'the theatre overflow[ed]'.[98] Shortly after, Rumford told his friend, the Genevan savant and editor Marc-Auguste Pictet (1752–1825), 'Mr Davy gives universal satisfaction'.[99] Rumford, in line with the terms of Davy's letter of employment, proposed that the Managers should double his annual salary to £200, which was agreed exactly a year after his appointment.[100]

Of those who attended the lectures, Davy claimed to his mother that he was 'almost surprised at the interest taken by so many people of rank, in the progress of chemical philosophy'[101]—the operative word being 'almost'! During the course, the nobility who attended his lectures included Gilbert Elliot, 1st Baron Minto (1751–1814), John George, 2nd Earl Spencer (1758–1834), Granville Leveson, Lord Gower (1773–1846), and Elizabeth Leveson-Gower, Countess of Sutherland (1765–1839).[102] All these aristocrats subscribed to the Royal Institution at one level or another and made it, at least for a while, a fashionable venue, as Lloyd has shown.[103] However, striking a slightly sour note, having such aristocrats in the audience did not commend the lectures to others. Southey, not appreciating the connection between Davy's research and his lecturing, commented privately that his 'situation, lucrative as it is, is yet beneath him. instead of acquiring knowledge himself he is wholly employed in imparting what he already knows to people who are likely to make no use of it. he lectures very well'.[104] Publicly, though pseudonymously, a few years later Southey said much the same: 'there is a Royal Institution … where some of the most scientific men in the kingdom are … unworthily employed.'[105] Such negative views of the Institution were quite common at the time, ranging from Henry Brougham (1778–1768), who wrote 'Has the Royal Society degraded its publications into bulletins of news and fashionable theories for the ladies who attend the Royal Institution',[106] to Francis Horner (1778–1817), who described it as a 'very

95 Davy, *op. cit.* (note 72), p. 14.

96 Jeremy Bentham to Étienne Dumont, 21 May 1802: J. R. Dinwiddy (ed.), *The correspondence of Jeremy Bentham: volume 7* (Oxford University Press, 1988), pp. 44–56.

97 Humphry Davy to Davies Giddy, 12 June 1802, CLHD, 1, 45.

98 Humphry Davy to Grace Davy, 23 January 1802, CLHD, 1, 49.

99 Reichsgraf von Rumford to Marc-Auguste Pictet, 10 February 1802: René Sigrist and David Bickerton (eds), *Marc-Auguste Pictet 1752–1825: correspondance sciences et techniques* (4 volumes) (Slatkine, Geneva, 1996–2004), vol. 3, pp. 571–573.

100 RI MM, 15 February 1802, 2, 241.

101 Humphry Davy to Grace Davy, 23 January 1802, CLHD, 1, 49.

102 Noted in Lord Minto to Lady Minto, 21 February 1802: Emma Murray, Countess of Minto (ed.), *Life and letters of Sir Gilbert Elliot First Earl of Minto from 1751 to 1806* (3 volumes) (Longman, London, 1874), vol. 3, pp. 239–240.

103 Lloyd, *op. cit*. (note 2) and Hattie Lloyd Edmondson, 'Chivalrous chemistry', *Ambix* **66**, 103–120 (2019).

104 Robert Southey to Charles Danvers, 23 February 1802, BL add MS 30928.

105 Manuel Alvarez Espriella [Robert Southey], *Letters from England: translated from the Spanish* (3 volumes) (Longman, London, 1807), vol. 3, pp. 314–315.

106 [Henry Peter Brougham, 'Review of] the Bakerian lectures on the theory of light and colours', *Edinb. Rev.* **1**, 450–456 (1803), on p. 452.

frivolous place'.[107] The combination of women and aristocrats forming the bulk of the Institution's supporters and audience created a (mis)perception of a mis-match between science and fashion, which Davy viewed positively.[108] What is significant is that all the detractors – Southey, Brougham, Horner – came from the aspiring middle class, who did not understand, or did not wish to, the crucial role that women and the aristocracy played in supporting science in Britain.[109]

The end of the lectures in mid May 1802 coincided with the start of the first major crisis in the Royal Institution's administration and financial viability. The seriousness of the situation only became apparent when the annual accounts were prepared in April 1802. Rumford sought to forestall the inevitable questions by presenting a report to what would be his last Managers' meeting on 26 April 1802. There he emphasized all the positive aspects of developing the Royal Institution during the previous year, concluding 'that the Institution has been completed without any debt being incurred';[110] the report was referred to the Visitors (a sort of audit committee). At the following Managers' meeting, Banks was appointed to the Committee of Expenditure in Rumford's place.[111] When Banks added up the amounts owed to various contractors, he found that the Royal Institution was nearly £2000 in debt;[112] Rumford sailed for France shortly after, never to return to England.[113] Furthermore, it was soon found that those proprietors and subscribers who had not paid their dues owed the Royal Institution £5000.[114] As the Royal Institution's only source of income was now from annual subscribers attending the lectures, Davy's popularity must have seemed to the Managers their lifeline to extricate them from the mess; doubtless to retain him, they promoted him to be 'Professor of Chemistry', though with no pay increase.[115]

Davy and Young commenced their 1803 lectures at the end of January, the Managers having instructed them to deliver a combined total of at least 100 during the season, the same as the previous year.[116] Davy delivered 50 lectures in his two courses, on experimental chemistry and applied chemistry, as well as the repeat of his six Board of Agriculture lectures in May and June.[117] Leaving that course aside, his two other courses seem to have followed exactly the same structure as in 1802, Davy referring to them as 'the common course'.[118] Neither he nor Young prepared a new syllabus for their lectures, but the Managers decided that printed notices of the lecture topics should be distributed to

107 Francis Horner to Edward St Maur, 11th Duke of Somerset, 7 June 1802: Kenneth Bourne and William Banks Taylor (eds), *The Horner papers: selections from the letters and miscellaneous writings of Francis Horner, MP 1795–1817* (Edinburgh University Press, 1994), p. 240.

108 Humphry Davy to Davies Giddy, 12 June 1802, CLHD, 1, 45.

109 Frank A. J. L. James, 'The subversive Humphry Davy: aristocracy and establishing chemical research laboratories in late eighteenth- and early nineteenth-century England', in *Compound histories: materials, governance and production, 1760–1840* (ed. Lissa Roberts and Simon Werrett), pp. 269–288 (Brill, Leiden, 2017).

110 Rumford's report was transcribed in RI MM, 28 April 1802, 3, 4–19, quotation on p. 19.

111 RI MM, 3 May 1802, 3, 23.

112 Reichsgraf von Rumford to Joseph Banks, 7 May 1802, RI MS Rumford/1/17. The calculation of the debt, in Banks's hand, is on the letter.

113 Bence Jones, *op. cit.* (note 20), p. 76.

114 RI MM, 24 May 1802, 3, 40.

115 RI MM, 31 May 1802, 3, 43.

116 RI MM, 17 January 1803, 3, 73. They were advertised in *The Morning Post*, 8 January 1803, 1a.

117 *The Morning Post*, 31 May 1803, 1b. On these, see James, *op. cit.* (note 3), p. 373.

118 Humphry Davy to Davies Giddy, 26 October 1802, CLHD, 1, 61.

subscribers every Monday. This practice continued until at least 1809,[119] but by 1812 cards covering the entirety of the ensuing season had been introduced.[120] In his 1803 course Davy continued to move his researches from the laboratory to the theatre. For instance, on 15 February he included his experiments made the previous year on the galvanic ignition of charcoal under water.[121]

Such novelty helped to ensure that Davy's audiences remained large, and indeed they may have grown, indicating his increasing popularity and fame, the trappings of which he began to acquire. Elected a corresponding member of the Parisian Philomathic Society in January 1803 and Honorary Membership of the Dublin Society in July, on 17 November, having been nominated in April, he became a Fellow of the Royal Society of London.[122] At some point early in the year he sat for the popular portraitist Henry Howard (1769–1847), who exhibited the result at the Royal Academy's exhibition. Engraved shortly afterwards by Samuel Reynolds (1773–1835), he published it as a mezzotint in May 1804.[123] It portrays a youthful thoughtful-looking Davy sitting at a circular table on which are placed a number of his manuscript notebooks, together with a quill in an inkbottle. On a shelf behind him is some glass gas apparatus, doubtless referencing his researches (and lectures) on nitrous oxide. The inclusion of apparatus related to his recent researches became a recurring theme in future portraits.

Davy's continuing success during the 1803 season led the Managers, despite the continuing severe financial problems, to increase his salary from £200 to £300 in line with Rumford's original appointment letter.[124] The 1803 lectures attracted more personal criticism of Davy from his old friends. The day after he dined with Tobin and Tom Wedgwood (1771–1805), the latter expressed concern that Davy's success had got him into 'an unhappy twist' since, quoting Luke 16:13 (KJV), he was 'trying to worship God & Mammon'.[125] Coleridge used the same quotation after visiting Davy just before the start of the 1804 lecture season. He concluded that Davy 'seems more and more determined to mould himself upon the Age in order to make the Age mould itself upon him'.[126] The first part suggests Coleridge recognized Davy's sensitivity to what his audience needed to hear; the second, his ambition to take full advantage of his circumstances. But Coleridge also became 'half angry with' Davy 'for prostituting and profaning the name of Philosopher'.[127] All their fears would undoubtedly have been heightened by Davy visiting the Sussex seat of James Baker-Holroyd, Lord Sheffield (1735–1821), for three weeks during autumn 1803.[128]

If Davy's spectacularly successful lectures secured his position at the Royal Institution, the same could not be said of Young. One commentator thought his lecturing style 'better adapted to the closet than to recitation before a numerous and very mixed audience'.[129] John Ayrton

119 RI MM, 17 January 1803, 3, 73; 27 November 1809, 4, 495. Four examples of these cards, listing some of Young's and Davy's lectures during February and March 1803, are in Sir John Soane's Museum, reference 5771–4.

120 See the printed lecture list dated 6 January 1812, RI MS GB/1, p. 109.

121 *Ipswich Post*, 19 February 1803, 2b–c.

122 Humphry Davy to Jean-Baptiste Biot, 20 January 1803, CLHD, 1, 64; RI MS HD/5/26; Royal Society of London MS EC/1803/3.

123 Richard Walker, *Regency Portraits* (2 volumes) (National Portrait Gallery, London, 1985), vol. 1, p. 147.

124 RI MM, 7 March 1803, 3, 106.

125 Tom Wedgwood to Thomas Poole, 11 September 1803, WM MS MC 67.

126 Samuel Taylor Coleridge to Thomas Poole, 26 January 1804, CLSTC, 2, 1041–1042.

127 Samuel Taylor Coleridge to Richard Sharp, 15 January 1804, CLSTC, 2, 1031–1035, on p. 1032.

128 Humphry Davy to Davies Giddy, October 1803, CLHD, 1, 76.

129 *British Critic* **25**, 97 (1805).

Paris (1785–1856) reported that the numbers in his audience diminished, though there is no contemporary evidence for this,[130] while Young himself in his lecture notes thought he had not performed well.[131] With the Royal Institution moving towards attracting fee-paying audiences, all this put Young in a very weak position, exemplified by the fate of the preface he drafted for the start of volume two of the Royal Institution *Journals*. In this he argued for retaining the status quo in the Royal Institution, seemingly oblivious to the financial crisis. The Managers referred the draft preface to a committee,[132] who recommended its deferment,[133] even though already typeset.[134] Thus when he asked, towards the end of April, for a salary increase, doubtless prompted by Davy's rise the month before (meaning they were now paid the same) the Managers refused.[135] Furthermore, at the start of June, they asked Young whether he would be willing to deliver a course of only 20 lectures in the following season;[136] he resigned shortly afterwards,[137] to be replaced by Allen.[138]

Following a joint report of the Committees of Science and of Accounts, dated 5 December 1803, during 1804 the Royal Institution began moving towards a more open approach to its potential audience. A newspaper advert, which appeared in *The Times* and elsewhere, was drafted and entered in full in the Managers' minutes, indicating its importance. This provided complete details, with costs, about how to become a proprietor or subscriber, noting that anyone wishing to subscribe should inform the Managers, who met every Monday at noon. The intention was doubtless to increase the audience for that season's lectures, which the advert stated would be delivered by Davy, Allen and the Mancunian chemist John Dalton (1766–1844), who would lecture on mechanics and physics.[139] Furthermore, a few weeks later the Royal Institution announced the establishment of fortnightly 'Public Experiments in Chemistry' to commence on 3 March. Spencer attended that day, but what role Davy may have played is not known and there is no further evidence that they were continued.[140]

In preparation for his 1804 lectures, which began on 2 February, Davy wrote a syllabus entitled *Outlines of a course of lectures on chemical philosophy*, dated 12 January and published towards the end of the month.[141] Another possible indication of the Royal Institution's increasing openness may be indicated by its publication of *An explanation of*

130 Paris, *op. cit.* (note 56), vol. 1, p. 140.

131 University College London MS add 13/16, fol. 21. See Cantor, *op. cit.* (note 67), p. 92, for references to other comments in a similar vein.

132 RI MM, 21 February 1803, 3, 87.

133 RI MM, 7 March 1803, 3, 92–93.

134 Both the MS and printed text are in RI MS RI/5/14/1.

135 RI MM, 26 April 1803, 3, 129.

136 RI MM, 6 June 1803, 3, 143.

137 RI MM, 4 July 1803, 3, 149.

138 Humphry Davy to William Allen, 4 July 1803, CLHD, 1, 71.

139 RI MM, 5 September 1803, 3, 151, appointed Dalton to lecture. No evidence as to how this happened or why Dalton would have wanted the job has been found, but his fellow Quaker, Allen, was involved, see Allen, *op. cit.* (note 47), vol. 1, p. 84, diary entry for 10 July 1803. Staying in the Royal Institution, Dalton delivered his lectures in December 1803 and January 1804; see William Charles Henry, *Memoirs of the life and scientific researches of John Dalton* (Cavendish Society, London, 1854), pp. 47–50. Dalton gave a second course at the start of 1810.

140 A copy of the joint report is in RI MS Pep/F/7. For the advert, see RI MM, 5 December 1803, 3, 172–174, and *The Times*, 16 December 1803, 1a. The public experiments were advertised in *The Sun*, 1 February 1804, 1b; Spencer, Diary, 3 March 1804, BL add MS 76327 (unfoliated).

141 *The Morning Post*, 21 January 1804, 1a.

terms used in chemistry, a short (22 p) pamphlet by Sadler. This was a sort of dictionary that defined 178 chemical terms, for example 'Calcareous Earth. Pure Lime', though most entries were a bit longer.[142] Nothing is known about the circumstances of the production or use of this text, not even its precise publication date. It is now quite rare, but the three copies that have been located are all bound with Davy's *Outlines*, which may suggest simultaneous publication. Aside from these sources and brief references in the diaries of Spencer and Davies Giddy (1767–1839),[143] no notes or reports, even briefly in letters, have been found.

Sadler's was not the only publication associated with Davy's lectures. After attending his lectures from 1801, the Anglo-Swiss writer Jane Marcet (née Haldimand, 1769–1858) in 1806 published *Conversations in chemistry*. This became one of the most popular nineteenth-century scientific texts, going through 16 English editions during her lifetime.[144] She had previously attended scientific lectures elsewhere and, though she did not enjoy them, that experience combined with discussions with her husband allowed her to fully benefit from Davy's 'excellent lectures'.[145] That gave her the idea of writing a book to provide the same background to the lectures she so enjoyed. The book took the form of a conversation between 'Mrs. B.' (presumably Marcet's alter ego) and two young girls, Caroline and Emily. Though the children's ages are not made clear, they appear to be in their early teens. While the presence of women at the Royal Institution has been frequently discussed both at the time and by historians, there has been no discussion, as far as I am aware, of children attending the lectures. Yet they were there. During the first season, Mary Temple, Viscountess Palmerston (1752–1805), and her daughters, aged 15 and 11, were 'pretty constant attendants'.[146] The poet Eleanor Anne Porden (1795–1825) recollected that she had attended lectures 'constantly' at the Royal Institution since she was nine and indeed regarded it as her 'Alma Mater'.[147] That means her first season would have been 1805. Ten years later she published a poem, *The Veils*, the notes to which contained many references to Davy. Indicating her indebtedness to the Royal Institution, she presented a copy bound in luxury red Morocco.[148]

The text of Davy's 1804 *Outlines*, its very title indicating a significant change in his approach to the lectures, comprised 54 pages – slightly over half the length of his 1802 *Syllabus*. He made it clear that *Outlines* provided the overall plan of the course rather than its 'minute detail'.[149] He divided the course into two, namely the connection of chemistry with natural operations (delivered in the afternoon) and with artificial operations (delivered in the evening). In the first part, Davy basically dealt with the chemistry of the globe,

142 John Sadler, *An explanation of terms used in chemistry* (Royal Institution, London, 1804), p. 6.

143 Spencer, Diary, 5 April 1804, BL add MS 76327 (unfoliated); Giddy, Diary, 10 May 1804, KK DG 17 (unfoliated).

144 There is a large literature on Marcet, but for an overview see Bette Polkinghorn, *Jane Marcet: an uncommon woman* (Forestwood Publications, Aldermaston, 1993) and more recently Tim Fulford, 'Humphry Davy, Jane Marcet, and the cultures of Romantic-era science', *Euro. Romantic Rev.* **32**, 535–550 (2021).

145 [Jane Marcet], *Conversations on chemistry. In which the elements of that science are familiarly explained* (2 volumes) (Longman, London, 1806), vol. 1, vi. Her husband was a proprietor: RI MM, 6 April 1801, 2, 158.

146 Reichsgraf von Rumford to Sarah Thompson, 2 March 1801, Bence Jones, *op. cit.* (note 20), pp. 70–71.

147 Eleanor Anne Porden to John Franklin, 4 June 1823, DRO D8760/F/FSJ/1/1/24. It is not clear how she came to attend the lectures as there is no evidence until 1811 of a family connection, when her mother became a subscriber (RI MM, 4 February 1811, 5, 182).

148 Eleanor Anne Porden, *The veils; or the triumph of constancy. A poem, in six books* (John Murray, London, 1815). RI MM, 1 May 1815, 6, 53. On this poem, see Adeline Johns-Putra, '"Blending science with literature": the Royal Institution, Eleanor Anne Porden and The Veils', *Nineteenth-Cent. Contexts* **33**, 35–52 (2011) and Lloyd Edmondson, *op. cit*. (note 103).

149 Humphry Davy, *Outlines of a course of lectures on chemical philosophy* (Royal Institution, London, 1804), unpaginated front matter.

including geological phenomena, the oceans, the atmosphere, vegetation and animal life, concluding:

> as we are acquainted with only a very minute part of the materials of the globe, there is great reason to suppose, that powers have been, and may be called into action in modifying it of which we can form no ideas; and which it has pleased the Divine Will to conceal from us in wisdom.[150]

In the second part, Davy covered more familiar territory, discussing the properties of various simple and compound chemicals in relation to heat, light and electricity. At one point he did discuss the utility of some of these materials for processes such as metallurgy, dyeing, bleaching and so on,[151] but this formed a comparatively small portion of the course. From this it seems that Davy had decided to move towards stressing the intellectual, theological and scientific, rather than the practical and utilitarian components of chemistry.

Davy's changing approach was well in line with the Royal Institution's developing policy of expanding the range of subjects covered by the lecture programme. During January 1804, courses on ancient and modern architecture, *belles lettres*, painting, botany, etc., were arranged.[152] As with Davy's changes to his lecture courses, the Royal Institution's expanded lecture programme showed a pronounced shift away from its Banksian/Rumfordian practical and utilitarian concerns. This doubtless accounts for Banks's complaint to Rumford that 'the Institution has irrevocably fallen into the hands of the Enemy, & is now perverted to a hundred uses for which you & I never intended it'.[153] Ignoring Banks's tantrum, those running the lecture programme continued to work hard to develop and diversify it, as well as starting the next season in November, rather than the new year. Furthermore, this planning occurred much earlier than before, with the programme for the 1804–1805 season in place by May 1804 with 10 or 11 lecturers.[154] Davy began his first course of the new season, 12 lectures on chemical analysis, at 2pm on Tuesday 13 November 1804, delivered with his 'usual eclat' as he modestly told his mother,[155] and completed just before Christmas.

The new year brought an alteration to Davy's lecture topics. Instead of continuing with chemistry, as originally intended, he would provide 12 lectures on geology and six 'On the History and Principles of Science'.[156] There is no corroborating evidence that the latter series was ever delivered,[157] but notes do exist for four lectures that may have been intended for the course.[158] Throughout his time at the Royal Institution, Davy had been collecting minerals, which formed the core of its mineralogical display opened in 1805.[159] The natural corollary, this time taking his field work into the theatre, would be to provide an accompanying lecture course on geology to the Institution, which he began in early February. About half way through the course, the Managers instructed lecturers not to

150 *Ibid.*, p. 24.
151 *Ibid.*, pp. 41–42.
152 RI MM, 23 January 1804, 3, 203–204.
153 Joseph Banks to Reichsgraf von Rumford, 6 June 1804, SCJB, 5, 355–356.
154 RI MM, 21 May 1804, 3, 284–285.
155 Humphry Davy to Grace Davy, 20 November 1804, CLHD, 1, 100, written the day he delivered his third lecture.
156 RI MM, 14 January 1805, 4, 9.
157 John Davy, *Memoirs of the life of Sir Humphry Davy* (2 volumes) (Longman, London, 1836), vol. 1, p. 213, noted his belief that they were not delivered.
158 RI MS HD/19/A-D; KK GS/6/1.
159 James, *op. cit.* (note 34).

lecture in Passion or Easter week, which they had done hitherto,[160] and that reduced Davy's course to 10. The reason for this decision is not clear, though possibly related to the growing influence of an evangelical faction within the Royal Institution.[161] For example, the Manager Thomas Bernard (1750–1818) had connections to the Clapham Sect.

This geology course is the first for which any of Davy's lecture notes have survived and indeed is the only course where we appear to have notes for every lecture in a series. All the notes were written into quarto exercise books and for most lectures in this series we have the notes both in Davy's hand and in the neat hand of an amanuensis.[162] They thus illustrate what lay behind his previous (and future) lectures and represent the general pattern for all Davy's lecture notes. The length of each geology lecture ranged between 4500 and 6000 words, which would have taken about 45 minutes to read, significantly shorter than Losh noted. While other lecture notes were shorter or longer, the range of the geology lectures seems about average.

It seems unlikely that Davy read his notes to the audience in the theatre; indeed, John Davy recollected that Davy mostly lectured 'viva voce' apart from the beginning and end of the lectures, which contained rhetorical passages, and that he rehearsed them the evening before and in his notes 'mark[ed] the words which required emphasis', for which there is some evidence.[163] In any case it would have been tedious to read them and occasionally the notes verge on the incomprehensible,[164] so I infer that he probably used them as a framework around which he talked and another copy provided a running order for the experiments, demonstrations and illustrations delivered by his assistant(s). When these were required, Davy usually wrote 'instance' in the notes, but occasionally used 'knock',[165] suggesting an audible signal to his assistant(s) to leap into action—Davy was certainly well aware of the theatricality of his performance.

Davy may have considered lecturing on the non-experimental science of geology a challenge. If so, that might explain why he persuaded the Managers to commission 10 or 12 paintings (at two and half guineas each) to illustrate the lectures.[166] (Davy failed to mention, or at least it was not minuted, that he commissioned Webster to make them.) Such images provided additional visual interest to the large number of mineral specimens he showed. In these lectures, Davy stressed the practical value of geology to the miner, the engineer, the drainer, the improver of the land and so on:[167] 'The progress of civilization is immediately concerned with the application of the metals.'[168] But what is really striking is that the first four lectures are almost entirely devoted to the history of science. Most of

160 RI MM, 1 April 1805, 4, 53.

161 Berman, *op. cit.* (note 62), p. 6.

162 RI MS HD/16/A-F, /17/A-F and /19/E; KK GS/6/2-5. The manuscripts in Kresen Kernow were published in Alexander Ospovat, 'Four hitherto unpublished geological lectures given by Sir Humphry Davy in 1805 from manuscripts belonging to the Royal Geological Society of Cornwall', *Trans. R. Geolog. Soc. Cornwall* **21**, 1–96 (1977), while those in the Royal Institution were published in Siegfried and Dott, *op. cit.* (note 9). (Their subtitle betrayed the common misunderstanding as to the composition of the Royal Institution audience.)

163 John Davy, *op. cit.* (note 5), [p. 19r]; Davy, *op. cit.* (note 157), vol. 1, p. 250. See RI MS HD/A/1, pp. 4, 6, 13, for examples of Davy using a symbol resembling the bottom left corner of a square, which may have been such marks.

164 For instance, RI MS HD/3/B/2, fol. 35r.

165 For example, RI MS HD/1/A/1.

166 RI MM, 14 January 1805, 4, 8. Sophie Read, 'Using drawings in the lecture room: John Soane's architectural performances at the Royal Institution', *Romanticism* (forthcoming), discusses how such illustrative material was deployed during the Royal Institution lectures delivered at the end of the 1810s by the architect John Soane (1753–1837).

167 Siegfried and Dott, *op. cit.* (note 9), p. 12.

168 *Ibid.*, p. 103.

these historical lectures dealt with classical Greek sources, but he also discussed eighteenth-century theoretical geological debates, devoting an entire lecture to the topic.[169] This historical content might have been influenced by preparations for his putative third course for the season on the history of science, but another possible reason may have been that he was waiting for Webster's paintings. On the day of his fourth lecture, Davy chased Webster for them, saying that he wanted six paintings 'immediately',[170] which he used in his next and sixth lectures.[171] According to Davy, these geology lectures were successful with 'very crowded audiences',[172] most of whom, according to Marianne Stanhope (1786–1862), were women – she thought 'Mr Davy … very clever, his style is good, his matter interesting'.[173]

The overall lecture programme had been organized by Bernard and its success prompted the Managers in early March 1805 to ask him to arrange the 1805–1806 season with the same eclectic mixture of topics.[174] It was agreed that Davy would deliver two courses on chemistry and one on modern history of science.[175] Although the organization of the programme was mostly attributed to Bernard, it seems possible that Davy was behind many of these developments, which accords well with the somewhat subversive way he established both the mineralogical collection and research as Royal Institution activities.[176] If so, it would explain the increasing recognition that the Managers gave Davy, and suggests that he was now perceived as the Royal Institution's chief asset. Rewards ranged from the minor, authorizing £4 to be spent on a clothes' press for him,[177] to his significant appointment in early February as 'Director of the Laboratory' with an additional annual salary of £100 backdated to the start of the year.[178]

The Royal Institution's next season began on 19 November 1805 with a lecture by Davy on chemistry, the first of 12 finishing just before Christmas about which nothing further is known.[179] As in 1805, it was decided that Davy would again deliver 10 lectures on geology instead of chemistry in the new year.[180] As well as, perhaps, using Webster's drawings again, it was also agreed that Davy would use transparent drawings also made by Webster[181]—presumably in a magic lantern of some sort—for which the Managers provided additional help from the assistant librarian Samuel Bishop, who was paid an extra 10 guineas.[182] Towards the end of the course, the Managers accepted Davy's proposal that he deliver some additional geological lectures (for which there is no supporting evidence that they ever happened) and then spend the remainder of the season in moving and

169 *Ibid.*, pp. 46–58.
170 Humphry Davy to Thomas Webster, 28 February 1805, CLHD, 1, 104.
171 Siegfried and Dott, *op. cit.* (note 9), pp. 73–90.
172 Humphry Davy to Thomas Poole, second half of February 1805, CLHD, 1, 106.
173 Marianne Stanhope to John Spencer Stanhope, 4 March 1805: A. M. W. Stirling, *The letter-bag of Lady Elizabeth Spencer-Stanhope compiled from the Cannon Hall papers, 1806–1873* (2 volumes) (John Lane, London, [1908]), vol. 1, pp. 9–12.
174 RI MM, 4 March 1805, 4, 37. For a discussion of Bernard's crucial role in the Royal Institution's programme, see Klancher, *op. cit.* (note 11), pp. 72–77.
175 RI MM, 25 March 1805, 4, 48.
176 James, *op. cit.* (notes 34 and 109).
177 RI MM, 1 April 1805, 4, 53.
178 RI MM, 4 February 1805, 4, 21. On the significance of this appointment, see James. *op. cit.* (note 109), p. 285.
179 This and the other lecture courses were advertised in *The Times*, 18 October 1805, 1a.
180 RI MM, 30 December 1805, 4, 129.
181 *Ibid*. See also Humphry Davy to Thomas Webster (CLHD, 1, 105), probably mis-dated and should be early 1806.
182 RI MM, 3 February 1806, 4, 143 and 5 May 1806, 4, 179.

organizing the mineralogical collection (a process that began at the end of March[183]) instead of delivering a third course.[184]

Once again these developments suggest Davy's increasing grip on managing the Royal Institution, and this is further confirmed by the tone of the minute where Davy proposed the topics he would cover in two courses of 20 lectures during the 1806–1807 season, which the Managers accepted.[185] His first course, on vegetable chemistry, commenced on 19 November 1806 and comprised eight lectures, rather fewer than agreed. For these we not only have his notes for two lectures,[186] but also short accounts of each lecture in a weekly magazine published during the first half of 1807 entitled *The Director*. This was owned by Bernard and edited by Thomas Frognall Dibdin (1776–1847), who lectured on the history of English literature at the Royal Institution.[187] Discontinued after the end of the season, *The Director* may have been an unsuccessful attempt to revive the *Journals of the Royal Institution* (published sporadically between 1800 and 1803).

From the summaries in *The Director*, one striking feature of his vegetable chemistry lectures was the encouragement that Davy gave to his audience to engage fully with the subject. In his opening lecture he provided a list of texts that the audience should read, including *Anatomy of plants* (1682) by Nehemiah Grew (1641–1712) and the more recent *Traité d'anatomie et de physiologie végétales* (1802) by Charles François Brisseau de Mirbel (1776–1854).[188] In his second, Davy recommended research 'particularly to the female part of his audience, as fitted to their habits and pursuits, capable of affording much rational amusement, and as an elegant and refined study'.[189] On the other hand, Davy talked about the practical value of understanding vegetable chemistry in terms of tanning,[190] dying and making cider,[191] and closed his course by recommending new research on soils 'as peculiarly important to the agriculture of the country'.[192]

Davy's second course commenced on 31 January 1807. The title had changed to the 'Chemical Phenomena of Nature' and, according to *The Director*, comprised 15 lectures, again rather less than agreed. In addition to *The Director* reports, notes for five of these lectures have survived.[193] One reason for Davy's popularity as a lecturer was that he showed spectacular phenomena in the theatre. Thus, in his third lecture he demonstrated Pictet's reflection of radiant heat by positioning two large concave mirrors 10 feet apart facing each other vertically. At the focus of the lower mirror he placed some fulminating mercury and at the focus of the upper mirror he put some burning coals, the radiation from which, reflected to the lower mirror, exploded the mercury.[194] In his opening lecture,

183 RI MM, 24 March 1806, 4, 157.
184 RI MM, 24 February 1806, 4, 149.
185 RI MM, 26 May 1806, 4, 185.
186 RI MS HD/2/B/1 and 2.
187 Thomas Frognall Dibdin, *Reminiscences of a literary life* (John Major, London, 1836), pp. 230–235, 249–253.
188 *The Director* **1**, 24 (1807).
189 *Ibid.*, 50.
190 RI MS HD/2/B/1, fol. 33.
191 RI MS HD/2/B/2, fols 13 and 16 respectively.
192 *Op. cit.* (note 188), 56.
193 RI MS HD/2/C/1, 2 and 3, HD/4/B/4 and HD/3/B/9.
194 *Op. cit.* (note 188), 185–186. James Evans and Brian Popp, 'Pictet's experiment: the apparent radiation and reflection of cold', *Am. J. Phys.* **53**, 737–753 (1985).

written the day before he delivered it,[195] Davy provided both a utilitarian and religious justification for the study of science,[196] but on the evidence of the reports and surviving notes, these themes were not pursued during the remainder of the course, unlike the many utilitarian references that he gave in his vegetable chemistry lectures.

During autumn 1806 Davy investigated the relationship of matter and electricity, recording many of his experiments in the Royal Institution's laboratory notebook, though not all, and those notes must be presumed lost.[197] In these experiments he showed the intimate relationship of electricity and chemical action, publishing the results in his first Bakerian Lecture to the Royal Society, delivered over four evenings in November and December 1806.[198] This was a decisive theoretical insight and his audience must have been keenly anticipating his first lecture on electricity due to be delivered on 7 March 1807. Unfortunately, he developed a sore throat and the day before asked Allen to step in to deliver the lecture, 'under very difficult circumstances, as the audience had been given to expect new discoveries' he noted in his diary.[199] Following his recovery, Davy in his next two lectures summarized and demonstrated the results described in his Bakerian Lecture, yet again taking his research, via his published paper, from laboratory to theatre.[200]

Davy's significance for the Royal Institution was further enhanced when, in February 1807, the Managers transferred responsibility for scrutinizing the syllabi of all lectures delivered in the Royal Institution from themselves to Davy.[201] In July they agreed to Davy's proposal that he would deliver 26 lectures in the autumn and 16 in spring 1808 on chemical topics.[202] But at the end of November the Managers announced that Davy would deliver a course on geology and another on electro-chemistry and that the season would begin on 9 December 1807.[203] The first course Davy had already delivered twice before, though he revised the introductory lecture,[204] but perhaps on this occasion he wanted to boost the recently established Geological Society, of which he was a founding member.[205] The other course allowed him to demonstrate the new electro-chemical discoveries he had made that autumn (including isolating the chemical elements that he named sodium and potassium),[206] and that may have provided the motivation behind changing topic.

However, disaster struck. Davy had visited Newgate prison to report on its ventilation,[207] though when is not entirely clear. Soon after, Davy became very ill and in later years

195 As noted on RI MS HD/2/C/1, fol. 1. John Davy, *op. cit.* (note 5), [p. 19r], claimed that during his time at the Royal Institution this was Davy's usual practice, though I do wonder about the time needed for an amanuensis to produce a copy.

196 RI MS HD/2/C/1, fols. 21–22 and 27–28 respectively. These passages were omitted from John Davy's published version of the lecture, CWHD, 8, 167–179.

197 RI MS HD/6, pp. 22–46; /13/J, p. 34. Colin A. Russell, 'The electrochemical theory of Sir Humphry Davy. Part III: The evidence of the Royal Institution manuscripts', *Ann. Sci.* **19**, 255–271 (1963), p. 260.

198 Humphry Davy, 'The Bakerian lecture, on some chemical agencies of electricity', *Phil. Trans.* **97**, 1–56 (1807).

199 Allen, *op. cit.* (note 47), vol. 1, p. 84, diary entry for 7 March 1807. Davy's request was noted in the previous day's entry.

200 RI MS HD/2/C/3; *The Director* **1**, 314–315 (1807).

201 RI MM, 2 February 1807, 4, 228.

202 RI MM, 13 July 1807, 4, 272.

203 RI MM, 23 November 1807, 4, 283. The announcement was published in *The Morning Chronicle*, 30 November 1807, 3a.

204 RI MS HD/4/A/2, watermarked 1808.

205 C. L. E. Lewis, 'Doctoring geology: the medical origins of the Geological Society', in *The making of the Geological Society of London* (ed. C. L. E. Lewis and S. J. Knell), pp. 49–92 (The Geological Society, London, 2009), on p. 75.

206 Humphry Davy, 'The Bakerian lecture, on some new phenomena of chemical changes produced by electricity, particularly the decomposition of the fixed alkalies, and the exhibition of the new substances which constitute their bases; and on the general nature of alkaline bodies', *Phil. Trans.* **98**, 1–44 (1808), p. 32.

207 William Babington and Humphry Davy to Sub-committee of City Lands, 21 November 1807, CLHD, 1, 151.

considered that he had contracted typhus in the prison. The fever was severe for three weeks and Davy later suffered a relapse of 10 days.[208] According to John Davy, the physician William Babington (1756–1833) thought Davy's illness was 'the result of over fatigue and excitement from his experimental labours and discoveries',[209] a view with which the non-expert Coleridge agreed. Whenever and whatever he contracted, it was certainly highly dangerous. Coleridge visiting on 24 November, found that Davy had taken to his bed, and told Dorothy Wordsworth (1771–1855) that he would sit with him that evening.[210] According to Edmund Davy, he and the housekeeper, Hannah Greenwood, watched over Davy on alternate nights.[211] On 7 December Davy was able to write to his mother, copying out the thrice daily report of his physicians from the previous day.[212] Coleridge seems also to have been infected by his proximity to Davy, but a trip to Bristol in 'cold frosty air' put paid to that. On his return Coleridge learned that Babington and another physician, Matthew Baillie (1761–1823), considered that 'Davy was not only ill, but his Life precarious, his recovery doubtful'. Though Davy appeared to be better by the 14th, nevertheless his condition and medical opinion prompted Coleridge, despite his issues with Davy, to make an emotional outburst in a letter to Southey that 'he must not die'.[213]

Davy's illness was recorded in the minutes of the Managers' meeting held on 7 December, and they postponed the start of all lectures until the beginning of January.[214] On 4 January 1808 the Managers decided that Dibdin would open the lecture season on Wednesday the following week.[215] That day, Allen visited Davy and was shocked at his 'much reduced' state,[216] but just over a week later found Davy up and dressed for the first time.[217] The following day, Dibdin delivered his first lecture, prefacing it by commenting on the state of Davy's health followed by a statement written 'by a Gentleman … the best qualified to do it', which described Davy's latest discoveries. Dibdin concluded by saying it was 'a matter of just congratulation, that the country, which has produced the two Bacons, and Boyle, has, in these days shown itself worthy of its former renown, by the labors of Cavendish and Davy'.[218] The Managers ordered that Dibdin's comments be printed as a four-page tract, which they had tipped into their minutes.[219]

By the end of January 1808 Davy, well on the way to recovery, though still not very strong, wrote to George Beaumont (1753–1827) quoting from 'Hart-leap Well'—the opening poem of the second volume of *Lyrical ballads* (1800) by William Wordsworth (1770–1850) that Davy helped see through the press in Bristol—about being as weak as a lamb.[220] So, it was not until mid March that Davy commenced his lectures, first on electro-chemistry and a few days later on geology.[221] For the former course, notes for five of these 10 lectures

208 Humphry Davy to George Beaumont, 24 and 25 January 1808, CLHD, 1, 153.
209 Davy, *op. cit.* (note 157), vol. 1, p. 386.
210 Samuel Taylor Coleridge to Dorothy Wordsworth, 24 November 1807, CLSTC, 3, 37–39.
211 Davy, *op. cit.* (note 157), vol. 1, p. 387.
212 Noted in *ibid.*, p. 386—the letter itself has not been found.
213 Samuel Taylor Coleridge to Robert Southey, 14 December 1807, CLSTC, 3, 41–43.
214 RI MM, 7 December 1807, 4, 289.
215 RI MM, 4 January 1808, 4, 303.
216 Allen, *op. cit.* (note 47), vol. 1, p. 90, entry for 4 January 1808.
217 *Ibid.*, entry for 12 January 1808.
218 Thomas Dibdin, *New discovery in chemistry* (Royal Institution, London, 1808).
219 RI MM, 18 January 1808, 4, between 306 and 307.
220 Humphry Davy to George Beaumont, 24 and 25 January 1808, CLHD, 1, 153.
221 RI MM, 22 February 1808, 4, 319.

have survived;[222] the first half of the course was reported in a recently founded monthly magazine, *The Athenaeum*, [223] edited by the radical writer John Aikin (1747–1822), that lasted two and a half years; the final two lectures appeared in *The Monthly Magazine*,[224] while *The Scots Magazine* provided an overall summary.[225] No accounts of the geology lectures have been found.

In his first electro-chemistry lecture, delivered on 12 March, Davy was 'greeted with three distinct rounds of applause'.[226] There he outlined the role of electricity in almost every conceivable aspect of nature, including life.[227] He concluded the course towards the end of May, with a peroration linking the practical applicable function of chemistry with its ideological and theological value:

> The advances in the transcendental part of Chemistry, having as their object new means of modifying the forms of Matter, must lay open practical applications of the highest value - & this kind of improvement thus leads to the acquisition of two species of power – one natural – one intellectual. One by which a dominion is gained over the properties of things & by which they are applied to the uses of Man. The other by which *the understanding*, is exalted & enlarged, filled with admiration at the new wonders of creation which continually unfolded & impressed with a deeper feeling of the infinite wisdom & power of the Creator.[228]

By this kind of rhetoric Davy provided a bridge between the Royal Institution's original practical agenda and the more ideological and evangelical approach fostered by Bernard.

During this period, the Royal Institution's dependence on Davy became increasingly clear. A consequence of the decision to postpone all the autumn lectures because of his illness meant that income from annual subscribers fell in 1807 by nearly £1200 compared with 1806, a figure that was not recouped during the opening months of 1808;[229] the suspension of the lecture programme inflicted a severe financial penalty on the Royal Institution. The Managers responded by altering the bye-laws, making Charles Royce redundant[230] and considering a reduced number of lectures.[231] At the start of June, Davy was appointed 'Superintendent of the House',[232] and consequently at their following meeting the Managers decided to invite him to attend their future meetings.[233] His new duties, for which there was no additional pay, included dealing with employing housemaids and porters, the building fabric and so on. However, these actions did not produce an immediate effect on the Royal Institution's finances, and at the end of June the Managers agreed that each of them as well as each visitor should advance £100 to meet the £2000 deficit.[234] In October, following Davy's recommendations, the subscription rates

222 RI MS HD/2/D/1-5.
223 *Athenaeum* **3**, 355–356, 455–456, 569–570 (1808).
224 *Monthly Mag.* **25**, 537–539 (1808).
225 *Scots Mag.* **70**, 522–524 (1808).
226 *British Press*, 14 March 1808, 3d.
227 RI MS HD/2/D/1; *Athenaeum* **3**, 355–356.
228 RI MS HD/2/D/5, pp. 35–36. This passage has a number of emendations written by Davy in pencil; this transcription is based on what he wrote in ink.
229 RI MM, 28 March 1808, 4, 329.
230 RI MM, 25 April 1808, 4, 344.
231 RI MM, 16 May 1808, 4, 349.
232 RI MM, 6 June 1808, 4, 356.
233 RI MM, 13 June 1808, 4, 361.
234 RI MM, 20 June 1808, 4, 363.

were restructured and increased.[235] Elenor Porden's father, the architect William Porden (bp. 1755, d. 1822), commented 'The Institution I think is rapidly declining'.[236]

Nevertheless, and despite the gloom, Davy, with the Managers' permission, embarked on a successful campaign to raise funds to build a very large battery[237]—a project that once again evinces Davy's power within the Royal Institution. From mid December 1808 until mid March 1809, Davy delivered a dozen lectures on experimental chemistry, for which half his notes survive.[238] These were attended (following his return from India) by the savant James Dinwiddie (1746–1815), who kept assiduous notes.[239] From late April to early June, Davy delivered another course of six lectures on electro-chemistry, for which only his notes for two survive.[240] But Dinwiddie's notes, together with the diary of the prominent politician William Windham (1750–1810), reveal that Davy continued introducing novelty into his lectures by using components of his new large battery.[241] Testifying to the interest in this exciting and spectacular new science, Davy delivered a second course of nine lectures on electro-chemistry from mid December 1809 to mid February 1810, of which only the notes for four survive, along with Dinwiddie's accounts.[242] For his course from mid March to early June 1810, Davy provided 12 lectures on chemical philosophy, for which a third of his notes survive.[243] These, along with Dinwiddie's notes,[244] reveal that Davy provided a glowing eloge of the recently deceased Cavendish,[245] an account of nitrous oxide and that he concluded his last two lectures by discussing his new giant battery. Indeed, in the final lecture he demonstrated the effect of all 200 components of the battery (2000 plates with a total surface area of 82.5 square metres), which he did by running wires from the battery room in the basement up to the lecture theatre. There, he made a three-inch spark and charged 24 Leyden jars, which would usually have required 20 to 30 turns of an electrical machine.[246] This was a direct, rather than metaphorical, instance of moving knowledge from the laboratory to the theatre.

During autumn 1810 Davy lectured to the Dublin Society, so his Royal Institution lectures did not commence until the new year, and he proposed repeating what he had done the previous year.[247] By this time, the Royal Institution had transformed itself 'to give it more the form of a Public Establishment, than of Private and Hereditary Property'.[248] Davy

235 RI MM, 31 October 1808, 4, 388, 7 November 1808, 4, 391. This was announced in *The Courier*, 21 April 1809, 1a.

236 William Porden to Eleanor Anne Porden, 30 June 1808, DRO, D8760/F/FEP/1/2/2.

237 Frank A. J. L. James, 'Instruments from scratch? Humphry Davy, Michael Faraday and the construction of knowledge', *Bull. Scient. Instr. Soc.* **148**, 2–13 (2021), pp. 6–7.

238 RI MS HD/3/A/2, 4–8.

239 On Dinwiddie, see Larry Stewart, 'The space between: James Dinwiddie and the transit of science, 1760–1815', in *Spaces of enlightenment science* (ed. Gordon McOuat and Larry Stewart), pp. 162–192 (Leiden, Brill, 2022).

240 RI MS HD/3/A/1, 3.

241 Dinwiddie, Notebook, 6 and 13 May 1808, DU MS Dinwiddie papers, E6 (unpaginated); Windham, Diary, 13 May 1808, ING Barings Bank MS Dep. 207.3.58 (unpaginated).

242 RI MS HD/3/A/9, HD/3/B/4-6. Dinwiddie, Notebook, December 1809 to February 1810, DU MS Dinwiddie papers, E7 (unpaginated). Davy had initially agreed to provide 12 lectures: RI MM, 20 November 1809, 4, 491.

243 RI MS HD/3/B/1, 2, 7, 8.

244 Dinwiddie, Notebook, March to June 1810, DU MS Dinwiddie papers, E7 (unpaginated).

245 This was published in both the *Gent's Mag.* **80**, 195 (1810), where it formed the first article of the March issue, and the *Annual Register* for 1810, pp. 376–377.

246 Dinwiddie, Notebook, 9 June 1810, DU MS Dinwiddie papers, E7 (unpaginated); 'Royal Institution', *Phil. Mag.* **35**, 463 (1810).

247 RI MM, 24 December 1810, 5, 160.

248 'The Report of the Committee of Managers, upon the present state of the Institution', dated 20 March 1809, included in *The Annual Report of the Visitors*, dated 18 April 1809, RI MS VM, 1, 89–94, 91–94, quotation on p. 94.

played a key role in this process, though evidently mildly irritated by the Managers, complaining that they 'cannot ride the horse at all as it is'.[249] What the reforms meant was that, instead of the Institution being owned by the proprietors, an Act of Parliament turned it into a membership organization, making it much easier to join. To support the reforms, Davy delivered, on 3 March 1810, 'A lecture on the plan which it is proposed to adopt for improving the Royal Institution and rendering it permanent',[250] a process Davy referred to as 'unrumfordizing the Royal Institution'.[251] What this somewhat unkind and indeed inaccurate comment meant was that the lecture programme (and possibly research, never part of anyone's original vision for the Royal Institution) would henceforth take priority over more practical concerns. So the advertisement for the 1811 lectures was addressed to 'Members and Subscribers'[252] and, in the opening lecture of his course for that year, Davy congratulated the Institution on its reform.[253]

One consequence of this transformation appears to have been a noticeable increase in general press coverage, at least of Davy's lectures, than before; *The Observer* published a report on each of his 14 lectures on chemical philosophy.[254] This reporting continued with his spring lecture course of six lectures on geology (which he delivered instead of electrochemistry as originally proposed). Unlike his 1806 and 1808 geology courses, which mostly used his 1805 notes, for these he wrote an entirely new set, five of which survive.[255] Each lecture was reported in *The Observer*, *The Morning Chronicle*, *Belfast News Letter* and the *Caledonian Mercury*.[256] The reports in the *Caledonian Mercury* were written by the Scottish mineralogist Thomas Allan (1777–1833), who soon turned them into a 55-page pamphlet.[257] Allan sent a copy to the Scottish geologist James Hall (1761–1832), who commented that they were similar to what he had heard Davy deliver in a previous course and of which he was quite critical, though he thought Davy was 'a fine fellow as you say, but rather rash'.[258]

The 1811 courses came to have a special significance for Davy, since in the audience was Jane Apreece (née Kerr, *ca* 1780–1855), presumably among the 'three to four hundred Ladies of the highest rank and respectability' who attended the geological lectures.[259] She had recently moved to London from Edinburgh, where she had run a successful literary and scientific salon. She was a wealthy widow, born on Antigua the only child of Charles Kerr (1748[OS]–1795), a merchant there who had acquired his fortune in a highly questionable

249 Humphry Davy to Alexander Marcet, 1 January 1810, CLHD, 2, 219.

250 Published as Davy, *op. cit.* (note 60). It was reported at some length in journals and newspapers, for instance, *Morning Chronicle*, 8 March 1810, 3d–e, and *Phil. Mag.* **35**, 225–229 (1810).

251 Humphry Davy to Francis Jeffrey, 11 April 1810, CLHD, 2, 231.

252 *The Times*, 29 December 1810, 1a.

253 *The Observer*, 3 February 1811, 2d, and Dinwiddie Notebook, 19 January 1811, DU MS Dinwiddie papers, E9 (unpaginated).

254 Davy's notes exist for four of these lectures: RI MS HD/1/A/4, HD/4/B/2, 3, 5. *The Observer*, 3(2d), 10(3a), 17(2d), 24(3a) February, 3(2d), 10(3a), 17(2d), 24(3a), 31(2c) March, 14(2d), 21(3a) April and 5(4c) May 1811; Dinwiddie Notebook, March to June 1810, DU MS Dinwiddie papers, E7 (unpaginated).

255 RI MS HD/4/A/1, 3, 4, 5 and 6, 7.

256 Details in the additional data.

257 [Thomas Allan] (ed.), *Sketch of Mr. Davy's lectures on geology. Delivered at the Royal Institution, London, 1811* (no publisher, [London?], [1811]).

258 James Hall to Thomas Allan, 30 May 1811, National Library of Scotland MS 584, fol. 80a–b.

259 *Liverpool Mercury*, 9 August 1811, 47c.

manner.[260] She had subscribed to the lectures by the end of January 1811,[261] and by at least the beginning of March had met Davy socially, writing admiringly about him to her distant cousin, the poet and later novelist Walter Scott (1771–1832);[262] by April she and Davy were corresponding.[263] After a fairly speedy courtship, they married on 11 April 1812, two days after George, the Prince Regent (1762–1830), had knighted Davy.

Despite the courtship, Davy occupied himself during 1811 in much the same way as the previous year. He spent the autumn in Wales and Ireland, where he delivered further lectures to the Dublin Society, and he agreed, by post, to deliver two courses of lectures to the Royal Institution in 1812 'on Electro-Chemical Science and another on General Chemistry as applicable to the phænomena of nature',[264] though by the time they were advertised they had been elided into a single course on 'Chemistry and Electrochemical Science'.[265] The course comprised 10 lectures, and Davy's notes for three survive;[266] half were reported in *The Monthly Magazine* and all in *The Morning Chronicle* as well as some in the provincial press.[267] Notes of four of the last five lectures were taken by Michael Faraday (1791–1867), just approaching the end of his bookbinding apprenticeship, who had been given tickets by a member. Perhaps more than any other source, Faraday's notes show how the verbal content of Davy's lectures related to his experimental demonstrations and illustrations.[268] As Faraday wished to pursue a career in science, he presented Davy with a bound, neatly written out copy of his notes, asking for a job in science at the Royal Institution, to which, after many contingencies, he was appointed in March 1813.[269]

On the day between being knighted and his marriage, Davy delivered what would be his last ever lecture at the Royal Institution, and he seems to have felt the sense of occasion. Eleanor Porden commented that 'it was delivered in a modest and proper and natural manner without any of the pomposity and rolling about which he has affected lately'.[270] She and others were also concerned that, because Davy had married such a wealthy woman, he would cease lecturing at the Royal Institution, a speculation that also appeared in the press.[271] It was correct, and on 11 May 1812 (the day Spencer Perceval (1762–1812), Prime Minister and Chancellor of the Exchequer, was assassinated) the Managers were informed that Davy could not pledge himself to deliver any further lectures. However, he would be happy to retain the professorship of chemistry and direction of the laboratory and mineralogical collection without salary, proposals which the Managers agreed to immediately.[272] As he told his brother:

260 Frank A. J. L. James, 'Making money from the Royal Navy in the late eighteenth century: Charles Kerr on Antigua "breathing the True Spirit of a West India agent"', *Mariner's Mirror* **107**, 402–419 (2021); see also in this issue Eleanor Bird, 'Humphry Davy, transatlantic slavery and his constructions of racial difference in an early notebook'.

261 RI MM, 28 January 1811, 5, 178.

262 Jane Apreece to Walter Scott, 4 March 1811, CLHD, 2, 259.

263 Humphry Davy to Jane Apreece, 13 and 18 April 1811, CLHD, 2, 265 and 266.

264 RI MM, 2 December 1811, b, 245–246.

265 *Morning Chronicle*, 8 January 1812, 1a.

266 RI MS HD/4/C/1, 2, /4/B/6.

267 'Proceedings of public societies: the Royal Institution', *Monthly Mag.* **33**, 259–263 (1812); *Morning Chronicle*, 27(3c–d) January, 3(3c), 10(3c), 17(3c), 24(3b) February, 2(3c), 9(3b), 16(3c) March and 13(3b) April 1812; *Lancaster Gazette*, 29(4c–d) February, 7(1e) and 14(1d) March 1812; *Leeds Mercury*, 7 March 1812, 3b; *Royal Cornwall Gazette*, 18 April 1812, 4e.

268 Faraday's notes are in RI MS F/4/A.

269 Frank A. J. L. James, *Michael Faraday: a very short introduction* (Oxford University Press, 2010), pp. 32–34.

270 Eleanor Porden to Mary Flaxman, 11 April 1812, DRO D8760/F/FEP/3/3/3.

271 *Freemans Journal*, 16 April 1812, 2b.

272 RI MM, 11 May 1812, 5, 299.

> I give up the routine of lecturing merely that I may have more time to pursue original inquiries & forward more the great objects of Science. This has been for some time my intention, & it has been hastened by my marriage.[273]

And he later told an old friend: 'Having given up lecturing, I shall be able to devote my whole time to the pursuit of discovery.'[274]

Such hopes were, of course, illusory. After his marriage, Davy (with Faraday's help) invented the miners' safety lamp, worked on unrolling the Herculaneum papyri (with mixed results) and oversaw the disastrous attempt to electro-chemically protect the copper bottoms of Royal Navy ships. None of this work involved fundamental scientific contributions of the kind he had made while at the Royal Institution, which Davy would doubtless have appreciated. That might explain why in the early 1820s he sought (unsuccessfully) to appropriate Faraday's work on electro-magnetism and the liquefaction of gases in an attempt to be seen as continuing his spectacular run of discoveries,[275] but as I have argued throughout this paper, using a variety of sources, there was an intimate link between what Davy did in the laboratory and his performances in the lecture theatre. While there is hardly any evidence to suggest Davy consciously intended this process, it is striking that, without the necessity of producing new knowledge for consumption in the theatre, he ceased to undertake original scientific research. He probably did not understand, as Faraday did, that the very need to provide novel material for lectures encouraged 'the great objects of Science'. Without the '*routine* of lecturing', Davy's career in original research faltered.

Acknowledgements

I am enormously grateful to Sharon Ruston and Joanna Taylor for their detailed comments on an earlier draft of this paper and also to Andrew Lacey, senior research associate on the Davy Notebooks Project, for several times pointing me in the right direction. I acknowledge support from the AHRC grant to image, transcribe and provide light critical apparatus of Davy's notebooks. Ruston was principal investigator on the project, while Taylor, I and others served as co-investigators. I also thank Hattie Lloyd Edmondson for laying much of the groundwork for this essay in her PhD thesis that I had the pleasure of supervising, Robert Fox for providing advance page proofs of his biography of Garnett and two referees for their comments. I am grateful to the following archives for allowing me to study material in their collections: Royal Society of London, Royal Institution (RI), British Library (BL), ING Barings Bank, Library of Birmingham, Carlisle Central Library, Dalhousie University (DU), Derbyshire Record Office (DRO), Keele University (KU), Kresen Kernow (KK), National Library of Scotland, University College London and the Wedgwood Museum (WM).

Data accessibility

This article has additional data.

Declaration of AI use

I have not used AI-assisted technologies in creating this article.

273 Humphry Davy to John Davy, June 1812, CLHD, 2, 327.
274 Humphry Davy to William Clayfield, 28 August 1812, CLHD, 2, 340.
275 James, *op. cit.* (note 269), pp. 39–40.