Humphry Davy: Analogy, Priority, and the "true philosopher"

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This essay explores how Davy fashioned himself as, what he called in his poetry, a "true philosopher." He defined the "true philosopher" as someone who eschewed monetary gain for his scientific work, preferring instead to give knowledge freely for the public good, and as someone working at a higher level than the mere experimentalist. Specifically, Davy presented himself as using the method of analogy to reach his discoveries and emphasised that he understood the "principle" behind his findings. He portrayed himself as one who perceived analogies because he had a wider perspective on the world than many others in his society. The poem in which he describes the "true philosopher" offers us Davy's private view of this character; the essay then demonstrates how Davy attempted to depict his own character in this way during critical moments in his career.

Introduction

During the safety lamp controversy of 1815–1817, Humphry Davy deliberately presented himself as a natural philosopher. For Davy this meant someone with a wider purview than others, who is alive to the metaphorical, literary, and philosophical ramifications of his scientific discoveries. He represented himself as working at a highly theoretical level in the laboratory, rather than practically in the mine, making a clear distinction between himself and George Stephenson in this regard. Davy suggested that he was working for loftier ideals and was opposed to monetary gain or profit by patent. He declared that his discoveries were the product of analogical thinking and a consequence of his understanding of scientific principle. Davy asserts his claims of priority on the grounds of this higher reasoning and use of analogy. By these means he thought he achieved a greatness beyond what mere experimentalists could achieve. Analysing his approach to this issue allows us to understand more fully the links

between method, philosophy, and the public fashioning of science in the early nineteenth century. Jan Golinski has written excellently on the ways in which Davy "was fashioning his identity while living his life" and he particularly notes that he "sought recognition as a "philosopher"."[1] This essay confirms Golinski's findings, while focusing on specific aspects of the philosopher identity and using a text that Golinski does not, the poem written at Ullswater on 5 August 1825 in which Davy describes the "true philosopher."[2]

William Hazlitt was among those who were sceptical of Davy's efforts in aligning his greatness with his scientific practice:

> Sir Humphry Davy is a great chemist, but I am not sure that he is a great man. I am not a bit the wiser for any of his discoveries; I never met with any one that was. But it is in the nature of greatness to propagate an idea of itself, as wave impels wave, circle without circle.[3]

As Hazlitt notes, the "idea" of greatness is bred or propagated by itself; it takes on a life of its own, growing in repeated, increasing patterns. In this essay, I reveal the beginnings of Davy's self-fashioning as a "true philosopher" and show how its repeated echoes are found in other, later episodes of his career. The essay uses new sources to show how Davy sought "to propagate an idea" of himself as a "true philosopher" – both in private and public – throughout his life.[4]

I discuss three specific episodes that reveal how Davy negotiated the issues of patents and priority. Firstly, I examine an episode that has been explored by June Fullmer and Golinski in this connection already: Davy's early unhappy dealings with the gunpowder manufactory of his friend John George Children (1812–1813).[5] Returning

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[1] Jan Golinski, *The Experimental Self: Humphry Davy and the Making of a Man of Science* (Chicago: University of Chicago Press, 2016), 8, 125.

[2] John Davy, *Memoirs of the Life of Sir Humphry Davy, Bart.*, 2 vols. (London, 1836), vol. 2, 217–8. The original can be found in notebook RI MS HD/14/E, 166 held at the Royal Institution (RI).

[3] William Hazlitt, *Table Talk; Or, Original Essays* (London: John Warren, 1821), 199. I have not found evidence that Hazlitt met Davy in person.

[4] Especially *The Collected Letters of Sir Humphry Davy*, ed. Tim Fulford and Sharon Ruston, advisory ed. Jan Golinski, Frank A.J.L. James and David Knight, 4 vols. (Oxford: Oxford University Press, 2020). Hereafter Davy, *Collected Letters*.

[5] Golinski, *The Experimental Self*, 137-41; June Z. Fullmer, "Humphry Davy and the Gunpowder Manufactory," *Annals of Science* 20 (1964): 165–94.

to this episode shows how he began to establish a public character that would be further developed in two later episodes that have received far less critical attention: the identification of iodine (1813) and the protection of ships' copper bottoms (1823–1824). We see Davy expressly using analogy as his method in publications on iodine. When frustrated by the response that his work on ships provoked, Davy noted that he was performing this work without applying for a patent or requesting payment. By 1818, the instrument maker John Newman was able to warn the lawyer Joseph Day before he met Davy that he should not mention anything about a patent for his invention, telling him: "he is averse to any scheme where a patent is intended to be taken out."[6] Davy had employed the same tactics often enough by this time to ensure that people knew how he wished to be perceived.

Towards the end of his life, in 1825, Davy wrote the poem that makes it clear he regarded himself as a "true philosopher" and sets out his description of this role. The poem details the kind of "greatness" Davy propagated during his career, as Hazlitt put it. Key to the character of the "true philosopher" is the ability to view from a distance the "relations" between things, in other words, the analogies to be made between them. For David Hume analogy was one of the ways in which we understood the world; for him, reasoning cannot occur without some degree of resemblance: "where we transfer our experience in past instances to objects which are resembling, but are not exactly the same with those concerning which we have had experience."[7] But for Percy Bysshe Shelley in the *Defence of Poetry*, as for Davy, the ability to think analogically is one very few possess. Shelley names such people "poets, in the most universal sense of the word," whose language "marks the before unapprehended relations of things and perpetuates their apprehension."[8] Shelley's description fits Davy's sense of himself as a philosopher, according with his claim that chemists, like poets, possessed "powers which may be almost called creative."[9] Throughout his life

[6] Joseph Day, *A Plan for Constructing an Electrical Telegraph, and a Nautical Nocturnal Communicator* (Chelmsford, 1818), 41.

[7] David Hume, *A Treatise of Human Nature*, 3 vols (London, 1739), 1, 260. I use first editions of texts quoted from except where modern scholarly editions supersede these.

[8] Shelley, P. B., *Poetry and Prose*, ed. Donald H. Reiman and Sharon B. Powers (New York: W. W. Norton, 1977), 512.

[9] Humphry Davy, *A Syllabus of a Course of Lectures on Chemistry* (London: J. Johnson, 1802), 22.

and career, Davy tried to forge an identity beyond that of the mere experimentalist, fashioning himself as both poet and philosopher.

The "true philosopher"

Davy's view of the kind of philosopher he feels himself to be can be seen quite clearly in the poem he writes at Ullswater on 5 August 1825, only four years before his death:

> It is alone in solitude we feel
> And know what powers belong to us.
> By sympathy excited, and constrain'd
> By tedious ceremony in the world,
> Many who we are fit to lead we follow;
> And fools, and confident men, and those who think
> Themselves all knowing, from the littleness
> Of their own talents and the sphere they move in,
> Which is most little, — these do rule the world;
> Even like the poet's dream of elder time,
> The fabled Titans imaged to aspire
> Unto the infinitely distant heaven,
> Because they raised a pile of common stones,
> And higher stood than those around them,
> ——— The great is ever
> Obscure, indefinite; and knowledge still,
> The highest, the most distant, most sublime,
> Is like the stars composed of luminous points,
> But without visible image, or known distance,
> E'en with respect to human things and forms,
> We estimate and know them but in solitude.
> The eye of the worldly man is insect like,
> Fit only for the near and single objects;
> The true philosopher in distance sees them,
> And scans their forms, their bearings, and relations.
> To view a lovely landscape in its whole,

We do not fix upon one cave or rock,
Or woody hill, out of the mighty range
Of the wide scenery, — we rather mount
A lofty knoll to mark the varied whole. —
The waters blue, the mountains grey and dim,
The shaggy hills and the embattled cliffs,
With their mysterious glens, awakening
Imaginations wild, — interminable![10]

As with other poems written later in life, such as "Thoughts after the *ingratitude* of the Northumbrians with respect to the *Safety Lamp*," Davy is quite bitter here.[11] He writes at the beginning that we are only able to know our true powers when we are alone because sympathy excites and "tedious ceremony" constrains these powers, such that we end up following those we should be leading. At this time Davy was President of the Royal Society, a position that no doubt involved a great deal of ceremony, but which would be more associated with leading than following others. His dissatisfaction can be seen again in his criticism of "those who think / Themselves all knowing, from the littleness / Of their own talents and the sphere they move in."[12] These are the rulers of the world, he claims, and he disparages their limited, narrow or small sphere of influence. He compares them to the Titans – whose rule was famously overthrown by their children.[13] He seems to be saying that the Titans thought

[10] There are not any letters written on this date but on 10 August [1825] Davy writes to his sister Katherine Davy from Lowther Castle, the country seat of William Lowther, 1st Earl of Lonsdale, Davy, *Collected Letters*, vol. 3, letter 1022. Davy was on his way home from Ireland.

[11] RI MS HD/14/E, 50–49. See Wahida Amin, "The Poetry and Science of Humphry Davy." Unpublished PhD thesis, University of Salford, 2013, p. 249 and Sharon Ruston, "Humphry Davy in 1816: Letters and the Lamp," *The Wordsworth Circle* 48 (2017): 6–15.

[12] It is tempting to consider who Davy might be thinking of here; by this time the failure of his copper plating of ships' bottoms was becoming apparent. He wrote to his mother on 2 January [1825] "Do not mind any lies you may see in the newspapers copied from a Portsmouth paper about the failure of one of my exp^{ts}" referring to an article that had been published in *The Hampshire Chronicle*, 21 June 1824, 3 (Davy, *Collected Letters*, vol. 3, letter ##). Perhaps Davy's frustrations here are with key players in positions of responsibility during this unfolding drama, such as John Wilson Croker, First Secretary to the Admiralty and John Barrow, Second Secretary to the Admiralty; both had been forwarding Davy complaints about the protectors (see Humphry Davy to John Wilson Croker, 6 January 1825, and Humphry Davy to John Barrow, 18 June 1825, Davy, *Collected Letters*, vol. 3, letters ## and ##.).

[13] Davy perhaps refers to Hesiod's *Theogeny* with "the poet's dream" of Titans.

they were superior because they, quite literally, stood above others, but that, despite this superiority, the "infinitely distant heaven" was still beyond their reach. The next few lines shows Davy using some of the "qualities" Edmund Burke identified as sublime in his *Philosophical Enquiry into the Origin of Our Ideas of the Sublime and Beautiful*, particularly obscurity and the indefinite.[14] While Burke considers the stars sublime because we are unable to count them, Davy here thinks the stars are sublime for different reasons: they are so far away as to give no real idea about what they look like, nor can we tell how far away they are. Some of the most exciting work being supported by the Royal Society at this time was in astronomy, specifically on the "Apparent Distances" of some stars,[15] and this field was not Davy's strength. Ireland's Astronomer Royal John Brinkley was awarded the Copley Medal in November 1824 and in his address Davy did his best to discuss the extremely difficult work being done on parallax and the distances between fixed stars, which was a matter of some controversy at the time.[16] Davy was quite open about the difficulty he had following the developments in astronomy; he wrote to an unknown correspondent on 21 November 1824: "There is a difficulty only for *me* to discourse of Astronomy a subject which I do not understand in two successive years; but I will do my bit."[17]

[14] For a discussion of Davy's use of Burke's definition of the sublime, see Sharon Ruston, *Creating Romanticism: Case Studies in Literature, Science and Medicine in the 1790s* (Basingstoke: Palgrave Macmillan, 2013), 157.

[15] John William Frederick Herschel and James South read on 15 January 1824 a paper published in 412 pages as "Observations of the Apparent Distances and Positions of 380 Double and Triple Stars, Made in the Years 1821, 1822, and 1823, and Compared With Those of Other Astronomers […]," *Philosophical Transactions* 114 (1824): 1–412. A further paper by Herschel was read at the Royal Society on 9 and 16 March 1826 and published as "On the Parallax of the Fixed Stars," *Philosophical Transactions* 116 (1826): 266–80. See also Mari Williams, "James Bradley and the Eighteenth-Century "gap" in Attempts to Measure Annual Stellar Parallax," *Notes and Records* 37 (1982): 83-100.

[16] Contrary to Brinkley, the Astronomer Royal John Pond, who had won the Copley Medal in 1823, denied the existence of any sensible parallax of the fixed stars. When he awarded Brinkley the medal on 30 November 1824, Davy attempted to be even-handed, *Six Discourses Delivered Before the Royal Society at Their Anniversary Meetings, on the Award of the Royal and Copley Medals; Preceded by an Address to the Society, on the Progress and Prospects of Science* (London: John Murray, 1827), Fifth Discourse, 8.

[17] Davy, *Collected Letters*, vol. 3, letter 976.

In his poem "knowledge," an abstract concept, is here likened to natural objects, the stars, in their sublimity.

According to this poem, for Davy, knowledge is only ever experienced in solitude. The "true philosopher," a man alone with his thoughts, unlike "the worldly man." The poem primarily invokes perspective – the Titans had a false perspective, which gave them an aggrandised but ultimately false confidence in their loftiness. The stars show us what knowledge is from our perspective; it is indefinite, distant, obscure, and thus sublime. The view of the "worldly man," he writes, "is insect like / Fit only for the near and single objects." This would seem to be a comment on those whose sphere is small and do not see beyond this small sphere to the whole picture. Instead, Davy considers himself a "true philosopher" who sees from a distance the whole of the landscape rather than fixing upon only one aspect of it. The "true philosopher" "scans" the "forms," "bearings," and "relations" of objects: not only does Davy see the whole, he also puts objects in context and relation to each other. In other words, he notices the analogies that exist between different things; he sees systems, patterns, and structures in the world. Davy's preferred pronoun is "we" (rather than "I"), perhaps using the "royal we" or majestic plural; in any case this confirms his identification as one of the true philosophers. Like them, he surveys from above, perhaps alluding to the idea of painting a sublime scene, or "lovely landscape." As with the viewing or painting of a sublime landscape scene, the eye is active, mastering it with a single gaze.[18] The scene has the effect of awakening the wild and never-ending imagination of the philosopher. In this poem, Davy portrays himself in the subject position more commonly associated with the male Romantic poet: solitary, set apart from the world because of his superiority to his fellow men, with a privileged view of a sublime scene.

The Gunpowder Manufactory

In July 1812, Davy signed articles establishing his partnership in a gunpowder manufactory with his close friend John George Children and another friend, James

[18] See John Barrell, *The Idea of Landscape and the Sense of Place 1730-1840: An Approach to the Poetry of John Clare* (Cambridge: Cambridge University Press, 1972) and Phil Shaw, *The Sublime* (Routledge, 2017).

Burton. Fullmer has written about what she calls "this curious chapter in Davy's life," trying to understand why, despite the fact that Davy was successful in his gunpowder experiments, he removed himself from the partnership and eventually forbid any mention of his connection with the manufactory.[19] As Fullmer has pointed out, the "story also provides insight into Davy's personality and into his method of dealing with colleagues when he felt himself under pressure" and can be seen as "the prototype of many subsequent incidents."[20] In this episode, Davy presents himself, for the first time, as a man determined not to be sullied with the reputation of a merchant out to make money and we see his attempts to control his public image.

It seems that Davy originally intended to be a full partner in the venture. In 1811, he wrote to his brother John on the matter of money he had lent him: "please consider it as a loan which you shall repay when you are a rich physician & I a poor gunpowder merchant."[21] In keeping with his sense of himself as a natural philosopher – rather than merely an experimentalist – Davy determined to apply the law of definite proportions to the manufacture of gunpowder. In lectures to the Royal Institution, he claimed that this law was "perhaps the most important of our science" because "Nature acts by this fixed and immutable law."[22] In the same series of lectures, Davy makes a distinction between the "practical and philosophical chemist."[23] Fullmer claims that Davy was at this time intending to profit commercially by means of a patent, revealing that he had not yet arrived at the stage where he would point blank refuse to engage with the idea of taking out a patent for one of his inventions. His marriage to the wealthy socialite Jane Apreece in April 1812 has been proposed as a factor in his decision to eschew monetary gain; her letters — and behaviour to Michael Faraday — show her to be a social snob who introduced Davy to a world of shooting and hunting parties in various aristocratic mansions.[24] There is plenty of evidence of

[19] Fullmer, "Humphry Davy and the Gunpowder Manufactory," 165.

[20] Fullmer, "Humphry Davy and the Gunpowder Manufactory," 166.

[21] Humphry Davy to John Davy, 15 October [1811] Davy, *Collected Letters*, vol. 1, letter 284.

[22] "Mr Davy's Lectures on the Elements of Chemical Philosophy," *Philosophical Magazine* 39 (1812): 134.

[23] "Mr Davy's Lectures," 135.

[24] Faraday described in a letter to Benjamin Abbott dated 25 January 1815 how Jane Davy was "haughty & proud to an excessive degree and delights in making her inferiors feel her power," in *The*

Davy's growing propensity for snobbery.[25] In a notebook, with a lack of self-awareness, he criticised Thomas Young: "He was a most amiable & good-tempered man; too fond, perhaps, of the society of rank for a true philosopher."[26]

In 1812, Davy continued to send Children positive letters: for example, on 14 October Davy referred to "our gunpowder works."[27] Later in October he visited Children in Tonbridge and seriously injured his eye when he managed to prepare the explosive compound nitrogen trichloride for the first time.[28] It is not until a letter of 7 April 1813 that the first glimmers of Davy being unhappy with his association with the gunpowder manufactory can be seen. He attempts here and in later letters to dictate exactly what should be written on the labels of the canisters in which the gunpowder is sold.[29] On 19 June 1813 Davy rather defensively writes that any consequent alteration needing to be made to the labels is not his fault and that "in wishing it to be correct I do not merely consider my own reputation but likewise the character of your new Manufactory."[30] The change of pronoun is telling: in the course of a few months in Davy's letters, "our gunpowder works" has become "your new Manufactory." By his letter of late July 1813, another more offending pronoun is used. Davy describes himself being "much disturbed & vexed by enquiries respecting the price of *my* gunpowder which from the labels I find is supposed to be *sold* by me."[31] Such enquiries places Davy in the demeaning role of a merchant. He continued with: "it must be understood by the public that I have given my gratuitous assistance & advice only." He specifies the form of words that labels must take and emphasises the care

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Correspondence of Michael Faraday, ed. Frank A. J. L. James, 6 vols. (London: IEE/IET, 1991–2012), vol. 1, letter 46.

[25] For example, when criticised in the press during the ships' bottoms debacle, Davy wrote of articles that will be discussed later in this essay: "The abusive article is in the Chronicle of Thursday. The Chemist & Mechanics magazine made overtures to me by sending me their first numbers &c; [~~xxxx~~] the Chemist being fil[l]ed with exaggerating praises: but I never shake hands with chimney sweepers even when in their may day clothes & when they call me 'your Honour,'" Humphry Davy to John George Children, [29–31 October 1824], Davy, *Collected Letters*, vol. 3, letter 968.

[26] RI HD/14/I, f. 63. This notebook was used between 1813 and 1826.

[27] Humphry Davy to John George Children, 14 October 1812, Davy, *Collected Letters*, vol. 2, letter 343.

[28] The explosion led to Davy employing Faraday for the first time.

[29] Humphry Davy to John George Children, [7 April 1813], Davy, *Collected Letters*, vol. 2, letter 367.

[30] Humphry Davy to John George Children, [19 June 1813], Davy, *Collected Letters*, vol. 2, letter 383.

[31] Humphry Davy to John George Children, [19/20/21 July 1813], Davy, *Collected Letters*, vol. 2, letter 387.

that must be taken, writing that the words "*under my directions* […] implies that I am a superintendent of the manufactory."[32] The same letter contains a threat: if his formulation is not "adopted speedily" there is a chance that "it may otherwise get abroad that I have nothing to do with the powder & that my name is used in a manner which does not meet my approbation for the sake of puffing the gunpowder."[33] By this point, then, Davy's relationship with Children had seriously deteriorated. Davy uses a high-handed tone and writes in imperatives and issues threats, with great emphasis placed on his sense of self-importance. Perhaps it is possible already to see his assumed superiority to the "eye of the worldly man" mentioned in his poem of 1825.

Davy continued to write letters in this vein to Children, expressing his "extreme harass & anxiety from the idea of the use of my name" and including further requests for revisions to the labels.[34] In the same letter he also stated: "I have resolved to make no profit of any thing connected with Science — I devote my life to the public in future & I must have it clearly understood that I have no views of profit in any thing I do."[35] This is one of a number of such comments that will appear in Davy's letters but it seems that this was the first moment that he determined, henceforth, to "make no profit" by his scientific activities. He also reveals his desire to present himself from now on as a servant to the public. Both of these self-representations were hugely successful, becoming part of the way that Davy was remembered.[36] On 23 July 1813, still bothered by the wording of the labels, he wrote to Children: "I must not have it supposed that I *sell* my name I would not do it for millions."[37] His concern was that the gunpowder will be marketed like a mountebank's tonic, such as Ching's worm lozenges, or Holloway's pills. In the letter written previous to this he had likewise

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[32] Humphry Davy to John George Children, [19/20/21 July 1813], Davy, *Collected Letters*, vol. 2, letter 387.

[33] Humphry Davy to John George Children, [19/20/21 July 1813], Davy, *Collected Letters*, vol. 2, letter 387.

[34] Humphry Davy to John George Children, 22 July [1813], Davy, *Collected Letters*, vol. 2, letter 389.

[35] Humphry Davy to John George Children, 22 July [1813], Davy, *Collected Letters*, vol. 2, letter 389.

[36] This reputation was forged even during his lifetime; for example, in Maria Edgeworth's *Harry and Lucy Concluded*, 4 vols. (London: Baldwin, Craddock, and Joy, 1825), Davy is contrasted with Robert Hooke: "But, my dear son, observe, that really great men are superior to such mean jealousy. You feel how much Sir Humphrey Davy has in this instance, by his openness, increased our admiration and gratitude." (vol. 2, 285).

[37] Humphry Davy to John George Children, 23 July [1813], Davy, *Collected Letters*, vol. 2, letter 390.

objected to his name being used to "puff" the product. On 26 July 1813 as he prepared to leave the country Davy required Children assure him by legal document "signed & attested" that his engagements as a partner in the firm were "legally made null."[38] Just as he had specified the wording on the gunpowder canisters, Davy writes out the form of words that Children must use for this document.

There are many interesting aspects to this episode, which Davy does not emerge from well. Golinski has noted how "The frantic, pleading tone of this correspondence shows Davy in an unfamiliar light […] Davy obviously felt his reputation was at stake and his standing in society at risk."[39] Children thought Davy "capricious and incomprehensible," but Golinski comments that in fact Davy's "action was consistent with his lifelong project of self-identification as a philosopher."[40] Golinski also connects Davy's attempts to control his public image with the safety lamp priority dispute.[41] It seems though that Children may get the final word on this matter with the publication of *The Collected Letters of Sir Humphry Davy*: when Davy wrote to him on 6 February 1816 after he had returned from his travels abroad, he again asks Children to legalise his withdrawal from the company and this in the midst of the acknowledged financial difficulties Children was going through at this time.[42] On this letter, Children wrote angrily in pencil: "This letter contains a *flat lie*. Davy had as *real* a concern in this himself as any – as we should have found had it prospered. J. C."[43] It is unclear to whom he is writing this note. It is possible that it was for the benefit of John Ayrton Paris, Davy's first and highly critical biographer, who had initialled this letter indicating that it was one he read in preparation for his *Life of Sir Humphry Davy* though it does not appear there.[44] In any case, it is Children's need to put the matter

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[38] Humphry Davy to John George Children, 26 July 1813, Davy, *Collected Letters*, vol. 2, letter 391.

[39] Golinski, *The Experimental Self*, 139.

[40] Golinski, *The Experimental Self*, 40.

[41] Golinski, *The Experimental Self*, 41.

[42] Children's father had become bankrupt and the family were forced to move house. There followed a period where Children wrote desperately to Davy trying to find employment; in 1822, with Davy's help, he became Assistant Keeper of the Department of Natural History at the British Museum.

[43] Endorsement on Humphry Davy to John George Children, 6 February 1816, Davy, *Collected Letters*, vol. 2, letter ##. Fullmer also quotes this, "Humphry Davy and the Gunpowder Manufactory," 193.

[44] Paris writes "No. 20 B / J. G. C. / D^{r} Paris" on the letter, Humphry Davy to John George Children, 6 February 1816, Davy, *Collected Letters*, vol. 2, letter 497.

straight and correct Davy that motivates this outburst. Davy's "real concern," which he denied to Children here, can be seen and proved quite clearly in his early letters and supports Children's accusation here.[45] The episode, taken as a whole, demonstrates Davy's first attempts to control his public image and ensure that it is not that of a mere gunpowder merchant intent on monetary gain.

Iodine

Davy's efforts to claim priority for iodine have been far less discussed but it is clear that his attempt to control his reputation and to fashion himself as a "true philosopher" (unconcerned with monetary or personal gain) continued with his use of electro-chemistry to isolate a number of new metals.[46] During this work, Davy repeatedly represents his discoveries as the result of the abstract, high-level method of analogy rather than of experiment. As he noted in the 1825 poem, the "true philosopher" sees the "forms," "bearings," and "relations" between objects from a distance, rather than the "insect-like" view of "the worldly man."

Davy is popularly credited with the isolation of nine chemical elements but of course the reality is a far more complex situation. Davy was himself reticent to identify something as an element, preferring the term "undecompounded." This choice of word perfectly demonstrates his concern that while the substance found had not yet been decompounded it does not mean that it never will be. Indeed, this is the way he uses the term itself, such as in a letter of 1810 concerning two elements he is credited with the identification of: "I have two or three decisive experiments against the idea of Potassium and Sodium being hydrurets; and a great mass of facts in favour of their being bodies as yet undecompounded."[47] Even here, he continues to prefix "undecompounded" with "as yet." At what point can anyone be sure that they have isolated a simple substance that cannot be further decomposed? Davy's answer to this

[45] Davy to Children, 6 February 1816, Davy, *Collected Letters*, vol. 2, letter 497.

[46] The iodine episode has been discussed by Maurice Crosland, "Davy and Gay Lussac," *Science and the Sons of Genius*, ed. Sophie Forgan (London: Science Reviews, 1980), 95–120 and Maurice Crosland, *Gay-Lussac: Scientist and Bourgeois* (Cambridge: Cambridge University Press, 2004), 71–91.

[47] Humphry Davy to David Bailie Warden, 7 August 1810, Davy, *Collected Letters*, vol. 1, letter 238.

issue was to use analogy as a guiding principle as he proceeded to isolate a number of elements using the new science of electrochemistry. It was through the use of analogy specifically that he came to the conclusion, in a race with French chemists, that iodine was in fact an element.

Of course, abstract thought – and in particular, analogy – is hugely important to the progress of chemistry in the nineteenth century.[48] Dmitri Mendeleev's periodic table published in 1869 predicted certain elements that had not at that point been discovered but which he knew must be analogous to those of which he did know the atomic weights. Trevor Levere writes that "Analogy had always been a guide to theory and practice in chemistry" but, in the nineteenth century, specifically, "analogies in physical as well as chemical properties" help to determine atomic weights and molecular formulas.[49] Chemical affinity between elements is obviously also important. Chemists had to proceed along the idea that elements were analogous to each other because often wider information was not available. Davy is clear in his 1807 "Introductory Lecture to the Chemistry of Nature" about the importance of analogy to chemistry:

> The *body* of natural science, then, consists of *facts*; its governing spirit is analogy, — the relation or resemblance of facts by which its different parts are connected, arranged, and employed, either for popular use, or for new speculative improvements.[50]

He even uses an analogy in his description here: analogy is to natural science like the spirit to the body. It seems to mean that analogy is that which brings together the otherwise disparate parts of the body, namely, the facts of the science. Analogy

[48] There is a rich literature on the use of analogy in the history of science; see, for example Amy Fisher, "Inductive Reasoning in the Context of Discovery: Analogy as an Experimental Stratagem in the History and Philosophy of Science," *Studies in the History and Philosophy of Science* 69 (2018): 23-33, which uses Davy as a case study, and John Brooke, "Chlorine Substitution and the Future of Organic Chemistry: Methodological Issues in the Laurent-Berzelius Correspondence (1843–1844)," *Studies in the History and Philosophy of Science* 4 (1973): 47-94.

[49] Trevor Levere, *Transforming Matter: A History of Chemistry from Alchemy to the Buckyball* (Baltimore: Johns Hopkins, 2001), 112.

[50] RI MS HD/2/C/1, f.1v.

connects, arranges and employs these facts for use by those more or less expert in the field.

Davy uses analogy a great deal in his work. The title alone of one essay published in 1816 makes this clear: "On the analogies between the Undecompounded Substances, and on the Constitution of Acids."[51] Davy thought that there were analogies to be drawn between "undecompounded substances." In his 1812 *Elements of Chemical Philosophy* Davy tells the reader that metals are the most analogous to each other, sharing so many characteristics and properties that there is a "chain of gradations of resemblance" between them.[52] Such analogies have suggested to him and others before him: "That the forms of natural bodies may depend upon different arrangements of the same particles of matter." He calls this idea "sublime chemical speculation" but is careful to note that it "must not be confounded with the ideas advanced by the alchemists," or "transmutation."[53] This concept was hugely suggestive for the natural philosophers of the early nineteenth century: the idea that all the atoms of matter were already in existence and merely transformed into different forms and states. I have argued elsewhere that this idea has consequences beyond science into literature, politics, and religion.[54]

The knowledge that there are analogies between elements in this closed system offers Davy a method for further discovery. In his essay "On the Analogies between the Undecompounded Substances," he writes that:

> In a work published in 1812 [*Elements of Chemical Philosophy*], I have pointed out some of the analogies between the substances considered in the present state of our knowledge as undecompounded, and I have endeavoured to found a classification upon these analogies: —
>
> I placed oxygen and chlorine together, because, in combining with inflammable bodies and metals, they produce heat and light in a much

[51] Humphry Davy, "On the analogies between the Undecompounded Substances, and on the Constitution of Acids," *Journal of Science and the Arts* 1 (1816): 283-8.

[52] Humphry Davy, *Elements of Chemical Philosophy* (London: J. Johnson, 1812), 478.

[53] Davy, *Elements of Chemical Philosophy*, 488-9.

[54] Sharon Ruston, "Chemistry," in *The Routledge Research Companion to Nineteenth-Century British Literature and Science,* ed. John Holmes and Sharon Ruston (London: Routledge, 2017), 271–85.

> higher degree than any other known species of matter, and because many of their compounds are possessed of analogous chemical and electrical qualities. At the same time I stated that there is a general chain of resemblance between all the chemical agents; and that while sulphur is analogous to chlorine in one of its properties, it possesses more general resemblance to phosphorus.
>
> The progress of chemical discovery since that time has added new links to the system of analogy, and modified some of the ancient links. The singular body, iodine, whilst it strongly resembles chlorine in most of its chemical qualities, is still more analogous than chlorine to sulphur; and in lustre, opacity, specific gravity, and the high proportional quantity in which it unites to other matter, it is similar to the metals.[55]

Davy here attempts to work out where to place these metals in relation to each other. Iodine, which he here calls a "singular body," is like chlorine in certain respects, but more like sulphur in other respects. At the beginning of this section his caution with regard to naming any element can be seen; he mentions the "present state of our knowledge" as though it were contingent and ever-shifting, while improving. He notes his earlier attempts to classify on the basis of analogy, writing here of his understanding of the similarities and differences between oxygen, chlorine and sulphur. He draws a complex and fluid map: analogous qualities can be held up against "general resemblance" and found wanting. This system of analogies is being added to continually and revised as new knowledge becomes available.

Davy uses a metaphor to illustrate his idea of analogy, one drawn from natural history rather than chemistry. The idea of a "general chain of resemblance" here and a "chain of gradations of resemblance" in 1812 comes from the concept of a chain of being, used to assert hierarchies of power with God at the top, humans, animals, plants and then minerals. It was a matter of some controversy to decide where exactly to place the moment of gradation between species (for example, the mimosa or sensitive plant was thought to be the highest kind of plant or the lowest form of

[55] Davy, "On the analogies between the Undecompounded Substances," 283.

animal). Davy's thinking here is reminiscent of early nineteenth-century comparative anatomy, which looked for analogies between different species.[56] As Andrea Henderson writes, "nature's powers are fundamentally analogous to one another."[57] Dahlia Porter quotes Samuel Taylor Coleridge's criticism of Linnaean taxonomy because it was merely a catalogue of things rather than an attempt to analyse "'the *relations* of things.'"[58] For Porter, while taxonomy is the "desire to distinguish, separate, and compartmentalize" whereas analogy "is the desire to connect and relate."[59]

After the revolutionary new classification system and nomenclature introduced by Lavoisier at the end of the eighteenth century, there was a major drive to classify elements in chemistry. We can see here how in his efforts to produce a classificatory system, Davy looks to analogies between these "as yet undecompounded" elements, analogies between the ways that these substances react with other substances, and the chemical and electrical properties they possess. Davy believes there is a "a general chain of resemblance" between all chemical elements and the specific elements with which he is concerned in 1812 — chlorine, and phosphorous — move around in different relations to each other, sometimes proving more and sometimes less analogous with each other. Indeed, he calls this a "system of analogy" where new discoveries add new links and old ones are being modified continually. Davy was partly motivated by a patriotic ambition to beat the French chemist Joseph Louis Gay-Lussac in the controversy over who had first identified iodine as an element. [60] The name

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[56] Perhaps the most famous of these is the fin/wing analogy. For analogy in poetry and scientific writing, see Dahlia Porter, *Science, Form, and the Problem of Induction in British Romanticism* (Cambridge: Cambridge University Press, 2018).

[57] Andrea Henderson, "The Physics and Poetry of Analogy," *Victorian Studies* 56 (2014): 389–97, 390.

[58] Dahlia Porter, "Scientific Analogy and Literary Taxonomy in Darwin's Loves of the Plants," *European Romantic Review* 18 (2007): 213–21, 213.

[59] Porter, "Scientific Analogy," 214.

[60] Davy coined the term chlorine before Gay-Lussac coined iodine. They did both acknowledge that Bernard Courtois had isolated iodine first. Davy made his claim in "Some Experiments and Observations on a New Substance Which Becomes a Violet Coloured Gas by Heat," *Philosophical Transactions* 104 (1814): 74–93, 74. Davy's characteristic outrage can be seen in his response to Gay-Lussac's paper (and what Davy saw as a refusal to acknowledge Davy's work), "Mémoire sur l'iode," *Annales de chimie* 91 (1814): 5–160. He wrote to Charles-Gaspard de la Rive on 16 February 1815: "Do you think it worth while to publish any answer – I doubt it: if I hit I shall be able to hit hard & with a pretty strong weight & upon more sore places even than they suspect." (Davy, *Collected Letters*, vol. 2, letter 446). This anger

(suggested by Gay-Lussac) makes the analogies clear: while iode denotes the colour violet, the -ine suffix makes clear the analogy with chlorine.

Davy's paper on the subject maps out the controversy between himself and Gay-Lussac on the grounds of analogy. He situates his opinions in relation to Gay-Lussac's just as he maps out the relations between the elements. There is a long footnote detailing exactly when Davy first told someone that iodine was an element, and during the course of the essay, Davy accuses Gay-Lussac of attempting "to introduce into chemistry a doctrine of occult qualities."[61] He accuses him of "*pure assumption*" as opposed to utilising "the whole series of chemical facts."[62] Both these accusations refer to Gay-Lussac's methodology rather than his findings. Finally, he tells the reader that there is a good use of analogy and a bad use of analogy: "The substitution of analogy for fact is the bane of chemical philosophy; the legitimate use of analogy is to connect facts together, and to guide new experiments."[63] Ultimately, Davy finds that he cannot "adopt" Gay-Lussac's opinions and consequently he cannot "approve of his nomenclature."[64]

Davy presents himself in this dispute as being led and directed by the "system of analogy," and he presents analogy as high-level thought process. Analogy was very much part of the perspective of his "true philosopher:" his world view was all-encompassing; analogy helped him to see the relations between the parts of the whole. It was very important to Davy that he not be thought of as narrow in his purview; he saw beyond the individual experiments in the laboratory to contemplate how they revealed the patterns in the whole world. Returning to the idea of the landscape painter in Davy's poem, this view offers the "true philosopher" mastery over the natural world. The world was necessarily therefore a closed system in which relations and similarities would be revealed if one had the right perspective. In his poem of 1825, Davy spoke about mounting a "lofty knoll to mark the varied whole."

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and thinly-veiled desire for revenge can be seen again in later episodes of Davy's life, particularly the miners' safety lamp and electroplating of ships' bottoms.

[61] Davy, "On the analogies between the Undecompounded Substances," 285.

[62] Davy, "On the analogies between the Undecompounded Substances," 286.

[63] Davy, "On the analogies between the Undecompounded Substances," 288.

[64] Davy, "On the analogies between the Undecompounded Substances," 288.

Analogy offers a form of even greater mastery than visual perspective, a form of the greatness to which Davy aimed.

Ships' Copper Bottoms

By 1828, when he was very ill and nearing the end of his life, Davy had become very bitter about his decision — first declared at the time of the gunpowder manufactory debacle — that he would "devote" his "life to the public in future." Indeed, in a letter to his wife dated 1 September 1828, expressing surprise at the favourable reception of his book *Salmonia; or, Days of Fly Fishing*, Davy grouped together three moments in his career as he reflected upon how he felt he has been ill-used by the public:

> I have been used so ill by the public when I have labored most to serve them & injured my body & mind in exertions for their good (Witness safety lamp copper bottoms Royal Society) that I am a little surprised at the reception of such a trifle as Salmonia[.][65]

The three episodes he mentions: the miners' safety lamp, the electroplating of ships' copper bottoms, and his presidency of the Royal Society, are all referred to as moments when Davy feels his work had not been recognised properly and acknowledged. There are echoes of the bitterness felt in the poem written at Ullswater in 1825. In fact, there are real similarities between the way he presents himself in his reaction to the ships' bottoms episode and in the safety lamp dispute that I shall draw out here.

In January 1823 Davy was asked by the Admiralty to find a way to prevent the corrosion that occurred on the copper bottoms of ships. He very confidently assured the Admiralty and Navy Board that he had found a certain method – the fitting of zinc or cast iron protectors, which became known as "Davy's protectors" just as the miners' safety lamp became known as the "Davy lamp." Unfortunately, what had worked in the laboratory did not work at sea and the electro-plating had a chemical side-effect, which stopped the poisonous copper salts from going into the sea and resulted in

[65] Humphry Davy to Jane Davy, 1 September [1828], Davy, *Collected Letters*, vol. 3, letter 1160.

ships' bottoms being fouled thus slowing them down considerably.[66] The whole episode was a disaster for Davy who, nonetheless, maintained throughout that there was no problem.

Davy encountered many of the same issues during the copper bottoms affair as he had with the safety lamp: for example, Robert Mushet, a Melter and Refiner at the Royal Mint, claimed to have already invented a system of protection for copper-bottomed ships and on 14 June 1823 was granted a patent for a "Process for Improving the Quality of Copper, and of Alloyed Copper, Applicable to the Sheathing of Ships, and to Other Purposes."[67] According to Frank James, Mushet's system of protection was developed "without any theoretical underpinning," just as Davy had argued Stephenson's lamp had been developed without philosophical understanding.[68] Mushet was not the only pretender to priority. A "Charles Wyatt of Birmingham" took out a patent in 1791 for tinned copper sheets, and recommended the use of tinned copper for the sheathing of ships.[69] Davy's supporters considered this "ridiculous claim" that "Sir Humphry Davy's invention [was] not original," "a most singular attempt which has been made to deprive this eminent philosopher of the merit of his discovery."[70] Once again Davy found himself in the midst of a priority dispute with supporters and critics issuing claim and counter claim in the press. It was particularly the issue of the patent to which Davy objected; he wrote to Thomas Allan on 10 April 1824: "I have no reason to believe that there is any advantage in Mushets process, or that his metal has any superiority over common impure copper; – but of course I do not wish to be quoted *in any manner* on a patent invention either for approbation or disapprobation."[71] Once again he is keen to control how his name is used and to ensure that it is not sullied by association with monetary profit.

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[66] For a detailed discussion of this episode see Frank James, 'Davy in the Dockyard: Humphry Davy, the Royal Society and the Electro-Chemical Protection of the Copper Sheeting of His Majesty's Ships in the Mid 1820s', *Physis* 29 (1992): 205–25.

[67] Patent 4802.

[68] James, "Davy in the Dockyard," 219.

[69] "Art. XXIII. History of Mechanical Inventions and Processes in the Useful Arts," *Edinburgh Journal of Science*, 1 (1824): 339–45 (344).

[70] "Art. XXIII. History of Mechanical Inventions," 345.

[71] Davy, *Collected Letters*, vol. 3, letter 938.

In a letter to his brother dated 30 January 1824, Davy wrote that he would not be applying for a patent for his "protectors" but also noted that had he done so, he might have made a good deal of money. Instead he claims that his duty is a patriotic one, to his country rather than to himself:

> I was led to this discovery by principle as you will easily imagine: & the saving to Government & the Country by it will be immense – I am going to apply it immediately to the Navy. I might have made an immense fortune by a patent for this discovery: but I have given it to my country, for in every thing connected with interest I am resolved to live & die at least "sans tache"[.][72]

Just as he had for the safety lamp, Davy represents this discovery as being directed by the application of a "principle" rather than by experiment. It is informed by scientific knowledge rather than practical activity. When presented with a gift of plate in acknowledgement of his lamp in September 1816, Davy explicitly acknowledged the part of analogy in his methods: "Gentlemen, allow me to observe in conclusion, that it was in pursuing those methods of analogy and experiment, by which mystery had become science, that I was fortunately led to the invention of the safety lamp."[73]

During the safety lamp period, in 1817, Davy considered patenting his discovery that platinum wire would burn without a flame.[74] The reason he gives is that he would like to secure the knowledge so that it may not be profitable to others:

> I for some time thought that it might be proper to *reserve it by* a patent – not for the sake of gain but to prevent Persons guilty of such conduct as M^{r} Brandling from profiting by my labours without a fine which I would give to the poor.[75]

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[72] Humphry Davy to John Davy, 30 January 1824, Davy, *Collected Letters*, vol. 3, letter 925.

[73] John Davy, *Memoirs*, vol. 2, 50.

[74] In his *Memoirs*, his brother noted that Davy "was urged by many of his friends to take out a patent for the safety lamp; but such a measure did not accord with his feelings of propriety, — was not suitable to his views of the dignity of science: he preferred making it a gift to his country." *Memoirs,* vol. 2, 50.

[75] Humphry Davy to John Buddle, 23 January 1817, Davy, *Collected Letters*, vol. 2, letter 572.

Though he never went down this route, Davy here imagines Brandling (one of Stephenson's supporters in the debate over who had first invented the lamp) being fined for not heeding Davy's patent and then fantasises about giving Brandling's fine "to the poor." In the earlier quotation, Davy asserts that he has determined to live his life and die "sans tache" meaning without a stain or blot on his reputation. The values and codes of the gentleman are invoked in both the 1817 and 1824 letters: Davy will not tarnish his reputation by an association with commercial gain.

Repeatedly in his letters on the safety lamp where Davy was keen to promote his sense of his discovery as radically different from Stephenson's, Davy used the phrase "principle of security" to describe what he had discovered.[76] The word "principle" connotes theoretic thinking: a law that once found can be applied to explain more than a single occurrence. Davy's continual complaint was that Stephenson, who claimed priority with his lamp, had not understood the "principle" behind the invention. In the episode with the ships' copper bottoms, the same language is used again. Children, who despite the earlier, poor treatment he received from Davy, was once again put to Davy's service, called upon to defend his friend from the accusations he faced. The idea of principle suggests the importance of replication and certainly Davy hoped that by establishing certain principles in his career he might control his legacy.

By this point Davy had been criticised in the press on a number of occasions and he complained to Children about the letter in the *Morning Chronicle* that had been published on 28 October 1824.[77] This letter criticized Davy's protectors on the grounds of "inutility" but then became rather more personal: "I beg to ask whether Presidents usually cover their errors with animosity – sacrifice the interests of science to enmity."[78] Davy's anger is palpable: "Every body seems to forget that I have *given* a discovery to the *public*, by which a great copper manufacturer said he would have

[76] Stephenson and his supporters also use this language; see numerous instances in Stephenson's *A Description of a Safety Lamp*, 2nd ed. (London: Baldwin, Craddock and Joy, 1817).

[77] *Morning Chronicle*, 28 October 1824, 3. Humphry Davy to John George Children, Davy, *Collected Letters*, vol. 3, letter 967.

[78] *Morning Chronicle*, 28 October 1824, 3.

made £20,000 a year."[79] He tells Children that he "strongly suspects Mushet" to be the author of the attack and invokes Galileo "& the times when Philosophers & public Benefactors were *burnt* for their services".[80] These reflections help assuage his irritation and as a consequence he feels that he has become "wiser".[81]

Children became Davy's most vociferous defender in the case of the ships' bottoms. He wrote a letter to the *British Press*, which was published on 1 November 1824 and which repeats much of Davy's own letter, marked "private," to Children of mid-October.[82] Children's further declaration "On the Mis-Statements in the *Morning Chronicle* and *Times* Newspapers Respecting Sir Humphry Davy's Method of Protecting the Copper Sheathing of Ships' Bottoms" was first published in the *New Times* on 3 November 1824 and these sheets were then published separately by the printer Charles Baldwin, of New Bridge Street, London. Two copies, with Children's handwritten revisions on them, are held in the British Library.[83] It seems clear that Davy read and revised the statement Children made on his behalf, because Davy's letter of 29 October 1824 begins with: "I have made a few alterations to give *actual* precision to your statement."[84]

Children had defended Davy previous to this in the *Mechanics' Magazine* for 7 August 1824 in his "Reply to an Erroneous Statement Respecting Sir Humphry Davy's Method of Defending the Copper Sheeting for Ships' Bottoms."[85] He was responding to an article written by Samuel Deacon titled "Sir Humphry Davy's Remedy for the Decay

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[79] Humphry Davy to John George Children, 29 October [1824], Davy, *Collected Letters*, vol. 3, letter 967.

[80] Humphry Davy to John George Children, 29 October [1824], Davy, *Collected Letters*, vol. 3, letter 967.

[81] Humphry Davy to John George Children, 29 October [1824], Davy, *Collected Letters*, vol. 3, letter 967.

[82] "Copper Sheathing of Ships' Bottoms," *British Press*, 1 November 1824, p. 3; Humphry Davy to John George Children, [mid-October 1824], Davy, *Collected Letters*, vol. 3, letter 965.

[83] "On the Mis-Statements in the *Morning Chronicle* and *Times* Newspapers Respecting Sir Humphry Davy's Method of Protecting the Copper Sheathing of Ships' Bottoms," *New Times*, 3 November 1824, 3. BL Add. MS 38625, ff. 63–6.

[84] "Copper Sheathing of Ships' Bottoms," p. 3; Children's copies of article in the British Library, Add. MS 38625, ff. 63–64, 65–66. Davy to Children, 29 October [1824], Davy, *Collected Letters*, vol. 3, letter 967.

[85] "Reply to an Erroneous Statement Respecting Sir Humphry Davy's Method of Defending the Copper Sheeting for Ships' Bottoms," *Mechanics' Magazine* 2 (7 August 1824), 342–3, which also appeared in the *Annals of Philosophy* 8 (n.s.) (August 1824): 141–3.

of Copper Bottoms, not original."[86] Children makes clear the difference between Davy's and others' discoveries using words and phrases that might have been used by Davy himself. Given that there is evidence Davy revised Children's statement to the *British Press*, the following words may well even have originated with Davy:

> But it is not on the substitution of tinned copper for plain copper, that Sir Humphry Davy's pretensions to originality rest: it is in the *principle* on which that substitution, or rather an equivalent, and, as we shall presently see, a superior process is recommended, that his claims are founded. For the explanation of that principle, I refer the reader to Sir Humphry Davy's [*Philosophical Transactions*] paper; […] It is in the *principle*, therefore, I repeat, that the merit and originality of Sir H. Davy's method is founded, and the importance of the principle is confirmed by a circumstance which would have rendered a mere mechanical covering, like Mr Wyatt's, useless and abortive.[87]

Children explicitly makes the connection between this invention and the lamp (and the way Davy was treated over that) in the article to the *British Press*, 1 November 1824. Children questions Wyatt's knowledge and then asks "Could he have explained the cause, if he knew the fact?" The strong inference is that this would be answered in the negative.[88] Children's responses smack of Davy's influence, in the language used and the knowledge displayed.

Poor Children did not get the thanks he might have expected from Davy though. On 16 October 1824, *The Times* ran a highly critical piece on Davy's protectors, claiming that the ships that had this treatment "returned after short voyages perfectly foul – their bottoms covered with sea-weeds, barnacles, or other worms."[89] Davy

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[86] Samuel Deacon, "Sir Humphry Davy's Remedy for the Decay of Copper Bottoms, not original," *Mechanics' Magazine*, dated 29 March 1824, and published in *The Chemist* 1 (10 April 1824): 72, as "A Discovery of Sir Humphrey Davy Disputed," *Mechanics' Magazine* 2 (3 April 1824): 57. Deacon claimed that a patent for this use of tinned copper sheets had been taken out by Charles Wyatt and advertised in *The World*, 16 April 1791.

[87] "Reply to an Erroneous Statement," 342–3.

[88] "Reply to an Erroneous Statement," 343.

[89] Humphry Davy to the Editor of *The Times*, 17 October 1824, Davy, *Collected Letters*, vol. 3, letter 964.

blamed something Children had written in his *Mechanics Magazine* response for the advent of *The Times's* criticism. He considered Children to have admitted in that paper that ships defended with Davy's protectors could become foul, which Davy absolutely refuted. Davy was so angry that he took the misguided step of replying immediately in anger to *The Times*, which printed what it called his "very singular letter" two days later on 18 October 1824. Davy was also criticised for his response: "If the passion of the learned President had not entirely blinded his understanding, he must have seen that the language which he employs is neither becoming the chair which he occupies, nor calculated to produce conviction in the quarter which he addresses."[90]

Davy's letter to *The Times* took the form of a five-point rebuttal moving from the affronted to the petty. Countering the proposal that he had had a "summer excursion, at the public expense, to the North Sea and the Baltic," Davy responded, speaking of himself in the third person, with "It is not true that he had a pleasant voyage. He had a stormy passage out, and a still more stormy passage home; and he wishes the author of the paragraph in question no severer punishment for his inaccuracies and ill-will, if he be a landsman and liable to sea-sickness, than a similar voyage."[91] It was indeed true that Davy had been very seasick on both journeys, of which there is ample evidence in his letters home.[92] The claim that he had made the journeys at the public expense is borne out in his letters though; Davy was fortunate that the editor of *The Times* did not have access to his private correspondence in which he repeatedly boasted that he had the HMS Comet "at his disposal."[93]

During his work on the ships' bottoms Davy represents his discovery of the effect of electro-plating copper as one he had come to by virtue of applying a scientific principle, which he claimed could be traced back to a theory he had published as early

[90] Humphry Davy to the Editor of *The Times*, 17 October 1824, Davy, *Collected Letters*, vol. 3, letter 964.

[91] Humphry Davy to the Editor of *The Times*, 17 October 1824, Davy, *Collected Letters*, vol. 3, letter 964.

[92] There are a number of letters in which Davy complains about his seasickness; see, for example, his letter to Jane Davy, 20 July 1824, Davy, *Collected Letters*, vol. 3, letter 955.

[93] Davy wrote to his mother on 22 August 1824 (Davy, *Collected Letters*, vol. 3, letter 960) that "the Admiralty Steam boat […] was at my disposal," and to Heinrich Christian Schumacher on 23 August (Davy, *Collected Letters*, vol. 3, letter 961) that the Comet was "still at my disposal."

as 1806.[94] He denied the possibility of invention that was not based on abstract scientific knowledge, claiming that those who had come to their conclusions based on practical experiment would not understand what they had discovered. Davy permitted no other response than absolute certainty that his process worked, refusing to acknowledge that he might be wrong. His reaction to criticism was angry, bitter, and ill advised.

In his final, posthumously published, book, *Consolations in Travel*, Davy returns to Galileo again to muse on "what appears to have been the ingratitude of men towards greatest benefactors."[95] Late poems like "Thoughts after the *ingratitude* of the Northumbrians with respect to the *Safety Lamp*" and that written at Ullswater on 5 August 1825 make it clear that Davy also felt himself to be one of man's greatest benefactors who had also been treated with ingratitude. In *Consolations,* the Genius tells Davy "you want analogies and all the elements of knowledge to comprehend the scene before you."[96] The Genius tells Davy that there are other beings superior to humans whose knowledge far exceeds anything known on earth. Their mode of life might be regarded with the "strictest analogy" to be like that which is called "exalted virtue" on earth.[97] It seems likely that Davy considered himself to be in the same relation to others on earth as these superior beings were to him, a "true philosopher" who can "view a lovely landscape in its whole […] awakening / Imaginations wild."

Note on Contributor

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[94] Davy represented his discovery as an extension of the hypothesis he had given in his Bakerian Lecture for 1806, "that chemical and electrical changes may be identical, or dependent upon the same property of matter," and which he further illustrated in *Elements of Chemical Philosophy* (1812); see "On the Corrosion of Copper Sheeting by Sea Water, and on Methods of Preventing This Effect; and on Their Application to Ships of War and Other Ships," *PTRS* 114 (1824), 151–8 (153).

[95] Humphry Davy, *Consolations in Travel: Or the Last Days of a Philosopher*, ed. John Davy (London: John Murray, 1830), 36.

[96] Davy, *Consolations in Travel*, 48.

[97] Davy, *Consolations in Travel*, 51.

(Palgrave, 2013). She is the editor of a special issue of *Essays and Studies* on 'Literature and Science' (2008); and the co-editor of *The Collected Letters of Sir Humphry Davy*, 4 volumes (Oxford: Oxford University Press, 2020). Address: English Literature and Creative Writing, B92, County College, Lancaster University, Bailrigg, Lancaster, England, LA1 4YW; s.ruston@lancaster.ac.uk.