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## **Anthologizing the Book of Nature: The Circulation of Knowledge and the Origins of the Scientific Journal in Late Georgian Britain**

**Jonathan R. Topham<sup>1</sup>**

Writing in the preface to a new monthly journal of science in 1813, the Scottish chemist Thomas Thomson observed that the ‘superiority of the moderns over the ancients’ consisted “not so much in the extent of their knowledge [...] as in the degree of its diffusion”.<sup>2</sup> This advance in the circulation of knowledge, he averred, was to a significant extent a consequence of the inception of moveable-type printing. More especially, it had been promoted by the periodical publications which existed in such profusion in Britain, France, and Germany, and most particularly by the new kinds of commercially produced “philosophical” journals that had emerged during the last quarter of the eighteenth century and began to be called ‘scientific’ journals from the turn of the century. As modern historians have shown, these pioneering journals, such as the botanist and agriculturalist François Rozier’s *Observations sur la physique* (f. 1771), were explicitly motivated by a desire to overcome the inadequacies of learned transactions in conveying the current state of scientific knowledge. Learned society publications were too slow to appear, Rozier argued, often too limited in their readership because written in the vernacular, and too extensive and expensive for many to acquire. New journals, such as Rozier’s, aimed to bring together all findings within their respective domains, from across the Western world, the better to promote the progress of science.<sup>3</sup> It was not until the 1790s that such commercial scientific journals began to be produced in Britain (although, as we shall see,

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<sup>1</sup> I am grateful to Geoffrey Cantor and to the editors of this volume for their helpful comments on earlier drafts of this chapter.

<sup>2</sup> [Thomas Thomson], “Preface,” *Annals of Philosophy* 1 (1813): [1].

<sup>3</sup> James E. McClellan III, “The Scientific Press in Transition: Rozier’s Journal and the Scientific Societies in the 1770s,” *Annals of Science*, 36 (1979): 425–49, esp. 433. See also Thomas Broman, “Periodical Literature,” in *Books and Sciences in History*, ed. Nicholas Jardine and Marina Frasca-Spada (Cambridge: Cambridge University Press, 2000), 225–38, and Maurice Crosland, *In the Shadow of Lavoisier: The “Annales de Chimie” and the Establishment of a New Science*, British Society for the History of Science Monographs, 9 ([n.p.]: British Society for the History of Science, 1994).

they were preceded by several commercial periodicals of medicine and of agriculture and the arts). The new British journals, Thomson claimed, again served to advance science not only by facilitating “the publication of useful discoveries” but also by circulating “the valuable dissertations of foreigners through Britain, which might otherwise remain in great measure unknown to us”.<sup>4</sup> Taking this claim as my starting point, my object in this essay is to examine the motivation behind the foundation of the eight scientific journals established in Britain between 1793 and 1806, examining them in relation to the theme of the international circulation and appropriation of knowledge. In particular, I will argue that these pioneering journals of science were initially conceived of as anthologies, intended to draw together in an affordable and manageable form the scientific findings of the entire Western world.

The inception of commercial scientific journals at the end of the eighteenth century is one of the most iconic developments of this transformational period in the ‘invention’ of modern science. Indeed, scientific journals are so distinctive of modern science that they seem to be a necessary part of it. This perception has, however, stunted the historical study of their development. Since scientific journals are such a necessary part of modern science, why should their origin require explanation? Or why, indeed, should we expect scientific journals in the past to be different from those at the present day? Of course, merely to make these questions explicit is to show them to be naïve. As James Secord has recently argued, the later dominance of the scientific paper should not blind us to the extent to which both the scientific paper and the scientific journal were undergoing complex processes of development in the first half of the nineteenth century. Although the Royal Society's *Catalogue of Scientific Papers*, first published in the 1860s, retrospectively canonized contributions to early scientific journals such as William

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<sup>4</sup> [Thomson], “Preface,” 3 and 4.

Nicholson's *Journal of Natural Philosophy* (f. 1797) and Alexander Tilloch's *Philosophical Magazine* (f. 1798) as being of a piece with the scientific papers of the newly professionalizing scientific specialties of that later period, this significantly distorts the historical record.<sup>5</sup> It was far from clear in the 1790s either that the primary purpose of a scientific journal should be to provide opportunities for authors to stake claims to scientific discovery or that having an account printed in a scientific journal was the appropriate way to stake such claims. Conversations in society meetings and other settings, correspondence, lengthy treatises—all were means of staking credible claims to knowledge. Only as a result of subsequent developments did the scientific periodical come, later in the nineteenth century, to take on this key role in science.<sup>6</sup>

My object in this chapter, then, is to re-expose the uncertain beginnings of commercial scientific journals in Britain, focusing on the distinctive way in which they were motivated or justified, not as the means of staking claims to scientific priority, but as international anthologies of scientific discovery, drawing together materials from a wide range of printed sources, as well as from original contributors. As I have argued elsewhere, these new journals constituted a significant element in a complex communication network by which Continental science came to circulate in Britain.<sup>7</sup> In this chapter, I restrict my attention to considering how, within the particular circumstances of the late eighteenth-century British book trade, such circulatory practices came to seem attractive to a number of individuals. The chapter is divided into two

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<sup>5</sup> Royal Society of London, *Catalogue of Scientific Papers (1800–1863)*, 6 vols (London: Royal Society of London, 1867–72).

<sup>6</sup> James A. Secord, "Science, Technology and Mathematics," in *The Cambridge History of the Book in Britain*, Vol. 4, 1830–1914, ed. David McKitterick (Cambridge: Cambridge University Press, 2009), 451–59. See also Alex Csiszar, "Broken Pieces of Fact: The Scientific Periodical and the Politics of Search in Nineteenth-Century France and Britain," PhD diss., Harvard University, 2010.

<sup>7</sup> Jonathan R. Topham, "Science, Print, and Crossing Borders: Importing French Science Books into Britain, 1789–1815," in *Geographies of Nineteenth Century Science*, ed. David N. Livingstone and Charles Withers (Chicago: University of Chicago Press, 2011), 311–44.

main sections. I begin by looking at the communicative context of the sciences in late-eighteenth-century Britain, asking what kinds of print media were available and how they compared to those on the Continent. This section draws on Thomas Thomson's retrospective review of scientific journalism, both to expose the continuities between the new journals and what went before, and to point out the ways in which events in Britain differed from those in France and Germany. The next section looks at the half dozen new scientific journals founded in Britain between 1793 and 1809. I show that these were introduced by somewhat marginal, often practically oriented men, and were to a significant extent motivated by financial considerations. Moreover, I argue that they were explicitly justified by a desire to present an anthology of discovery, drawn from a wide range of expensive publications, which would constitute a commercially attractive product to cash-strapped readers. By concentrating and making available the findings of the learned of all Western nations, editors hoped to produce an ongoing encyclopaedia, so much more attractive for purchase because it was constantly updated. Finally, in my concluding remarks, I briefly consider the importance of such practices for the circulation of science in Britain and beyond, urging the need for more systematic study of these sources as providing valuable evidence of the processes of international interchange and encounter.

### **Periodicals and Science in late Eighteenth-Century Britain**

We began with Thomas Thomson's history of the scientific journal, and it is helpful to continue with it, since it provides a revealing contemporary perspective. Before the seventeenth

century, Thomson reported, the learned had been obliged to rely on ‘epistolatory correspondence’, which had many inadequacies. He continued:

The first periodical work of science which made its appearance in Britain was the *Philosophical Transactions*, begun in 1665, and continued for many years, in numbers, published monthly, quarterly, or annually, as materials were more or less copiously supplied. The *Journal des Sçavans* in Paris, and the *Leipsic Acts* in Germany, were somewhat similar in their plan. About the middle of the 18th century the *Philosophical Transactions* altered their form, and came to be published only in volumes. From that period they have consisted entirely of original papers, and have taken no notice of the discoveries made by foreigners, nor of the scientific books which have made their appearance in different countries. Thus Britain no longer possessed a periodical philosophical journal. The *Monthly and Critical Reviews* indeed had commenced, and were conducted with considerable spirit; but being entirely confined to criticisms on books, they could scarcely be considered as registers of the discoveries of science. Perhaps the *Gentleman’s Magazine*, which [...] contained a great deal of philosophical as well as miscellaneous information, would have been entitled to rank as a philosophical journal, had not the greater number of its columns been filled with articles of belles lettres and antiquarian research.<sup>8</sup>

Thomson considered that the new specialist ‘philosophical journals’—including his own in addition to Nicholson’s *Journal* and the *Philosophical Magazine*—served to advance science by

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<sup>8</sup> [Thomson], “Preface,” 1–2.

facilitating “the publication of useful discoveries” and by circulating “the valuable dissertations of foreigners through Britain, which might otherwise remain in great measure unknown to us”.<sup>9</sup>

The teleological rhetoric of Thomson’s history was clearly intended to accentuate the novelty of the new specialist journals. However, the new journals had more in common with existing periodicals than this outline suggests. Certainly, the *Philosophical Transactions*, which in the second half of the eighteenth century were issued twice a year, did not typically contain extracts, abstracts, and reviews of foreign scientific publications. Nevertheless, Britain did possess a vigorous and expanding periodical press, which provided readers with ready access to a wide range of scientific findings. As Thomson identifies, the monthly review journals, of which the *Monthly* (f. 1749) and the *Critical* (f. 1756) were two of the most prominent and long-lived, provided extensive summaries of and critical commentaries on new books, both British and foreign. Moreover, contrary to Thomson’s claim, such publications often provided reviews of other periodicals. The *Philosophical Transactions*, for instance, were routinely reviewed by the *Monthly* and *Critical*, usually with a list of all contributions, and often with lengthy synopses of those considered particularly interesting. This was later extended to include the transactions of the new learned societies formed outside of London or dealing with specialist subjects. The transactions of Continental societies were not so regularly reviewed, but they were nevertheless often given the same synoptic treatment, as were the increasing numbers of specialized commercial periodicals which, as we shall see, began to be produced both in Britain and on the Continent.

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<sup>9</sup> [Thomson], “Preface,” 3–4.

While the reviews provided regular synopses of scientific publications, both British and foreign, the magazines—of which the *Gentleman's Magazine* (f. 1731) was the archetype—also functioned as repositories of scientific knowledge, combining occasional extracts from, or accounts of, scientific publications with readers' own scientific observations. The *Gentleman's* innovative application of the term 'magazine' (that is, 'storehouse') to a periodical publication was intended to convey a sense of its encyclopaedic ambitions. Such magazines reflected an Enlightenment conceit that members of the educated public could contribute to the amassing of observations and experiments and assist in the progress of knowledge. Contributions ranged from natural history to the practical arts and from meteorology to agriculture, and, as Roy Porter has shown, the many medical contributions often came from highly respected practitioners (fig. 1).<sup>10</sup> On its semi-centenary in 1782, the *Gentleman's Magazine* claimed: "There has scarce a new Subject been started, a new Invention introduced, or a Discovery of any Kind, either by Land or Sea, of which a satisfactory Account is not to be found in the *Gentleman's Magazine*".<sup>11</sup> Similarly, in 1785, the *European Magazine* (f. 1782) began a regular section providing "an account of the discoveries and improvements which are daily made in philosophy, chemistry, astronomy, mechanics, &c. [...] principally extracted from the Transactions of the various learned Societies, form other foreign periodical publications, and from the communication of our

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<sup>10</sup> Roy Porter, "Lay Medical Knowledge in the Eighteenth Century: The Evidence of the *Gentleman's Magazine*," *Medical History* 29 (1985): 138–68, and "Laymen, Doctors and Medical Knowledge in the Eighteenth Century: The Evidence of the *Gentleman's Magazine*," in *Patients and Practitioners: Lay Perceptions of Medicine in Pre-industrial Society*, ed. Roy Porter (Cambridge: Cambridge University Press, 1986), 283–314.

<sup>11</sup> Anon., "[Advertisement]," *Gentleman's Magazine* 52 (1782): ii.



correspondents.”<sup>12</sup> Yet, as Thomson correctly identified, these magazines’ purview was general rather than special.<sup>13</sup>

While the reviews and magazines of the later eighteenth century provided substantial scope for the communication of scientific findings, the last quarter of the century witnessed the gradual emergence of new kinds of more specialized periodicals. In part, this can be seen as a consequence of the newly competitive conditions of the book-trade in these years. Prior to 1774, the London booksellers who dominated British publishing had successfully prosecuted their claims that perpetual copyright was enshrined in common law, and they had combined together to secure control over books that were often decades or even centuries old. The House of Lords ruling against perpetual copyright in 1774 overthrew the certainties of this monopoly, so that booksellers had now to find new products to appeal to new markets, including novels, anthologies, pocket-books, and magazines. In such a market, magazines had a particular attraction. The amount of investment required to produce a 48-page octavo magazine issue was much smaller than the average book, and the bookseller could moderate the number of copies produced in line with sales. Moreover, if it proved successful, the ongoing sales provided a regular and reliable income. In fact, however, the earliest of the specialized magazines predated the 1774 ruling, a point which reflects the extent to which the growing market for print in this period had already encouraged entrepreneurial speculation, both in Britain and on the Continent.

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<sup>12</sup> *European Magazine*, 13 (1785): 409. The *Annual Register* (f. 1758) similarly included a regular section of ‘Useful Projects’, as well as a section of ‘Natural History’. The role of such publications in the development and communication of science in the eighteenth century clearly warrants concerted attention.

<sup>13</sup> On the subsequent transformation of such Enlightenment miscellanies into recognizably and self-consciously ‘literary’ magazines in the years following the Napoleonic wars, see Geoffrey Cantor *et al.*, *Science in the Nineteenth-Century Periodical: Reading the Magazine of Nature* (Cambridge: Cambridge University Press, 2004), 10–13.

Two of the earliest specialized periodical markets were for magazines related to agriculture and the arts (from the 1760s) and to medicine (from the 1770s)—literary products aimed at identifiable occupational groups. However, there were no analogous attempts to find or create a market for periodicals of natural philosophy or natural history, subjects for which no obvious professional market existed. This situation contrasts somewhat with that in France and Germany, where, at the same period an increasingly large number of specialized scientific magazines appeared, including the agricultural reformer Rozier's *Observations sur la physique* (1771), the chemical lecturer Lorenz Crell's *Chemisches Journal* (1778), Lavoisier's *Annales de chimie* (1789), and Crell's student, Friedrich Gren's *Journal der Physik* (1790). Yet while there were no British equivalents, the new Continental journals were not only treated to extensive synoptic reviews in British periodicals, but several of them were also republished in English editions. Prominent in this activity was radical publisher Joseph Johnson, whose circle included several prominent chemists, including Priestley, and who was involved in publishing a wide range of translated works.<sup>14</sup> Johnson issued a translation of the first volume of the *Annales de chimie* in 1791, which at 3s. 6d. undercut the imported French original by 2s. 6d. However, while the translation was intended to be ongoing, it did not proceed beyond the first volume. In the same year Robert Baldwin, the scion of a large book-trade family who became a leading publisher of scientific works, began to issue a translation of Crell's journal, which ran to three volumes before folding. Then, in 1795, Johnson also published a translation in English and French of the one volume of Swiss naturalist Johann Caspar Fuessli's *Archiv der Insectengeschichte*, a decision probably actuated by his friendship for Fuessli's brother, the painter Henry Fuseli, who translated it.

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<sup>14</sup> Gerald P. Tyson, *Joseph Johnson: A Liberal Publisher* (Iowa City: University of Iowa Press, 1979).

These translations imply a growing sense that a market might exist in Britain for specialist scientific magazines. At the same time, however, their rapid failure was not encouraging. Moreover, as Josiah Wedgwood's secretary and chemical assistant Alexander Chisholm observed, writing anonymously in the *Monthly Review* in 1792, while the translator of the *Annales de chimie* had promised 'the speedy and *complete* communication of discoveries' in chemistry, the translation only told half the story; English readers also needed access to Rozier's journal, which emanated from the opposing party.<sup>15</sup> Merely translating Continental journals was unlikely to meet the needs of British science, and over the following decade and a half at least eight attempts were made to commence a British journal which, like its Continental counterparts, would draw together the most important new work within a manageable compass. The next section examines these eight journals in turn, drawing out from their rhetoric and practice the manner in which they were intended to anthologize scientific discovery.

### **Anthologizing the Book of Nature: The Commercial Origins of the Scientific Journal**

Of the commercial 'philosophical' journals commenced in Britain during the 1790s and 1800s, the only two to have attracted attention are those that survived the decade and came to play a significant role in the history of science, namely, the *Journal of Natural Philosophy, Chemistry, and the Arts* and the *Philosophical Magazine*.<sup>16</sup> This section places these more

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<sup>15</sup> [Alexander Chisholm], "The Annals of Chemistry, Vol. I," *Monthly Review*, 2nd ser. 8 (1792): 169. On Chisholm's involvement in private translation activities in this period, see Larry Stewart, "Assistants to Enlightenment: William Lewis, Alexander Chisholm and Invisible Technicians in the Industrial Revolution," *Notes and Records of the Royal Society*, 62 (2008): 17–29.

<sup>16</sup> S. Lilley, "'Nicholson's Journal' (1797–1813)," *Annals of Science* 6 (1948–50): 78–101; W. H. Brock and A. J. Meadows, *The Lamp of Learning: Two Centuries of Publishing at Taylor & Francis* (London and Philadelphia: Taylor & Francis, 1998), ch. 4.

famous journals in the context of others that failed or which came to be associated exclusively with the practical arts, highlighting the extent to which the several publications were begun with a similar sense of the extent to which a scientific anthology would prove useful to the book-buying public, and that this utility would ensure the new journals' commercial attractiveness. As we shall see, the journals were commenced by men somewhat at the margins of learned science, most of whom shared a background in the practical arts, and several of whom were dissenters. The new journals were also all motivated in part by the desire of their editors to secure a steady income from publications that were their own property. As the previous section indicates, these new 'philosophical' journals of the 1790s drew on pre-existing journalistic practices in the general monthly magazines and reviews, in the specialist medical and agricultural journals of recent years, and in Continental scientific journalism. Yet the rapid success of some of them signalled that they had found a considerable market which not only yielded a significant income for several of the editors over the following two decades, but soon had some of the country's leading publishers interested.

John Aikin's *Memoirs of Science and the Arts* (1793–94)

The first of these new periodicals was also the most ambitious. Beginning in January 1793, the *Memoirs of Science and the Arts* promised to provide notices of every article in all the principal learned transactions throughout the world. Since by the editor's own estimate these amounted to more than fifty titles, it is not surprising that the project appears to have collapsed under the weight of its own ambition before a second volume was complete. The anthologizing ambition was spelt out in detail in the anonymous preface to the first volume. Relating the

progress of the arts and sciences in modern times to the impetus given to individual research and publication by learned societies and their transactions, the preface considered that these had now become so extensive and so varied in their places and languages of publication, that the ‘private scholar’ found it ‘an extremely difficult matter to obtain and peruse them’, especially in the ‘detached part of Europe’ that was Britain. By confining itself solely to learned transactions, the new journal was intended “to afford more complete information concerning them, than can be done in Journals which embrace the whole of literature”. The only merit the *Memoirs* claimed for themselves was that of ‘utility’.<sup>17</sup>

The *Memoirs* were in large part the production of John Aikin (1747–1822), a physician and rational dissenter, whose father had been the classics tutor at Warrington Academy.<sup>18</sup> Aikin had for over twenty years combined medical practice with a wide range of literary productions—including not only works on medical biography and *materia medica*, but also a variety of books for children—almost all published by Joseph Johnson, of whose circle he was a significant member. His medical practice in Great Yarmouth having been irreparably damaged by his support for reformist causes following the French Revolution, he removed to London in 1792.<sup>19</sup> This brought him into closer contact with dissenting friends, including Johnson, his own sister Anna-Laetitia Barbauld in Hampstead, and old acquaintances from Warrington, including Joseph Priestley and Gilbert Wakefield, who were working at the new dissenting academy in Hackney.

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<sup>17</sup> Anon., “Preface,” *Memoirs of Science and the Arts* 1 (1793): ii and iii.

<sup>18</sup> The attribution to Aikin was made in a contemporary advertisement (*Oracle and Daily Advertiser*, 1 November 1800, p. 1c). Also, when reissued in 1797 they were described as being “by a member of the Royal College of Physicians”, a description that applies to Aikin. See [John Aikin], *The Philosophical Transactions Abridged; or, Memoirs of Science and the Arts. From the Works of the Learned and Economical Societies of Europe, Asia, and America* (London: printed for the proprietors, and sold by James Wallis; Edinburgh: James Dickson; Dublin: J. Archer; Hanchester: Clarke & Co.; Newcastle: Charnley & Son, and J. Bell; and Liverpool: Jones, [1797]).

<sup>19</sup> Tyson, *Joseph Johnson*, p. 66; A[rthur?] A[ikin?], “Dr. John Aikin,” *Gentleman’s Magazine* 93 pt. 1 (1823): 85–89; and Lucy Aikin, *Memoir of John Aikin, M. D., with a Selection of His Miscellaneous Pieces, Biographical, Moral and Critical*, 2 vols (London: Baldwin, Cradock, and Joy, 1823).

Indeed, Aikin became secretary of a Literary and Philosophical Society initiated by Priestley, which may have been the London Philosophical Society founded in 1794, or a separate body in Clapton.<sup>20</sup> It seems highly likely that it was in these circles of rational dissent that the plan for the new journal arose; Aikin told his friend John Haygarth that he was engaged in the plan ‘with a few literary persons’, and that he was chiefly responsible for ‘the medical and natural history departments’.<sup>21</sup>

That the new publication was not issued by Johnson may reflect his interest in the *Analytical Review*, a journal which contained extensive accounts of learned transactions, both British and foreign. Instead the *Memoirs* were published by Robert Faulder, John Egerton, and John Sewell (the publisher of the *European Magazine*)—all well-established booksellers—although Sewell was replaced by the reform-minded nonconformist Charles Dilly in the second volume. Like the transactions it abridged, the *Memoirs* had a quarto format, possibly in part to accommodate its plates. The first number was apparently issued in January 1793, and the intention was to continue it in 2s. monthly numbers.<sup>22</sup> However, the preface issued with the first number warned of the current difficulty of obtaining Continental publications, and it is clear that the monthly schedule soon slipped. In December 1793, an ‘Address to the Public’ blamed the lack of

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<sup>20</sup> Aikin, *Memoir*, 1: 152 and 163. Robert Schofield considers Aikin’s epistolary reference to such a society being instituted “here” as being likely to refer to the “very friendly and innocent club” Priestley reported he had “found” in Clapton. See Joseph Priestley, *The Present State of Europe Compared with Antient Prophecies; A Sermon, Preached at the Gravel Pit Meeting in Hackney, February 28, 1794, Being the Day Appointed for a General Fast* (London: J. Johnson, 1794), xiv; and Robert E. Schofield, *The Enlightened Joseph Priestley: A Study in His Life and Work from 1773 to 1804* (University Park, PA: Pennsylvania State University Press, 2004), 305–06. However, Aikin’s “here” very probably relates to London, suggesting that this might have been the Philosophical Society of London. See Ian Inkster, “Science and Society in the Metropolis: A Preliminary Examination of the Social and Institutional Context of the Askesian Society of London, 1796–1807,” *Annals of Science* 34 (1977): 9.

<sup>21</sup> Aikin, *Memoir*, 1: 155.

<sup>22</sup> Aikin, *Memoir*, 1: 92; *Analytical Review* 16 (1793): 529. In the copies I have examined, the first volume is separated into two parts, each with a separate titlepage; however, it is unclear at what stage the shift from monthly to biannual publication was made. The first volume sold for £1 1s. See [John Aikin], “[Review of *Memoirs of Science and the Arts*],” *Monthly Review* 13 (1794): 238.

regularity and the restricted content on the embattled state of the Continent, which had led to the suspension of scientific activity and difficulties in obtaining foreign publications. Indeed, of the twenty volumes of transactions abridged in the first year, only three were Continental publications. However, claiming that these difficulties had now been largely surmounted, the address promised a continuation in twice-yearly parts. The first of these, priced 10s. 6d., appeared the following year, but no more were issued.<sup>23</sup> Aikin's daughter was unsure about the 'causes of failure', but it seems clear that the intended comprehensiveness of the *Memoirs* was impractical on a number of grounds.<sup>24</sup> Moreover, sales had clearly not lived up to expectations in terms of circulation, since the great remaindering bookseller James Lackington was soon offering half-price copies from his Temple of the Muses in Finsbury-Square, and in 1797 the remaindered copies were offered for sale under a different title.<sup>25</sup>

#### John Wyatt's *Repertory of Arts and Manufactures* (1794–1862)

Even before Aikin's journal ceased publication, a new monthly had begun with a similar purpose, but a rather more contracted sense of what would be 'useful'. The *Repertory of Arts and Manufactures* was commenced by another London-based émigré from the industrial heartlands of the Midlands. Its founder, John Wyatt (1752–1818), was the scion of a famous dynasty of Staffordshire inventors and architects, whose father developed some of the earliest textile machinery and later worked for Matthew Boulton. In the 1760s, both John and his brother were apprenticed to Boulton, who was like an adoptive father to them. John continued to work

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<sup>23</sup> Anon., "Address to the Public," *Memoirs of Science and the Arts* 1 (1793): [i]; and *Analytical Review* 19 (1794): 499.

<sup>24</sup> Aikin, *Memoir*, 156.

<sup>25</sup> *Oracle and Daily Advertiser*, 3 October 1798, p. 1b; [Aikin], *Philosophical Transactions*; and *Universal Magazine* 101 (1797): 382.

for Boulton for a number of years, initially as a clerk, then as his London agent between 1776 and 1778, later executing commissions for him on the Continent. He was also involved with a number of mechanical projects, chairing the committee of mechanics of the Society of Arts for a spell, and later successfully projecting the iron bridge over the Thames at Southwark.<sup>26</sup> In April 1794, however, he published a prospectus for his new monthly magazine, to be published in octavo and priced 1s. 6d. Directed at ‘Artists and Manufacturers of every Class’ as well as ‘Country Gentlemen and Farmers’, the magazine was intended ‘to promote and extend the Knowledge of the useful Arts’.<sup>27</sup> The first issue of the new magazine appeared in June 1794, and an advertisement published in the first volume declared that one of its ‘principal objects’ was

to establish a vehicle, by means of which new discoveries and improvements, in any of the useful Arts and Manufactures, may be transmitted to the public; particularly to Artists, Manufacturers, and others, who, from various circumstances frequently attending those discoveries and improvements, (such as their being announced in a bulky or expensive publication, or in a foreign language,) might otherwise have but little chance of ever becoming acquainted with them.

Thus, while the magazine was to contain patent specifications taken from the patent office, and contributions from readers, it was also to contain materials derived from the transactions of

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<sup>26</sup> See *DNB*; John Martin Robinson, *The Wyatts: An Architectural History* (Oxford: Oxford University Press, 1979), 13–17; D. G. C. Allen and John L. Abbott, *The Virtuoso Tribe of Arts and Sciences: Studies in the Eighteenth-Century Work and Membership of the London Society of Arts* (Athens and London: University of Georgia Press, 1992), 361; and Christopher Davy, “Southwark Iron Bridge,” *Mechanics’ Magazine* 16 (1831–32): 258.

<sup>27</sup> [John Wyatt], [*Prospectus for “The Repertory of Arts and Manufactures”*] (n.l.: n.p.), [1794]. A copy of the prospectus is in the John Johnson Collection, Bodleian Library, Oxford.



learned societies. These would be selected on the grounds of their practical utility, excluding the ‘speculative or other matter’ foreign to the purpose of the *Repertory of Arts*.<sup>28</sup>

According to his friend and long-time printer, John Nichols, it was Wyatt who ‘projected’ the magazine. The name of the well-established booksellers George and Thomas Wilkie appeared on the prospectus, and early advertisements announced that the journal was ‘printed for’ the Wilkies and for the leading wholesaler George Robinson.<sup>29</sup> Nevertheless, Wyatt rapidly made the *Repertory* the basis of a personal publishing business, and in 1799 he took sole responsibility, selling the *Repertory* from an address in Fleet Street before moving his office in 1803 to a more gentrified address in Hatton Garden.<sup>30</sup> That Wyatt was able to establish a publishing business around the new journal is a testament to the commercial success which it achieved. The editor of the *Monthly Review*, Ralph Griffiths, greeted the first volume enthusiastically, emphasizing the ‘the novelty and importance’ of the ‘compilement’.<sup>31</sup> The *British Critic* was also animated in its praise, and after just one volume was able to report that the *Repertory* had achieved a ‘very extensive circulation’.<sup>32</sup> By 1797, it was reported to be

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<sup>28</sup> Anon., “Advertisement,” *Repertory of Arts and Manufactures*, 1 (1794): i and iii.

<sup>29</sup> John Nichols, *Literary Anecdotes of the Eighteenth Century*, vol. 9 (1815), p. 191n. Wilkie’s name alone was given in the prospectus, but Robinson’s was added in the advertisement in *The Times*, 19 December 1794, p. 2a. There is no reference to the *Repertory* in Robinson’s surviving copyright records; see G. E. Bentley, “Copyright Documents in the George Robinson Archive: William Godwin and Others, 1713–1820,” *Studies in Bibliography* 35 (1982): 67–110. A few other prominent booksellers were also listed on the title pages; however, these are an uncertain guide to the journal’s publishing history, since some numbers were reissued on several occasions with variant imprints.

<sup>30</sup> *The Times*, 8 April 1796, p. 2a and 3 January 1799, p. 2b. Between 1808 and 1811, the *Repertory* was sold by Wyatt’s son Walter Henry (1781–1849)—later an inventor and manufacturer—from the “Repertory and Patent Office, 9 Pickett-Street, Temple Bar”, perhaps because the father was busy forwarding his plans for Southwark Bridge. However, on reverting to the Hatton Garden office of the now sexagenarian Wyatt, publication of the journal began to be handled by the prominent periodical wholesalers Sherwood and Co., and later also by the medical specialist Thomas Underwood. See *The Times*, 10 January 1812, p. 2a and 8 February 1814, p. 1e. After Wyatt’s death in 1818, the journal continued under the management of the family, though renamed *Repertory of Patent Inventions* in 1825. In the 1830s, it was sold to James Shirley Hodson (a neighbouring publisher in Hatton Garden) and continued as a going concern until 1862.

<sup>31</sup> [Griffiths, Ralph], “[Review of *Repertory of Arts and Manufactures*],” *Monthly Review*, 2nd ser. 16 (1795): 147.

<sup>32</sup> *British Critic*, 5 (1795): 535.

selling a thousand copies per number and by May 1800 the print run had risen to 1500 copies.<sup>33</sup> Moreover, despite the war, some, at least, of these copies were going overseas. In 1801, for instance, Wyatt was advertising agents in Dublin (Dugdale) and Hamburg (Remnant); and in 1817 in Antwerp (Vandervaeren) and Hamburg (Puther and Bessu).<sup>34</sup>

Such commercial success attracted emulation. Looking back in 1806, Wyatt noted that his had been the first of the new periodical publications “devoted exclusively either to Philosophical objects, or the improvement of Arts and Manufactures”, and that the success of the *Repertory* and its chiefly practical focus had prompted others, “both at home and abroad”, to begin periodicals “of a more speculative or theoretic tendency”.<sup>35</sup> Indeed, the continuities between the *Repertory* and the other periodical compilations from learned transactions are unmistakable. Admittedly, Wyatt’s first volume contained twenty-two patent specifications, but these accounted for less than a quarter of the pages. Of the remaining thirty-two articles, six were original, two came from the *Annales de Chimie*, four from agricultural reports, and the remaining twenty were extracted from the transactions and memoirs of the Society of Arts, the American Philosophical Society, the Manchester Literary and Philosophical Society, the Royal Irish Academy, the Royal Society, and the academies of sciences of Paris and Turin. Moreover, while these were certainly practical in orientation, they nevertheless included papers by Benjamin Franklin, Claude Berthollet, Joseph Banks, Thomas Henry, and Jean-Antoine Chaptal. In later volumes, the proportion of original articles increased. Nevertheless, by combining these with

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<sup>33</sup> C. H. Timperley, *Encyclopaedia of Literary and Typographical Anecdote*, 2 vols (New York and London: Garland Publishing, 1977), Vol. 2, 795; and John Bowyer Nichols to C. Taylor, 26 May 1800, Royal Society of Arts, AD/MA/104/10/302.

<sup>34</sup> *The Times*, 8 August 1801, p. 1d and 17 July 1817, p. 2b.

<sup>35</sup> [John Wyatt], “Preface,” *Retrospect of Philosophical, Mechanical, Chemical, and Agricultural Discoveries* 1 (1806): [iii].

extracted articles, Wyatt intended his journal “to form a perpetual Register of useful Discoveries”.<sup>36</sup> Indeed, by 1815, the magazine’s printer, John Nichols, could suggest that to manufacturers the work would “be found of much greater utility than an Encyclopedia, because it gives the improvements in each branch as they arise or become known, while an Encyclopedia details only what was universally known at the time of writing the article.”<sup>37</sup>

William Nicholson’s *Journal of Natural Philosophy, Chemistry, and the Arts* (1797–1813)

One of the titles seeking to emulate Wyatt’s success was the *Journal of Natural Philosophy*, begun in March 1797 by William Nicholson (1753–1815; fig. 2). Yet while the new publication bore a significant resemblance to Wyatt’s *Repertory*, its editor was from the start anxious to point out the differences. Like his journal, however, Nicholson’s life bore notable parallels with Wyatt’s. The son of a London solicitor, he had been an East India Company midshipman before coming to work in the late 1770s as a commercial agent on the Continent for Josiah Wedgwood. On his return to Britain he began to find work as an author, and the *Introduction to Natural Philosophy* which he published with Joseph Johnson in 1782 established his reputation both with the publishers and more widely. Through Wedgwood, he became secretary of the General Chamber of Manufacturers of Great Britain in 1784, and in the same year he also became one of the secretaries of a philosophical club meeting at some of London’s coffee houses (the Coffee House Philosophical Society), through which he came into contact with leading natural philosophers.<sup>38</sup>

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<sup>36</sup> *Morning Chronicle*, 8 August 1801, p. 1d.

<sup>37</sup> Nichols, *Literary Anecdotes*, 9: 192n.

<sup>38</sup> See *DNB*; the manuscript biography by Nicholson’s son in the Bodleian Library, Oxford (MS Don.e.125) sheds little light on the *Journal of Natural Philosophy*.

Nicholson's new journal was designed to build on his established reputation in both the sciences and the practical arts. Its subtitle, as printed in Nicholson's prospectus of 1 March 1797, stated that it would give "an Account of the Present State, New Publications, and Discoveries" in natural philosophy, chemistry, and the arts, and in "the various Departments of Manufacturing Industry". The prospectus laid great emphasis on the character of Nicholson as editor. Noting that, unlike most British periodicals, Continental journals of 'Literature, of Science, and of the Arts' had not infrequently been published under the names of 'men of character and ability', Nicholson argued that the latter practice made a work worthy of receiving signed correspondence from reputable men and of being quoted 'by other Authors of credit'. Moreover, he considered his own credentials as a cultivator of science and as someone with practical experience in the arts and manufactures fitted him to conduct a journal on such a basis. Nevertheless, the prospectus acknowledged that his accounts of new discoveries would be extracted or abridged from 'the Acts of Academies' and other publications, as well as from 'observation, enquiry, and correspondence'.<sup>39</sup>

The preface to Nicholson's first number gave a more extended justification of the value of such anthologizing practices in a journal of science, asserting the importance of accurately conveying the most important scientific discoveries over and above providing content that was entirely original.<sup>40</sup> Nicholson asserted that "even the best memoirs they contain must continue unknown to a very large class of men of science", given "the very limited circulation of academical Transactions, from their price, their number, their extent, distance of publication,

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<sup>39</sup> [William Nicholson], [*Prospectus for "Journal of Natural Philosophy"*], ([London: G. G. and J. Robinson], 1797), 1 and 2. A copy of the prospectus is in the John Johnson Collection.

<sup>40</sup> [William Nicholson], "Preface," *Journal of Natural Philosophy* 1 (1797–98): [iii].

difference of language, labour of perusal, and the efforts of mental abridgment". In such circumstances, 'public utility' demanded that discoveries "buried from the knowledge of the world" should be placed above original observations, even when they were several years old. What was most important, however, was that the selection of materials be discriminating. By the end of the first volume, Nicholson was able to boast that his work was not "an indiscriminate compilation of things nearest at hand, nor a loose temporary record of transactions". Rather, he considered that the journal would become 'the Repository of Discoveries in Science and the Arts'. Of course, this was also Wyatt's expressed ambition, and while Nicholson was careful not to refer to the rival journal by name, he clearly intended to establish the superiority of his own claims as an editor over those of Wyatt.<sup>41</sup>

The proportion of original communications in Nicholson's journal was from the start higher than in Wyatt's, due in part to his scientific connections and his greater involvement in metropolitan research activity, for example through the Coffee House Philosophical Society. He invited contributions not only from 'Philosophers' but also from 'manufacturers, and others', and it was no doubt the latter whom he particularly sought to reassure when he promised to be scrupulous in respecting the 'rights' of those who communicated with him verbally or in writing, including in "that first and most sacred property which men hold in the products of their own understanding". At the end of the first year, Nicholson reported that nearly half of the papers published were original, a third were new translations from Continental publications, and only around a sixth were reports or abridgements of papers already published in British 'academical collections'. A similar proportion was reported in 1802, but by now Nicholson claimed that he

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<sup>41</sup> For instance, he commented: "it would not be difficult to point out imperfections in the works of others, and promise to avoid them". [Nicholson], "Preface," iv.

was struggling to find space for translated and abridged materials, as a result of the large number of valuable original communications he was receiving.<sup>42</sup>

Like Aikin and Wyatt, Nicholson was financially reliant on his editorial labours and was able to make a reasonable profit from the considerable sales of his journal. Some of Nicholson's earliest publications had been handled by Johnson, but by the time he started the *Journal* all of his new publications were published by Johnson's "invariable and confidential friend", George Robinson.<sup>43</sup> However, while the *Journal* was for a spell published on a half-profits basis, Nicholson soon became sole proprietor, employing Robinson as a commission publisher.<sup>44</sup> Nicholson found initial sales of around seven hundred and fifty copies disappointing, but circulation seems to have increased to give a healthy income.<sup>45</sup> Perhaps in consequence, Nicholson was keen to assert that his name and character gave the *Journal* a value far beyond a mere commercial compilation. Some review journals disagreed, resenting his encroachment on their territory. The reviewer in the Tory *British Critic*, for instance, asserted in August 1798 that the new journal consisted largely of abridged articles extracted from publications which the *Critic* had already reviewed, and that many of the original articles were 'of a trifling nature'. While allowing that some who were interested in following the progress of arts and sciences did not have access to new scientific publications, the *Critic* was unwilling to give its 'entire approbation' to a work which professed "to extract, and, as it were, to monopolize the beauties of

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<sup>42</sup> [William Nicholson], "Preface," *Journal of Natural Philosophy* n.s. 1 (1802): [iii]; and [William Nicholson], "Preface," *Journal of Natural Philosophy* n.s. 2 (1802): [iv].

<sup>43</sup> [William West], "Annals of Authors, Artists, Books, and Booksellers. Letter XI. Mr. Johnson, of St. Paul's Church-Yard, and His Literary Connexions," *Aldine Magazine* 1 (1839): 205.

<sup>44</sup> Bentley, "George Robinson Archive", pp. 93–94 and 106–107; *Journal of Natural Philosophy* 33 (1813): 152.

<sup>45</sup> Timperley, *Encyclopaedia*, p. 795; [William Nicholson], "Advertisement," *Journal of Natural Philosophy* 1 (1797–98): [v]. An agreement was drawn up in December 1799 allowing Robinson to reprint a thousand copies each of the early numbers to make up sets. See Bentley, "George Robinson Archive," 106.

all the modern scientific publications”.<sup>46</sup> At the other end of the political spectrum the *Critical Review* was also sensitive to the potential encroachment on its own territory, claiming that Nicholson’s accounts of books were “too general and indiscriminate”.<sup>47</sup>

The *Critical* was nevertheless generally enthusiastic about the new journal, seeing it as supplying a long-standing need for something like the Continental scientific journals and claiming that Rozier’s *Journal de physique* had often hitherto given the first information to British readers of discoveries made in Britain. Moreover, the reviewer considered that the particular value of Nicholson’s name was not so much the promise of accuracy, as Nicholson claimed, as the promise of discrimination in the selection of materials. Johnson’s *Analytical Review* also warmly welcomed the new journal as the first ‘well directed attempt’ to follow the model of Continental journalism in Britain, complimenting Nicholson on the *Journal*’s management. It was “not a hasty compilation of such materials as the editor could most readily lay hold of, but an able, judicious, and well meant endeavour, to propagate and improve scientific knowledge”.<sup>48</sup> In the *Monthly Review* Cambridge mathematician Robert Woodhouse reflected at length on the reconfiguration of scientific print. A general ‘scientific journal’ like the *Journal des sçavans*, he averred, was no longer practicable given the expansion of the objects of scientific enquiry. Nicholson’s *Journal* was to be welcomed as ‘the first of its kind’ to provide a specialized focus.<sup>49</sup>

#### Alexander Tilloch’s *Philosophical Magazine* (1798–)

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<sup>46</sup> Anon, “[Review of *Journal of Natural Philosophy*],” *British Critic* 12 (1798): 116–17.

<sup>47</sup> Anon, “[Review of *Journal of Natural Philosophy*],” *Critical Review* n.s. 26 (1799): 283.

<sup>48</sup> Anon, “[Review of *Journal of Natural Philosophy*],” *Analytical Review* 28 (1798): 364 and 377.

<sup>49</sup> [Robert Woodhouse], “[Review of *Journal of Natural Philosophy*],” *Monthly Review* 2nd ser. 29 (1799): 301–03.

The founder of the *Philosophical Magazine*, Alexander Tilloch (1759–1825), was also heavily involved in the mechanical arts, although he was not, like Wyatt and Nicholson, intimate with Boulton, Wedgwood, or other members of Birmingham’s Lunar Society. The son of a Glasgow tobacco merchant and magistrate, he matriculated at the University of Glasgow without graduating, and subsequently spent some time in his father’s line of business. He also independently invented a process for stereotyping, entering into partnership with the printer, Andrew Foulis the younger, and patenting and briefly employing the technique. In 1787 he moved to London, becoming in 1789 one of the co-proprietors and co-editors of the first daily evening paper, the *Star*, which he edited until ill health prevented his doing so around 1821. He also continued his involvement in the practical arts, devising a new method of printing banknotes, patenting other mechanical inventions, and serving for a spell as chairman of the Committee on Correspondence and Papers at the Society of Arts.<sup>50</sup> Furthermore, Tilloch’s philosophical interests led to his becoming a member of several societies frequented by practically oriented men, including the London Philosophical Society (f. 1794), the Askesian Society (f. 1796), and the Mineralogical Society (f. 1799).<sup>51</sup> However, while he later became a corresponding member of learned societies as far afield as Edinburgh, Dublin, and Munich, Tilloch was given to understand that his election to the Royal Society would be black-balled on the grounds that he was a newspaper and journal editor, indicating that his status was in some ways marginal.

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<sup>50</sup> Anon, “Society of Arts,” *Universal Magazine*, 11 (1809): 344. In addition to the *DNB* see Anon., “Memoir of Alexander Tilloch,” *Imperial Magazine* 7 (1825): 208–22; [Thomas Byerley?], “Alexander Tilloch, LL.D.,” *Literary Chronicle* 7 (1825): 141–42; and Anon., “Alexander Tilloch, LL.D.,” *Annual Biography and Obituary* 10 (1826): 320–34.

<sup>51</sup> Brock and Meadows, *Lamp of Learning*, 90–97; Inkster, “Science and Society”; and Paul Weindling, “The British Mineralogical Society: A Case Study in Science and Social Improvement,” in *Metropolis and Province: Science in British Culture, 1780–1850*, ed. Ian Inkster and Jack Morrell (Philadelphia: University of Pennsylvania Press, 1983), 120–50.



Heavily involved in the practical arts and in philosophical pursuits, and already experienced as an editor, Tilloch saw in the success of Wyatt's and Nicholson's journals an invitation to capitalize on his interests to produce a publication that would make available to "the Public in general ... the improvements which are daily made in the different branches of human knowledge". His prospectus acknowledged the existence of similar publications but promised that the *Philosophical Magazine* would operate on an altogether larger scale. Tilloch proceeded to outline his sources. First, there were the "transactions of the [Continental] Academies, works too dear to be purchased by readers in general, and written, besides, in languages with which few are acquainted." Through a Continental correspondence network, and despite the war with France, Tilloch promised to secure such publications promptly, and to 'select and translate' from them. Secondly, he would mine the 'great variety' of Continental 'Journals'. Thirdly, Tilloch promised extracts from "the transactions of the Public Societies in Great Britain" and, fourthly, information about newly patented machines. Only 'in last place' did Tilloch list his ambition to include "original communications on Scientific Subjects," noting that he had received "assurances of assistance from some of the most distinguished characters in the kingdom as Philosophers and Mechanics". In addition, he offered "short notices of New Discoveries and Improvements", obituaries of men eminent in science or the arts, and notices and extracts from new books of importance.<sup>52</sup>

Tilloch's forthright anthologizing ambition was encapsulated in a punning Latin epigraph to the prospectus which subsequently, for many years, adorned the title-page: "The spider's web

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<sup>52</sup> [Alexander Tilloch], "Prospectus of a New Periodical Work, Intituled, The Philosophical Magazine," *Star*, 29 June 1798, p. 1a–b.

[*textus*] is no whit the better because it spins it from its own entrails; and my text no whit the worse because, as does the bee, I gather its components from other author's flowers".<sup>53</sup> When the first monthly issue of the *Philosophical Magazine* appeared in June 1798, price 2s., it fulfilled Tilloch's promises by providing translations and abstracts of work extracted from Continental transactions, journals, and books. Of seventy-seven articles in the first volume, fifty-five were from taken such sources, and a further seven were taken from British publications (fig. 3). Only sixteen were original, and some of those were descriptions of published work. In addition, a regular 'Intelligence' section allowed Tilloch to summarize further Continental work. Tilloch's first, self-congratulatory preface reiterated that his 'grand Object' had been "to diffuse Philosophical Knowledge among every Class of Society, and to give the Public as early an Account as possible of every thing new or curious in the scientific World, both at Home and on the Continent".<sup>54</sup>

This emphasis on the inclusive nature of his readership was also evident in Tilloch's prospectus, which described the work as being "for the use of the common ranks as well as of the learned", and suggested that it would be valuable to 'young persons' wishing to acquire knowledge of "the philosophical sciences". As with Wyatt and Nicholson, he laid considerable emphasis on the practical importance of the magazine to those engaged in the "arts and manufactures", but he also reported his intention to include articles of a more theoretical cast which may ultimately prove to be of practical value. The journal was to cover "Natural and Experimental Philosophy, Chemistry, Economics, Natural History, Mechanics, Geography,

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<sup>53</sup> "Nec aranearum sane textus ideo melior, quia ex se sila gignunt. Nec noster vilior, quia ex alienis libamus ut apes." I am indebted for the translation to Ann Moss, "The *Politica* of Justus Lipsius and the Commonplace-Book," *Journal of the History of Ideas* 59 (1998): 424.

<sup>54</sup> [Alexander Tilloch], "Preface," *Philosophical Magazine* 1 (1798): [iii].

Statistics, Astronomy, Meteorology, Antiquities; and, in a word, every thing that relates to Science, the Liberal and Fine Arts, Trade, Manufactures, and Agriculture”. Tilloch again echoed Nicholson in emphasizing that ‘New Discoveries, or Inventions’ were not to be the journal’s overriding preoccupation, and that, where necessary, articles would return to important but relatively unknown materials of an older vintage.<sup>55</sup>

Like the *Repertory of Arts* and the *Journal of Natural Philosophy*, the *Philosophical Magazine* was the property of its editor, for whom it became a valuable source of income. More than the other editors, however, Tilloch assembled a list of prominent booksellers to act as commission publishers, with Richardsons and Cadell and Davies initially heading a list of nine. Significantly, the list included William Remnant in Hamburg, and booksellers were soon added in Dublin, Edinburgh, and Glasgow, indicating the extent to which the journal was intended to function as a communication hub. The first volume was greeted by the *Monthly Magazine* as ‘very promising’ and by 1804 it was clear to contemporaries that the *Philosophical Magazine*, like the Nicholson’s *Journal*, was there to stay, “fixed on the firm rock of public approbation and support”.<sup>56</sup> Production figures support this assessment. By 1803, the print-run stood at 1250 copies per month, and while this had fallen to 1000 copies by 1813, it continued at that level until 1827, and it seems clear that Tilloch secured a significant profit at this period.<sup>57</sup> So successful was the journal by 1805 that leading publishers John Murray, Archibald Constable, Longmans, and Richard Phillips were all in the market to buy it. Murray thought it “one of the

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<sup>55</sup> [Tilloch], “Prospectus”.

<sup>56</sup> *Monthly Magazine* 6 (1798): 52; D., “Cursory Character of the Magazines,” *Universal Magazine*, 2nd ser. 1 (1804): 361.

<sup>57</sup> Printing Ledgers of R. Taylor & Co., 1803–10 and 1804–15; Printing Journals of R. & A. Taylor, 1815–26 and 1827–54 (‘Journal 1829’), Taylor & Francis archive, St Bride Printing Library, London. Even making some rather conservatively questionable assumptions about printing costs, Brock and Meadows estimated an annual profit of £264; Brock and Meadows, *Lamp of Learning*, 101.

most respectable and best-selling of our periodical publications”, and it was only the extent of the stock in hand that scuppered the deal. In the event, Tilloch retained ownership of the magazine until his death in 1825, when it was purchased as a going concern by his co-editor Richard Taylor.<sup>58</sup>

### Thomas Garnett’s *Annals of Philosophy* (1801–02)

Notwithstanding the increasingly full market, a further attempt to found a philosophical journal was made in June 1801, when Thomas Garnett (1766–1802) ‘and other gentlemen’ published the first volume of their *Annals of Philosophy*.<sup>59</sup> Garnett’s journal was distinctive in being an annual, more in keeping with the *Annual Register* (1758–), which had long included sections for ‘Useful Projects’ and ‘Natural History’, than with the monthly magazines. It nevertheless had much in common with its competitors, as Garnett did with the other early editors. The son of a Westmoreland yeoman, Garnett had early studied mathematics and natural philosophy while apprenticed to the celebrated Sedbergh surgeon and mathematician John Dawson. His scientific education was broadened while studying for the Edinburgh M.D., and, practicing as a physician in Bradford and Harrogate, he began to lecture and publish on natural philosophy and chemistry. Following his marriage in 1795 he established a growing reputation as an itinerant lecturer, and was appointed the first professor of natural philosophy at Anderson’s Institution in Glasgow in 1796. He moved to London in 1799, having been invited to become the first professor of natural philosophy and chemistry at the Royal Institution. However, a

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<sup>58</sup> Thomas Constable, *Archibald Constable and His Literary Correspondents: A Memorial*, 3 vols (Edinburgh: Edmonston and Douglas, 1893), 1: 353; John Murray papers, National Library of Scotland, MS 41908, p. 152.

<sup>59</sup> The earliest advertisement I have located (announcing “this day is published”) is *Morning Chronicle*, 29 June 1801, p. 2a; the earliest review dates from November 1801 (Anon 1801).

combination of ill health and growing estrangement from Rumford and the institution's managers led to Garnett's resignation in mid-June 1801. It was at precisely this juncture that he advertised his *Annals of Philosophy*, and the scheme was clearly part of a wider professional strategy which involved resuming medical practice and lecturing on his own account from his premises in nearby Great Marlborough Street.<sup>60</sup>

As the professor, Garnett was officially expected to edit the *Journals of the Royal Institution* (1800–03), which were intended to publish details of its scientific investigations on a weekly or at least fortnightly basis, at a price of 3*d.* or 6*d.*, depending on the number of pages. In the event, only two numbers appeared during Garnett's professorship, and these were edited by Rumford.<sup>61</sup> Garnett's own journal, however, was rather different in intent. As with the other new journals, the stated objective was to produce, for reasons of utility, "a general and concise view of the scientific discoveries of the year, with references to the original works in which such discoveries were published". Garnett continued:

As it is in the power of very few, on account of indispensable occupations, to read every publication on the sciences and arts that comes from the press, it is certainly desirable to have a work, which, in the compass of a volume, will give a detail of all that has been done, and which, placed in a library, will serve as an index, pointing out the sources from whence satisfactory information on each subject may be obtained.

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<sup>60</sup> On Garnett see *DNB*; Henry Bence Jones, *The Royal Institution: Its Founder and Its First Professors* (London: Longmans, Green, 1871), 162–79; Thomas Garnett, *Popular Lectures on Zoonomia or the Laws of Life, in Health and Disease* (London: for the benefit of the author's children, 1804), v–xxii; and S. G. E. Lythe, *Thomas Garnett (1766–1802)* (Glasgow: Polpress, 1984). The published outlines of Garnett's new lecture courses on chemistry and natural philosophy were advertised alongside the *Annals*. See *Morning Chronicle*, 10 November 1801, p. 2a.

<sup>61</sup> Jones, *Royal Institution*, 141, 153–56, 181–83, and 188; *Archives of the Royal Institution of Great Britain in Facsimile: Minutes of Managers' Meetings, 1799–1900*, ed. Frank Sulloway, 15 vols in 7 (Menston: Scolar Press in association with the Royal Institution of Great Britain, 1971–76), 1: 112, and 2: 42, 183, and 185.

The intended work would thus be useful even to those based in the metropolis, but yet more so to those living in the country, and especially to those “in America, and the East and West-Indies”, who would, “[b]y means of a small annual volume [...] become acquainted with the state of science and of the arts in every part of the world”.<sup>62</sup> The opening section provided accounts of new scientific discoveries in natural philosophy, natural history, and chemistry, abstracted from learned transactions, other scientific journals, and books. In addition, however, Garnett’s *Annals* purported to provide a listing of the entire output of the British press for the year, as well as of some Continental literature, together with notes. A third section, headed ‘Miscellaneous’, contained original contributions relating to improvements in practical and fine arts and in agriculture, together with obituaries.

The *British Critic* greeted the new journal with the observation that Garnett’s justification of it in terms of “the necessity of gathering the scattered branches of scientific knowledge” into a “small compass, which may be useful to such inquisitive persons as have neither time nor opportunity for acquiring more extensive information”, had become the typical pattern for “similar periodical publications”. Nevertheless, it welcomed the plan as ‘excellent’ and the execution as accomplished, concluding that the *Annals* contained information “incomparably more extensive than that of any other similar publication”.<sup>63</sup> The potential encroachment on the territory of existing reviews was again a concern, and the *Critical Review* considered the review of new books ‘totally unnecessary’. Nevertheless, the reviewer agreed that there was ‘ample room’ in the market for a ‘collection of this kind’:

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<sup>62</sup> [Thomas Garnett], “Preface,” *Annals of Philosophy* 1 (1801): [i]–ii.

<sup>63</sup> Anon, “Garnett’s *Annals of Philosophy and Arts*,” *British Critic* 20 (1802): 157 and 164–65.

In an *extensive* literary journal much must be passed over hastily that might require the minuteness of detail, the abstruser and drier parts of science must be slightly touched in a work that “must please to live;” and the reviewer will sometimes “omit what he despairs of adorning.” The scientific analyst, while he labours on the same materials with the journalist, is not impeded by the same difficulties: he has models in the *miscellanea curiosa*, and in the various abridgements of memoirs, to guide him, and he may fill up the picture, of which the reviewer can only sketch the outlines, while he leads to those who may give fuller information

Where the annual registers contracted the view of passing events given in the monthly press, the *Annals* should “enlarge upon the minuter points, less adapted to a general journal, and include accounts which scarcely come within the province of the former”.<sup>64</sup>

Garnett’s 448-page volume was published for 10s. 6d. by Cadell and Davies, who had published his *Observations on a Tour through the Highlands* the previous year. The basis of their agreement remains unclear, but when Garnett died of typhus in June 1802, the ‘proprietors’ announced that his place had been taken by Charles and Arthur Aikin—whose father, John, was now one of Cadell and Davies’s readers—working alongside the anonymous editor who had previously compiled the natural history section.<sup>65</sup> Making some structural modifications, the Aikins produced two further volumes of the *Annals* at the lower price of 9s. That the journal was

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<sup>64</sup> Anon, “Annals of Philosophy,” *Critical Review* 33 (1801): 255–56.

<sup>65</sup> Theodore Besterman, ed., *The Publishing Firm of Cadell & Davies: Select Correspondence and Accounts, 1793–1836* (Oxford: Oxford University Press and London: Humphrey Milford, 1938), 172; Anon 1802b, p. ii; and Anon, “Annals of Philosophy,” *British Critic* 22 (1803), 307.

then abandoned suggests an inadequate return. However, Arthur Aikin had also projected the *Annual Review* with Longmans in 1802—probably to an extent inspired by his experience of the *Annals*—and editing two such journals was probably impracticable.<sup>66</sup> Nevertheless, the involvement of two of John Aikin’s sons in succession to Garnett again confirms the close connection between the new journals and the Metropolitan world of practically oriented and commercially engaged science.

### Three ‘Archives’ and ‘Retrospects’

The inception of three relatively long-lived journals of science and the arts in the years 1794 to 1798 clearly established the commercial viability of the form, as is testified by the interest of Longmans, Phillips, Murray, and Constable in acquiring the *Philosophical Magazine*. That none of these leading publishers sought to introduce a competing journal, however, suggests that they now considered the market relatively well served by journals that were well respected. Indeed, after the initial flurry of activity, few further attempts were made to found new journals in the succeeding decade, and those few were unsuccessful. In May 1805, for instance, H. D. Symonds (a well-known periodical wholesaler of Paternoster Row) issued the first monthly number of *The Archives of Philosophical Knowledge*, priced 2s. 6d., but it seems to have foundered after only two numbers.<sup>67</sup> The editor, B. Lambert, acknowledged that the ‘general merit’ of the existing philosophical journals might “seem to render any addition to their number unnecessary”, but

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<sup>66</sup> The initial prospectus (in the John Johnson Collection) suggested that, in providing a systematic survey, the review would present the reader with “an uninterrupted history of the annual advancement of science”. [Arthur Aikin], *Prospectus of a New Work, to be Entitled “The Annual Review, or Register of Literature”* ([London]: printed by T. Gillet, [1802]), 2–3. Somewhat confusingly, Arthur Aikin also assisted Thomas Thomson in editing his *Annals of Philosophy* in 1818–19.

<sup>67</sup> *Morning Chronicle*, 18 May 1805, p. 2c; Thomas Rees, *Reminiscences of Literary London from 1779 to 1853, with Interesting Anecdotes of Publishers, Authors, and Book Auctioneers of that Period, &c., &c.* (London: Suckling and Galloway, 1896), 62.



argued that there still existed “a material chasm in the speedy diffusion of experimental and practical knowledge”.<sup>68</sup> Lambert’s new journal, subtitled “manual of foreign discoveries and improvements in the experimental, mechanical, and physical sciences”, was to consist “wholly of Translations, Abridgments, or Extracts from Foreign Memoirs and larger Works, in the Experimental, Mechanical and Physical Sciences, in order to enable the British Philosopher, Manufacturer, and Artisan to obtain an early acquaintance with the discoveries and improvements daily making in the arts and sciences in other countries”.<sup>69</sup> Lambert, who had recently produced a translation of Berthollet’s *Essay on Chemical Statics* (1804) and other French works, was quite probably a French émigré. In any case, all except five of the twenty-six translated memoirs were from French sources. However, his translations were not well-regarded and the journal made no progress against the established competition.<sup>70</sup>

A further attempt was made to found such a journal in January 1809, when the medical and scientific lecturer Alexander Walker issued the first quarterly number (priced 7s. 6d.) of his *Archives of Universal Science*.<sup>71</sup> The journal consisted largely of articles on the arts and sciences reprinted from other publications, British and foreign, interspersed with a significant number penned by the editor. Many of these related specifically to Walker’s ‘Natural Theory of Universal Science’, on which he had lectured to mixed audiences in Edinburgh, and the journal sought to reassert the value of an Enlightenment notion of universal science against the specialization of other journals. In addition, Walker offered prospective contributors ten guineas

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<sup>68</sup> See the “Prospectus” on the paper wrapper of the first issue, in the copy at the Senate House Library, London, which is also quoted in *Universal Magazine* 3 (1805): 459.

<sup>69</sup> *Morning Chronicle*, 18 May 1805, p. 2c.

<sup>70</sup> See, for example, Anon, “Berthollet on Chemical Affinities, &c.,” *Imperial Review* 4 (1805), 297 and, for the suggestion that he was a foreigner, Anon, “Clausen’s Russian Anecdotes,” *Critical Review* 3rd ser. 4 (1805), 181.

<sup>71</sup> *Caledonian Mercury*, 26 December 1808, p. 1d.

per sheet for their contributions.<sup>72</sup> The journal was initially advertised as being published by the publisher of the *Monthly Magazine*, Richard Phillips, in London, and by the small-time publisher Thomas Bryce in Edinburgh (where it was printed by the University printer Charles Stewart). In the event, the large periodical wholesalers Sherwood and Co. were the London agents, but the journal was not a success, surviving for only three numbers.

While these two ‘archives’ failed, John Wyatt considered by 1806 that there were so many ‘scientific journals’ that readers now needed ‘a digested index’ of them.<sup>73</sup> He consequently began a quarterly, costing 3s. 6d. and entitled *A Retrospect of Philosophical, Mechanical, Chemical, and Agricultural Discoveries*, which was designed to provide “An Abridgement of the Periodical and other Publications, English and Foreign, relative to Arts, Chemistry, Manufactures, Agriculture, and Natural Philosophy”, with occasional critical commentaries and suggestions for applications (fig. 4). The prospectus promised:

This work will not resemble any other Periodical Publication, on the subjects comprehended in its Title; but, as the information on these heads is now scattered amidst a variety of Monthly Journals (the same articles, particularly those of Foreign origin, often appearing in all), it is presumed a concentration of that knowledge in one Work, published less frequently, and thereby less expensively, will meet the approbation of a numerous class of Readers.

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<sup>72</sup> [Alexander Walker], “Archives & Review of Universal Science” ([n.l.: n.p.], [1809?]). See the copy, dated November 1809, in the John Johnson Collection, and the account of Walker’s lectures in the *Caledonian Mercury*, 30 April 1810, p. 1a.

<sup>73</sup> *Retrospect of Philosophical, Mechanical, Chemical, and Agricultural Discoveries* 1 (1806): [iii].

Even those who bought all the monthly journals, Wyatt suggested, would find the new magazine helpful as “a complete Compendium or Epitome of Scientific and Practical Knowledge”.<sup>74</sup>

Commentators certainly valued the *Retrospect* as a critical “Supplement and Index to all other scientific Journals”, and even Robert Woodhouse, who questioned the adequacy of the abridgements and the lack of plates, considered it ‘likely to be highly useful’.<sup>75</sup> However, while its prefaces boasted of the assistance and approval of scientific men, the magazine did not sell as well as the *Repertory*.<sup>76</sup> Moreover, the *Retrospect* was hampered by the difficulty of obtaining Continental publications during the Napoleonic blockade of Britain. From the first preface, Wyatt observed that the irregularity in the arrival of foreign books might cause publication delays, and this deteriorated so that by 1809, it was reported that ‘the troubled state of Europe’ had deprived the journal “almost entirely of the materials for that portion of their work which they had hitherto received from the Continent”.<sup>77</sup> However, it seems to have been the state of Wyatt’s health that precipitated the end. Publication became infrequent and irregular, and while an announcement in the *Universal Magazine* in January 1814 promised a return to regular publication, the final numbers (for 1813) were issued in 1815.<sup>78</sup>

## Conclusion

Reviewing Nicholson’s *Journal* anonymously in the *Monthly Review* for July 1799, Robert Woodhouse reflected on the changing character of printed publications in relation to the

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<sup>74</sup> [John Wyatt], [*Prospectus for “Retrospect of Philosophical Discoveries”*] ([London]: printed by C. Spilsbury, [1806]); a copy is in the John Johnson Collection.

<sup>75</sup> *Universal Magazine* 21 (1814): 60; and [Robert Woodhouse], “[Review of *Retrospect of Philosophical Discoveries*],” *Monthly Review* 2nd ser. 51 (1806): 220.

<sup>76</sup> *Retrospect of Philosophical Discoveries* 3 (1808): [i]; 9 (1809): iv.

<sup>77</sup> *Retrospect of Philosophical Discoveries* 1 (1806): iv; 3 (1808): ii; 4 (1809): [ii]. See also Topham, “Science, Print, and Crossing Borders”.

<sup>78</sup> *Universal Magazine* 21 (1814): 60.

sciences. Scientific journals like Nicholson's, he averred, were one aspect of a wider expansion of book production—including the production of small, cheap, and elementary books on the sciences—which had done much to increase the spread of knowledge in society. According to Woodhouse, the development that characterised the period was that 'Epitomes, Abstracts, Synopses, Abridgements, Magazines, Journals, &c.', providing the "general outlines and principal features" of knowledge, had supplanted "profound and systematic treatises". Such publications, when conducted well, could prove valuable, most particularly in educating "the great majority of the people", and on the whole Woodhouse thought Nicholson's journal would be 'useful'.<sup>79</sup> It was by thus making recondite knowledge more generally available through modern techniques of book-making, rather than by providing prestigious places to publish authoritative and original scientific findings, that Woodhouse considered that the new scientific journals gained their value. By seeing such journals from this contemporary perspective we are enabled to resituate the international circulation of scientific knowledge in this period within a particular commodity culture of print. Britain's earliest scientific journals emerged in a rapidly changing market in which literary entrepreneurs were able to earn a living by selecting and anthologizing. The founders of these early journals were chiefly men marginalized by their backgrounds in the practical arts, and in several cases by their involvement in rational dissent and political reform. They were also men who saw a dual opportunity in selectively anthologizing the latest scientific findings of Europe and North America: first, in securing a regular income and status from scientific work and, secondly, in making scientific knowledge more widely available. The journals they produced as a result significantly altered the means by which scientific knowledge circulated, both within Britain and beyond.

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<sup>79</sup> [Woodhouse], "Review of Journal", 301–03.

Of course, this study raises several new questions, the most important of which is how the anthologizing practices of these early journal editors impinged on scientific knowledge-making. Unfortunately, direct evidence of editorial practice and decisions is very limited in the case of the early British journals.<sup>80</sup> Rather, practice must be inferred indirectly from the end product, with close scrutiny being given to what was being anthologized, how it was modified in the process, and how that changed over time. Detailed study of the relative extent to which work was reproduced from different countries, from different journals, from different authors, and on different subjects would be profoundly informative about the processes of knowledge circulation. As we have seen, editors prided themselves on being highly selective, and this is confirmed by even the briefest glance into the Royal Society's *Catalogue of Scientific Papers*, which lists the republication in other scientific journals of what were retrospectively deemed to be 'scientific papers'. For instance, whereas only two of Lamarck's thirty-one 'papers' are listed as having been reprinted in the *Philosophical Magazine* or the *Journal of Natural Philosophy*, fifteen of the twenty-eight 'papers' of the French industrial chemist Jean-Antoine Chaptal were reportedly reprinted.<sup>81</sup> Moreover, the process of republication was often highly transformative. For example, while the *Philosophical Magazine* translated and reproduced Georges Cuvier and Adolphe Brongniart's important joint paper on the mineral geography of the Paris region without comment or correction in January 1810, the next issue carried a lengthy review of the article from the land surveyor John Farey, accusing the authors of attempting to secure priority over William Smith's pioneering work on geological mapping. Farey also provided a fourteen-page glossary and index to place and species names and a tabular geological section of the strata

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<sup>80</sup> By contrast, a significant archive has permitted a detailed reconstruction of Marc-Auguste Pictet's practice as editor of the *Bibliothèque Britannique*. David Bickerton, *Marc-Auguste and Charles Pictet, the "Bibliothèque Britannique" (1796–1815), and the Dissemination of British Literature and Science on the Continent* (Geneva: Slatkine Reprints, 1986). See also Crosland, "In the Shadow".

<sup>81</sup> Royal Society, *Catalogue of Scientific Papers*.

described, as well as a detailed discussion relating the French findings to British geology.<sup>82</sup> Such sophisticated reinterpretation of foreign science is suggestive of how far practices of knowledge circulation could contribute to knowledge making.

A further set of questions naturally arises concerning the process by which these early scientific journals came to be succeeded by (or in the case of the *Philosophical Magazine*, transformed into) something more recognizably modern. I have argued here that the early scientific journals were not solely or even primarily intended to provide authors with a means by which to secure credit or priority for original discoveries. Yet, as we have seen above, both Tilloch and Nicholson soon found themselves struggling to find space for abstracted materials alongside all the original papers they received. Nicholson's *Journal*, in particular, has been celebrated for the extent to which the pioneering work on electrochemistry was first published in its pages.<sup>83</sup> By offering an outlet for original researches that was more focused and authoritative than the *Gentleman's Magazine*, and at once more rapid and less socially restrictive than the *Philosophical Transactions*, the new journals contributed significantly to reconfiguring the process of scientific communication. Indeed, in doing so they presented a challenge to the ponderously slow-to-appear transactions of the learned societies, which by the 1820s and 1830s were responding with more timely volumes of 'proceedings'.<sup>84</sup> Yet, scientific journals at this later period continued to have a major role in reporting on and anthologizing findings published elsewhere, as the case of Thomas Thomson's *Annals of Philosophy* well illustrates.

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<sup>82</sup> Georges Cuvier and Alexandre Brongniart, "Memoir on the Mineralogical Geography of the Environs of Paris," *Philosophical Magazine* 35 (1810): 36–58; John Farey, "Geological Remarks and Queries on Messrs. Cuvier and Brogniart's Memoir on the Mineral Geography of the Environs of Paris," *Philosophical Magazine* 35 (1810): 113–39; and Martin Rudwick, *Bursting the Limits of Time: The Reconstruction of Geohistory in the Age of Revolution* (Chicago and London: University of Chicago Press, 2005), 494–95.

<sup>83</sup> Lilley, "Nicholson's Journal".

<sup>84</sup> See Secord, "Science, Technology and Mathematics," pp. 451–59; Csiszar, "Broken Pieces of Fact", esp. introduction and ch. 1.

Commencing his new journal against the established competition in 1813, Thomson claimed that its distinctiveness lay in the way it restricted itself on the one hand to ‘original papers’ and on the other to “translations of foreign papers supposed to be unknown to the generality of the British public”. The latter were still sufficiently important to his purpose that he felt obliged to apologize at length for the difficulty of securing ‘foreign papers’ in wartime conditions.<sup>85</sup> Indeed, looking back at mid-century, one obituarist claimed that Thomson’s journal had been valued because it “presented an epitome of all the transactions of physical science in an agreeable and readable form.”<sup>86</sup> More generally, the anthologizing practices of scientific journals continued to be an important aspect of their operation through a significant part of the nineteenth century.

My purpose in this chapter has been to re-expose the extent to which the early scientific journals were conceived and justified as attempts to anthologize scientific discovery, drawing together for the harassed and means-limited reader claims to knowledge made across the Western world. Much of the analysis here has been devoted to manifesting how different such journals were from the scientific journals of twentieth-century science, and to explaining their origins in relation to the conditions of the late eighteenth-century book trade. Yet, as this conclusion shows, the bearing of these sources on our understanding of the transnational circulation of knowledge is weighty, and much remains to be done in interpreting and analysing the evidence they provide.

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<sup>85</sup> [Thomas Thomson], “Preface,” *Annals of Philosophy* 3 (1814): [iii]–iv.

<sup>86</sup> [Robert Thomson?], “Biographical Notice of the Late Thomas Thomson,” *Glasgow Medical Journal* 5 (1857): 138–39.

## Figures

Fig. 1. A page from the *Gentleman's Magazine* for 1792, containing “Observations on the Appearances attending on the Conversion of cast into malleable Iron” by the eighteen-year old medical student and later renowned natural philosopher, Thomas Young (1773–1829). Reproduced from *Gentleman's Magazine* 62 (1792): 303, by kind permission of Leeds University Library.

Fig. 2. William Nicholson (1753–1815), editor of the *Journal of Natural Philosophy*. Reproduced from the *European Magazine* 62 (1812): 83f, by kind permission of Leeds University Library.

Fig. 3. In an early issue of the *Philosophical Magazine*, Alexander Tilloch sought to compensate for the inadequacy of English literature on the theory of crystals by translating a paper from the *Annales de chimie* by French mineralogist René Just Haüy. Reproduced from the *Philosophical Magazine* 1 (1798): 35, by kind permission of Leeds University Library.

Fig. 4. The titlepage of the first volume of James Wyatt's *Retrospect of Philosophical, Mechanical, Chemical, and Agricultural Discoveries* (1806–15). Reproduced by kind permission of Leeds University Library.



15 Drayton, Richard, *Nature's government: science, imperial Britain, and the "improvement" of the world* (New Haven, CT, 2000), p. 105. 20 Topham, Jonathan R., "Anthologising the book of nature: the origins of the scientific journal and circulation of knowledge in late Georgian Britain"™, in Lightman, B., McOuat, G., and Stewart, L., eds., *The circulation of knowledge between Britain, India and China* (Leiden, 2013), pp. 119–52; Topham, Jonathan R., "Science, print, and crossing borders: importing French science books into Britain" Nature is a British weekly scientific journal founded and based in London, England. As a multidisciplinary publication Nature features peer-reviewed research from a variety of academic disciplines, mainly in science, technology, and the natural sciences. It has core editorial offices across the United States, continental Europe, and Asia under the international scientific publishing company Springer Nature. During the late-2010s the weekly had a circulation of 53,000 with a readership of over 400,000 Clarifies what distinguishes scientific knowledge from other forms of knowledge. Explores some of the major challenges to our scientific knowledge and how those challenges can be satisfactorily met. see more benefits. Buy this book. In addition to numerous journal articles, he has published a research monograph on the nature of epistemic justification, Evidentialism and Epistemic Justification. He is also currently co-editing (with Ted Poston) a volume on inference to the best explanation and a volume on philosophical skepticism. Show all. Reviews. "The Nature of Scientific Knowledge"™An Explanatory Approach (TNSK)™"is a recent contribution to textbooks in Epistemology of Science.