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Chapter 1. Scientific, Medical, and Technical Periodicals in Nineteenth-Century Britain: New Formats for New Readers

Gowan Dawson and Jonathan R. Topham

In the *Monthly Review* for July 1799, Cambridge mathematician Robert Woodhouse reflected on the effect on the “intellectual character of society” of what he presented as the first of a new kind of scientific journal – William Nicholson’s *Journal of Natural Philosophy*. It was, he considered, part of a recent and larger development:

When presses multiplied, and restraints were removed from them,—when writing became a trade, and the love of gain operated with the love of fame as motives to authorship,—the number of literary productions increased, and their nature was changed: the serious and unremitting devotion of twenty or thirty years, to the study of a particular science, was no longer considered as a necessary preparation for a work; and when a person imagined that he had some information to communicate, the means were ready.

Journals such as Nicholson’s, he claimed, like the “Epitomes, Abstracts, Synopses, [and] Abridgements” that had become commonplace of late, had the regrettable effect of removing incentives for profound learning. Importantly, however, their positive achievement was that they answered the desire for knowledge that had spread itself “through all ranks.” They acted as an intellectual manure that produced “more uniform utility over the whole soil” than could be produced by lumpen works of individual scholarship.¹ For Woodhouse, Nicholson’s innovation thus amounted to a democratizing impulse: the new scientific journal invited the involvement of a far larger proportion of the populace in the project of natural enquiry.

As the introduction to this volume has demonstrated, the history of scientific, medical, and technical periodicals in nineteenth-century Britain is not one that can be read through the character or functions of modern scientific journals. On the contrary, the increasing range of periodicals that came into existence took a wide range of forms and functioned in a similarly wide range of ways. Only by degrees – and especially towards the end of the century – did a proportion of these periodicals come to resemble modern academic journals to a significant extent. Throughout, the history was punctuated by the production of new types of periodicals aimed at new audiences. As Woodhouse had noted on the eve of the new century, changes in the culture of print opened up new possibilities for configuring knowledge communities, and editors, publishers, and societies were quick to seize those opportunities in shaping new kinds of scientific periodicals. Charting the resultant developments in the forms and audiences of scientific periodicals is an indispensable first step in understanding their changing role in constructing scientific communities. In this chapter, therefore, we offer a broad, and inevitably tentative overview of the development of scientific, medical, and technical periodicals over the course of the nineteenth century, seeking to map some of the distinctive features of that history.

Getting to grips with the scale and diversity of scientific, medical, and technical periodicals in nineteenth-century Britain is, however, a major challenge. Despite the existence of several catalogues, no satisfactorily comprehensive listing exists. The most systematic is the bibliography of British and colonial medical periodicals prepared in 1937 by W. R. LeFanu, the librarian of the Royal College of Surgeons of England, and expanded in

1984 by Jean Loudon, although even this is far from complete. It does, however, enable the historian to gain something of a sense of the rate of growth across the period, from nine British medical titles in 1800 to more than 150 in 1900.² Gaining a comparable sense for scientific titles is less straightforward. Robert Gascoigne's *Historical Catalogue of Scientific Periodicals, 1665–1900* (1985) lists 124 British titles, selected on the basis of the degree of their use by “scientists of the time”, as measured by their citation in leading catalogues of scientific papers, rising from eleven in 1800 to 110 in 1900. The *Catalogue of Scientific Serials, 1633–1876* compiled in 1879 by American naturalist Samuel Scudder is more extensive, listing a total of more than 550 titles published in Britain and Ireland. More extensive still (although excluding society publications) is the *Catalogue of Scientific and Technical Periodicals, 1665–1885* prepared by American chemist and bibliographer Henry Bolton, which includes more than 800 British titles, rising from thirty-six in 1800 to 330 in 1900. Bolton's list, however, includes numerous general titles and many titles that reflect a very inclusive definition of “scientific and technical”.³ This inclusivity becomes quite unmanageable in John North's *Waterloo Directory of Newspapers and Periodicals, 1800–1900*, series two of which (out of a planned five) lists over 5000 titles with the subject keywords “science” or “medicine”, but includes under these keywords such general titles as *Acworth's Ealing Illustrated Magazine and General Advertiser* and the *Agnostic Annual*.⁴

The growth and diversification of scientific, medical, and technical periodicals in nineteenth-century Britain is clearly in part a reflection of larger patterns in periodical production during this age of the industrialization of print. Figures from the *Waterloo Directory* suggest something in the order of a ten-fold increase in the number of periodical titles across the century, while average circulation also increased very markedly. It is not surprising that from early on in the nineteenth century commentators felt themselves to be living in an age in which periodicals exerted a new dominance, and that dominance, relative to other types of publication, only increased as the century progressed.⁵ Statistical analysis of the entries in LeFanu's list of medical periodicals and Bolton's list of scientific periodicals suggests that the pattern here was broadly comparable (fig. 1.1). Indeed, scientific, medical, and technical periodicals were affected by many of the factors that caused the growth of periodical literature more generally, including the expansion and diversification of reading audiences and the wholesale industrialization of print manufacture and distribution. In what follows, we connect the history of scientific periodicals to that larger history, exploring features that are common, as well as those that are distinct.

The chapter begins by reviewing the surprisingly large range of scientific, medical, and technical periodicals that existed in Britain at the turn of the nineteenth century, including a growing array of both society publications and commercial journals, before examining the rapid expansion in types of periodicals after 1815. In these years, the increased commercialization and mechanization of the book trade, together with the growth of reading audiences, underpinned a variety of initiatives to produce new types of scientific periodical, including cheap weeklies and natural history monthlies. Moreover, learned societies began to emulate the commercial press with new forms of society publication. The second section examines the middle years of the century, when many of the efforts to produce commercial periodicals on particular scientific subjects met with financial disaster, but society publications proliferated, and an increasing range of commercial periodicals were directed at occupational groups, including not only medical practitioners, but also miners, engineers, architects, and pharmaceutical chemists. The final section explores the changed circumstances of the periodical press in the late Victorian period, following the removal of taxes in the 1850s and 1860s and with further technological developments in book production

and distribution. It charts the establishment of commercially sustainable journals in a growing range of scientific fields and the growth of scientifically important “popular science” journals – a context out of which *Nature* emerged – while also showing that the period witnessed a continuing growth of occupationally oriented journals, not least in relation to medicine. Finally, it explores the emergence of university-oriented professional journals in the last decades of the century.

Early Nineteenth-Century Periodicals

While the number and range of scientific, medical, and technical periodicals published in Britain at the dawn of the nineteenth century was distinctly restricted by the standards of that century, close inspection reveals it to be greater than historians might expect. The form of scientific periodical that was of the longest standing was the volume of transactions, published by a learned society. Of these the oldest was, of course, the Royal Society of London’s *Philosophical Transactions*, which, after being a private endeavour for almost a century, was taken firmly under the Society’s control in 1752, becoming formally tied to the Society’s other activities.⁶ Over the final years of the century the practice of issuing transactions was emulated by new learned societies elsewhere in the kingdom – namely the Manchester Literary and Philosophical Society in 1785, the Royal Irish Academy in 1787, the Royal Society of Edinburgh in 1788, the Society of Antiquaries of Scotland in 1792, and the Dublin Society in 1799 – as well as by the Asiatic Society of Bengal in 1788. They were also emulated in the capital by new, more specialist bodies – notably, the Royal College of Physicians in 1768, the Society of Antiquaries in 1770, the Society of Arts in 1783, the Medical Society in 1787, and the Linnean Society in 1791. These publications, typically in large (quarto) format, were rooted in the learned societies they served, and were not typically produced with a view to financial returns, although they might find themselves subject to financial constraints.⁷ And as Alex Csiszar discusses in Chapter 3 below, their length and “polished memoirs” were far removed from the “articles” of commercial journalism.

Alongside the learned transactions, a small but increasing number of commercial medical, technical and scientific periodicals began to appear in Britain over the closing decades of the eighteenth century, with more than a dozen in production by 1800. These ranged from well-established medical, agricultural, and astronomical periodicals to more recently launched titles in natural history, natural philosophy, and the practical arts. As Thomas Broman has shown, these new commercial scientific periodicals of the eighteenth century need to be seen in relation to a larger transformation. The rapid growth of the periodical press in the eighteenth century contributed to the development of a novel sense among the educated of their participation in “a new collectivity, the ‘public,’” that was altogether more open and critical than were the learned academies, typically rooted as they were in the patronage structures of a monarchical and aristocratic state, although still fairly small and restricted, and quite distinct from the mass reading public that arose in the following century.⁸ At first, scientific, medical, and technical subjects were topics of extensive discussion in the new general magazines and reviews, such as the *Gentleman’s Magazine* (1731–1907) and the *Monthly Review* (1749–1844).⁹ It was not long, however, before editors and booksellers began to exploit the opportunities within this public sphere to target particular sets of readers with periodicals that were more selective in their content.

As contemporaries observed, Britain lagged somewhat behind leading Continental countries – notably Germany, where universities supplied both editors and readers – in developing such periodicals.¹⁰ Yet certain better-defined groups of consumers seemed worth

the speculation in a print market that was increasing in size and entrepreneurial ambition. Arguably the most promising, and certainly one of the earliest markets targeted was that for medical periodicals, where recognizable occupational groups existed whose interests were quite distinct. An increasing range of titles began to appear from the 1760s onwards, several of which secured lasting success, including Andrew Duncan's *Medical and Philosophical Commentaries* (1773–95), the *London Medical Journal* (1781–90), and the *Medical and Chirurgical Review* (1794–1808).¹¹ Another early market was that relating to agriculture, where the many improving landowners helped to sustain periodicals such as Arthur Young's *Annals of Agriculture* (1784–1815) and the *Commercial and Agricultural Magazine* (1799–1816).¹² A further occupational group – mariners – provided a market for a very particular type of periodical, the Board of Longitude's *Nautical Almanac* (1766–1959), and there continued to be a steady market for the astronomical and meteorological data in a range of widely sold almanacs. Beyond the functional, the annual *Gentleman's Diary* (1741–1840) and *Ladies' Diary* (1704–1840) were striking in the manner in which they sustained readerships over many decades with their annual offering of entertaining mathematical problems.¹³ A handful of other, more strictly mathematical periodicals were more ephemeral, but around the turn of the century the *Scientific Receptacle* (1791–1819) was one of a number of more broadly based periodicals, containing mathematical and other problems, that were produced for school-children and others seeking to educate themselves.¹⁴

The last two decades before the turn of the century saw significant innovation in the production of periodicals in natural history and natural philosophy. In 1781, the first and the longest-lived of a group of serialized natural history publications appeared in the form of the monthly *Botanical Magazine* of the apothecary turned naturalist, William Curtis. With its coloured plates and botanical descriptions, Curtis's magazine found a steady market among both naturalists and connoisseurs. Moreover, numerous periodicals emulated it over succeeding decades, including zoological as well as botanical titles, as in the case of the *Naturalist's Miscellany* (1789–1813).¹⁵ In the 1790s, several speculators finally concluded that enough of a market might now exist to sustain a “philosophical” or “scientific journal” like those that had begun to appear on the Continent in recent decades. In the space of just eight years, no fewer than six journals were commenced, most by projectors connected as much with the practical arts as with learned natural philosophy. The periodicals they began – including John Wyatt's *Repertory of Arts and Manufactures* (1794–1862), William Nicholson's *Journal of Natural Philosophy* (1797–1813), and Alexander Tilloch's *Philosophical Magazine* (1798–) – were established with the claim that learned philosophers and practical men alike needed cheaper and easier access to the details of the progress of science than could be obtained from Europe's learned transactions. They consequently offered anthologies of discovery that included some original matter, but laid particular store by the reprinting, abstracting, and translation of materials published elsewhere. This approach had the desirable effect of maximizing the market for pioneering products that did not, in Britain, map on to a sizeable occupational group. The editors' imagined audience drew together university professors, manufacturers, and even “young persons” with the offer of an anthology of scientific discovery that met their divergent interests. Moreover, their vision yielded journals that were not only financially sustainable but valued by a range of those with scientific interests.¹⁶

The success of these new commercial philosophical journals, with their broad appeal to “public” authority, soon created concerns for the learned societies. Offering to public scrutiny an alternative and sometimes much earlier means of access to the activities of such societies, the journals prompted the ire of Royal Society president Sir Joseph Banks, who

sought to wrest back control.¹⁷ Before long, however, some of the recently founded, more specialist societies began to cooperate with the commercial philosophical journals to offer their own authorized accounts of their proceedings, as is explored in detail in Chapter 3, below. The new societies founded to cater to emerging scientific disciplines, such as the Geological (f. 1807) and the Astronomical (f. 1820) continued to emulate the Royal Society in accumulating volumes of transactions or memoirs. In the 1820s, however, both of these societies co-operated with their printer, Richard Taylor, to include accounts of their proceedings in his *Philosophical Magazine*. By 1827 members of each were receiving specially offprinted “proceedings” that soon became separate journals in their own right. Moreover, this new mode of appeal to the “public” developed apace. Old societies, notably the Royal Society in 1832, adopted the form alongside existing transactions; new societies, such as the Zoological Society (f. 1826), could choose whether to publish transactions, containing longer memoirs, as well as proceedings, offering much more succinct accounts of scientific findings.¹⁸

Meanwhile, others had perceived opportunities in the new form of scientific periodical. The early “scientific journals” had been produced largely at the initiative of entrepreneurial editors, for whom they had generated a healthy income. However, even as early as 1805, fashionable and established publishers such as John Murray, Archibald Constable, Longmans, and Richard Phillips were interested in purchasing Tilloch’s journal as a successful and highly regarded publication. In the dozen years between 1813 and 1825, these commercial publishers joined up with more “learned” and “philosophical” editors to publish titles with larger ambitions, namely chemist Thomas Thomson’s *Annals of Philosophy* (1813–26), chemist William Thomas Brande’s *Journal of Science and the Arts* (1816–30), natural philosopher David Brewster and naturalist Robert Jameson’s *Edinburgh Philosophical Journal* (1819–64), and Brewster’s break-away *Edinburgh Journal of Science* (1824–32). At a moment when the encyclopaedic monthly magazine of the eighteenth century was morphing into the self-consciously literary magazine, of which *Blackwood’s Edinburgh Magazine* (1817–1980) was the type, publishers and editors alike expected to be able to reach a similarly large readership with well-financed and reputable magazines that were exclusively “scientific”, albeit that it would entail adopting a more “popular” mode of address. The publishers threw large sums at their speculations, only to discover that their sought-for market was nothing like so large as they had believed. By 1832, the total number of the general “scientific journals” surviving was just two: the *Philosophical Magazine* and Jameson’s *Edinburgh New Philosophical Journal*.¹⁹

One of the reasons for the failure of these periodicals was the further diversification of periodical literature that took place at this period. At the wealthier end of the market, new weekly journals such as the *Literary Gazette* (1817–63) and the *Athenaeum* (1828–1921) sought to combine literary with scientific news. Moreover, working-class entrepreneurs began to exploit the market for cheap weekly periodicals that had been developed by the post-war radical press before a terrified government introduced the “Six Acts” of 1819 to suppress it through the extension of libel laws and stamp duties. The new form of the cheap apolitical weekly – popularized by the *Mirror of Literature, Amusement and Instruction* (1822–47) – was soon taken up by the Edinburgh-educated radical journalist Thomas Hodgskin and the Scots patent agent and writer, Joseph Clinton Robertson to produce their three-penny weekly *Mechanics’ Magazine* (1823–72), intended for “that numerous and important portion of the community, the Mechanics or Artisans,” whom it was intended would be able to say “This is ours and for us”.²⁰ Not only did the new magazine contribute significantly to the development of the mechanics’ institute movement, but it soon spawned a

number of similar titles, including the *Glasgow Mechanics' Magazine* (1824–26) and the *London Mechanics' Register* (1824–28), as well as Hodgskin's own *Chemist* (1824–25). Moreover, the manner in which the cheap weeklies used the new technologies of the increasingly mechanized book trades, such as machine made-paper and stereotype, to cheapen the price of print and expand the market, was soon emulated by others, including the Society for the Diffusion of Useful Knowledge, so that contemporaries felt that theirs had become the era of the "march of mind".²¹ By the early 1830s, the cheap weekly journal had reached new heights of success in the form of periodicals such as the *Penny Magazine* (1832–45) and *Chambers' Edinburgh Magazine* (1832–1956), which mixed scientific content with a broad array of other matter.

The format of the cheap weekly was also adopted by London surgeon Thomas Wakley to produce a radically new kind of medical periodical. With more than twice the number of pages, and costing sixpence, Wakley's *Lancet* (1823–) nevertheless used the production strategies of the other new cheap weeklies produced in the same neighbourhood of the Strand (fig. 1.2). It also emulated the journalism of post-war political weeklies, notably *Cobbett's Weekly Political Register* (1816–19), in its pugnacious engagement with the medical politics of the day.²² A number of new medical monthlies and quarterlies had been founded over the preceding two decades, many produced by the emerging specialists in the increasingly vigorous world of medical publishing and edited by ambitious medical practitioners.²³ However, the *Lancet* marked a radical departure from the established formats, offering above all a vibrant sense of rapid progress in both medical knowledge and the medical community. Its ambition to reach a much wider medical readership than previous titles, including medical students and the great bulk of general practitioners, was soon rewarded. In 1824, Wakley claimed over ten thousand readers, although circulation reportedly settled at around four thousand.²⁴ Unsurprisingly, Wakley's combative approach encouraged the conservative medical place-holders to find their own vehicle, and the *London Medical Gazette* (1827–52) became one of a series of competitors with the *Lancet* in the weekly market over succeeding decades.

A further important innovation at the end of the 1820s was the appearance of the first scientific periodical of any note devoted to a particular scientific field. From the 1780s onwards, a growing number of periodicals had offered naturalists, collectors, and gardeners regular depictions and descriptions of plant and animal species, including such new titles as the *Botanist's Repository* (1797–1815), the *Botanical Register* (1815–47). The *Botanical Cabinet* (1817–33), the *British Flower Garden* (1823–38), and the *Botanic Garden* (1824–51). In many ways, however, these were more similar to other serialized part-works in natural history than to periodicals, in that they provided next to no space for a temporally extended conversation. John Loudon's *Magazine of Natural History* (1829–40), with which the introduction to this volume began, offered something altogether more ambitious. As Chapters 2 and 5 discuss, this magazine and Loudon's earlier *Gardeners' Magazine* (1826–44), were notable in finding out a new readership for such subject-specific fare, leading to a decade of vigorous experimentation that was, nevertheless, rather limited in its success.

Mid-Nineteenth-Century Periodicals

One of the great novelties of the 1830s, then, was the rush of editors and publishers to exploit the market that Loudon had found for periodicals on natural history and horticulture. Over the course of the decade, around twenty new periodicals were commenced focusing on these sometimes overlapping subjects, which exhibited a significant variety of approaches in

terms of subject matter and intended audience, ranging from the learned bimonthly *Magazine of Zoology and Botany* (1836–38), priced at 3s. 6d., to the populist monthly *Edinburgh Journal of Natural History and of the Physical Sciences* (1835–40), issued at 1s. in the large format of *Chambers's Edinburgh Magazine* and including Cuvier's *Animal Kingdom* in serialized parts.²⁵ The monthly and then quarterly *Analyst* (1834–40), which combined significant natural history content with other topics, was the ground-breaking production of the editor of the *Worcester Herald*, William Holl, aimed at a primarily provincial audience among the “intellectual residents” of the West Midlands and interacting significantly with local societies.²⁶ The sobering reality, however, was that, despite the growing market for print and the increasing use of such technological novelties as machine-made paper and wood engraving, managing the finances for such specialized periodicals was challenging, especially when costs were significantly increased by the notorious “taxes on knowledge” (paper, advertisement, and stamp duties) and by postal charges, which affected provincial ventures disproportionately.²⁷ Only five of the new titles survived beyond 1844. Of these, two were monthlies directed at gardeners (the hugely successful sixpenny *Floricultural Cabinet* (1833–1916) and the more up-market *Paxton's Magazine of Botany* (1834–49)) and one was an innovative weekly horticultural newspaper, the *Gardeners' Gazette* (1837–80), probably made possible by the reduction of stamp duty in 1836 from four to one penny. Among the new journals, William Jackson Hooker's *Journal of Botany* (1829–57; begun as the *Botanical Miscellany* and with further name changes) and the *Annals and Magazine of Natural History* (1838–1967; begun as the *Annals of Natural History*) alone endured as publications of scientific repute.²⁸

In addition to these commercial ventures, however, the 1830s also witnessed the beginnings of what grew to become a nationwide abundance of natural history societies, many of which issued periodicals. Thus, alongside the proceedings (1830–1965) and transactions (1835–1984) of the Zoological Society, the transactions (1834–1932) of the Entomological Society, and the annual report and proceedings (1837–44) of the Botanical Society of Edinburgh, appeared the transactions (1831–38) of the Natural History Society of Northumberland and the proceedings (1834–76) of the Berwickshire Naturalists' Club. More generally, the number of specialist scientific societies in London and elsewhere that were issuing periodicals continued to increase, with new Metropolitan titles including publications from the Geographical Society (1832–80), the Statistical Society (1834–38; 1838–), the Institution of Civil Engineers (1836–42; 1837–), the Pharmaceutical Society (1841–1908), the London Electrical Society (1841), and the Chemical Society (1843–48). Likewise, the number and range of observatory publications continued to grow, with publications commencing at Cambridge in 1829 and Edinburgh in 1834, and with the Greenwich Observatory issuing *Results of Magnetical and Meteorological Observations* from 1840. A particular novelty was the publication from 1833 of the *Report* of the annual meeting of the British Association for the Advancement of Science, offering synoptic reports on the state of several sciences, as well as highly condensed reports on a selection of papers.

In the commercial arena, however, the bitter experience of previous decades, and the ever-increasing number of society publications, meant that the *Philosophical Magazine* and the *Edinburgh New Philosophical Journal* suffered little further competition as general science journals. Prospective editors and publishers seem to have been chastened by a sense of the smallness of the potential readership for periodicals serving the increasingly arcane demands of the special sciences in relation to the high costs of production. In 1837, the printer and co-editor of the *Philosophical Magazine*, Richard Taylor, asserted that the journal had never covered its expenses, and that the failure of scientific journals was solely due to the

costs incurred.²⁹ As printer of a large proportion of the publications of learned societies, and publisher of the *Philosophical Magazine* and the *Annals and Magazine of Natural History*, Taylor was the dominant figure in the production of science periodicals. Moreover, he was one of the few innovators at this period, and his business, continued by his illegitimate son, William Francis, maintained a dominant role throughout the century. Taylor's *Scientific Memoirs* (1837–52) was an earnest endeavour to bring British men of science up to date with Continental work by translating selected articles, but with a sale of fewer than two hundred copies, it was a loss-making “altruistic enterprise.”³⁰ Another notable novelty was the *Cambridge Mathematical Journal* (1837–54), the editors of which sought out a small but sustainable readership rooted in the university's mathematical community, again seeking to make Continental work available.³¹ Striking in its singularity was William Sturgeon's *Annals of Electricity* (1836–43). A prominent electrical lecturer, demonstrator, and inventor, Sturgeon struggled against his status as an outsider to London's learned circles, and commenced his journal having had his first paper on electromagnetic machines turned down for publication in the *Philosophical Transactions*. As with the London Electrical Society that Sturgeon was instrumental in founding, the new journal was in part his attempt to “forge a constituency for himself”, but with subscriptions remaining low, it lasted only a few years.³²

A very notable development in the 1830s, however, was the growth of periodicals related to particular occupational and professional interests that had some bearing on scientific subjects. The 1820s had seen the establishment of additional technical periodicals (e.g. *London Journal of Arts and Sciences*, 1820–67) and agricultural titles (e.g. *Quarterly Journal of Agriculture*, 1828–68). Now, however, such work-oriented periodicals diversified significantly. Notable examples of this trend include the monthly *Veterinarian* (1828–1902), *United Service Journal* (1832–1920), *Architectural Magazine* (1834–39), *Railway Magazine* (1835–1903), and *Civil Engineer and Architect's Journal* (1837–67), the quarterly *Mining Review* (1830–40), and the annual *Papers on Subjects Connected with the Duties of the Corps of Royal Engineers* (1839–1918). Some of these occupational journals were even issued as weeklies, notably the *Mining Journal* (1835–) and the *Railway Times* (1838–1918), a development aided from 1836 by the reduction of stamp duties to one penny and the complete removal of duty for local delivery from what were now termed “class” journals. Aimed at restricted groups of readers with very specific interests, these journals became increasingly familiar over succeeding years, and among them the number and range of work-related titles continued to grow apace.³³ The booming railways, building, and engineering offered especially promising markets (e.g. the weekly *Railway Record* (1844–1901), *Economist* (1843–), and *Builder* (1843–1966), and the *Quarterly Papers on Engineering* (1843–49) but decade by decade new markets developed.³⁴ From 1849, for instance, the gas supply industry supported a weekly *Journal of Gas Lighting* (1849–1972) that later contributed significantly to the debate concerning the introduction of domestic electricity.³⁵ Such weeklies especially benefited in the following decade as advertising duty (1853) and stamp duty (1855) were finally repealed in the face of continued campaigning.

Most of these practically oriented titles remain little studied, especially from the perspective of the history of science. However, one notable growth area in the 1840s, relating to pharmacy and chemistry, has attracted more attention, not least because of its obvious bearing on learned discussions. The first of a series of successful publications was Charles and John Watt's sixpenny monthly *Chemist* (1840–58), which promised readers an account of “the various discoveries and improvements in chemistry, chemical manufactures and pharmacy,” while “protecting the rights of the chemist, the chemical manufacturer and

the druggist ... from the schemes of ignorance and imposture.”³⁶ The journal’s contents engaged to a significant extent with contemporary theoretical discussions, and it was soon joined by a more ambitiously theoretical title, Richard Taylor’s fortnightly *Chemical Gazette* (1842–59). While still directed to the manufacturer and the “pharmacist,” this was a spin-off from the *Philosophical Magazine*, placing great emphasis on the abstracting of Continental work, and was edited by the German-educated William Francis (Taylor’s son) and Henry Croft. Sales never rose above a few hundred, but the journal survived until its incorporation into William Crookes’s *Chemical News* (1859–1932), as discussed below.³⁷

The manner in which the larger occupational market (and Taylor and Francis’s strong personal commitments) sustained these two chemical periodicals in the 1840s stands in stark contrast to other special sciences. As Gowan Dawson shows in Chapter 4, for instance, attempts in the 1840s to commence commercial periodicals in geology demonstrated that the market was not viable, and the same applied in the case of microscopy.³⁸ It was in natural history alone that new titles were founded with some success. The printer and naturalist Edward Newman, who had edited the *Entomological Magazine* (1832–38) associated with the Entomological Club, began his own *Entomologist* (1840–42) believing there was a need for more specialized natural history periodicals. Shortly, however, he closed that title to begin the one-shilling monthly *Zoologist* (1843–1916), a “popular miscellany of natural history” similar to Loudon’s earlier magazine and published by natural history specialist, John Van Voorst, which was soon a going concern. But while Newman’s more specialized *Phytologist* (1841–63) also endured, sales were very low and it was probably cross-subsidized.³⁹ Likewise, as Chapter 6 of this volume shows, the *Entomologist’s Weekly Intelligencer* (1856–61) that Newman later published, was produced by its editor without financial gain in view. Yet, while the natural history market continued to be financially strained, several horticultural periodicals that found success were of considerable significance in natural history. Especially notable was the sixpenny *Gardener’s Chronicle* (1841–), founded as a “stamped newspaper of rural economy and general news” by botanist and horticulturalist John Lindley (who edited the horticultural part), horticulturalist Joseph Paxton, and journalist Charles Wentworth Dilke, while at the cheaper end of the market, gardening writer George W. Johnson’s *Cottage Gardener* (1848–1915) appeared in a smaller weekly format at two pence, or three pence stamped for postal delivery.⁴⁰

The market for medical periodicals also grew and diversified across the middle years of the century. One notable feature was the commencement of new titles produced outside of the leading medical centres of London and Edinburgh, including the *Glasgow Medical Journal* (1828–1955) and the *Dublin Journal of Medical and Chemical Science* (1832–1922). Especially notable were the endeavours of the Provincial Medical and Surgical Association to support the interests of the growing numbers of English practitioners outside London, which included the issuing of transactions (1833–53), but also prompted a weekly commercial speculation in the shape of the *Provincial Medical and Surgical Journal* (1840–57). Always closely linked with the association, the new journal was soon taken over by it, becoming the *British Medical Journal* (1857–) after the association became national and changed its name to the British Medical Association.⁴¹ Ireland also secured a weekly in the shape of the *Dublin Medical Press* (1839–65), which became the more broadly based *Medical Press and Circular* (1866–1961) after merging with the London *Medical Circular* (1852–66).⁴² The *Lancet’s* dominance was also challenged by a further long-lasting weekly founded in London, namely surgeon and journalist Frederick Knight Hunt’s *Medical Times* (1839–85). Another important innovation, as professional standards became more stringent, was the commencement of periodicals pitched at allowing practitioners to keep abreast of

developments, including the *Retrospect of Practical Medicine and Surgery* (1840–1901) and the *Half-Yearly Abstract of the Medical Sciences* (1845–73).

The 1830s also witnessed the commencement of the first long-lived hospital journals, in the shape of *Guy's Hospital Reports* (1836–1977). By the following decade, the first successful periodicals focused on special medical subjects were beginning to appear. The transactions (1846–1907) of the Pathological Society of London were soon followed over the succeeding decade by those of the Epidemiological Society (1855–1907), Odontological Society (1856–1907), and Obstetrical Society (1859–1908), and by the *Ophthalmic Hospital Reports and Journal of the Royal London Ophthalmic Hospital* (1857–79). Strikingly, however, it was in the distinctive field of psychological medicine that a successful commercial journal was first established in 1848. Asylum owner and physician Forbes Winslow's *Journal of Psychological Medicine and Mental Pathology* (1848–83) soon had competition from the *Asylum Journal of Mental Science* (1853–) produced by the Association of Mental Officers of Asylums and Hospitals for the Insane, but the market was sufficiently robust for the two to continue together over several decades. Similarly, the notably early *British Journal of Dental Science* (1856–1935) continued alongside the related society publications.

Such specialist titles became ever more frequent in the later part of the century, as the medical profession itself became specialized but, as Sally Shuttleworth shows in this volume (Chapter 10), another early development was the commencement of commercial journals concerning public health, typically aimed at a readership including (but extending beyond) medical practitioners, such as the *Journal of Public Health and Sanitary Review* (1855–58). A smattering of medical periodicals aimed at informing members of the public about their own health and treatment also appeared, including the penny weekly *Doctor* (1832–37), the eight-penny monthly *Magazine of Health* (1836), and the distinctly unorthodox *Journal of Health* (1848–67). Unorthodox or dissident medical periodicals flowered more generally in the middle decades of the century, as the long-standing *Phrenological Journal* (1823–47) was joined by a wide variety of other titles, including patent medicine vendor James Morrison's *Hygeist* (1842–67), Mesmerist John Elliotson's *Zoist* (1843–56), the *British Journal of Homeopathy* (1843–84) and *British Homeopathic Review* (1856–1907), the *Water-Cure Journal* (1847–49), the *Vegetarian Messenger* (1849–), and the *Anti-Tobacco Journal* (1858–1900).⁴³

Late Nineteenth-Century Periodicals

The 1860s witnessed rapid growth in the number of periodicals of all kinds, and scientific, medical, and technical journals were an important component of this general expansion of the mid-Victorian literary marketplace. Even the most specialist titles were not immune to the technological innovations in printing and paper production, increasingly efficient railway and postal distribution networks, and the repeal of paper duties in 1861, that, along with larger, better educated and more affluent readerships, fuelled this veritable boom in periodical publishing. By the end of the century, moreover, further technological innovations such as half-tone photographic illustrations and mechanical typesetting, and the increasing dominance of publishers with close ties to academia, whether family firms like Macmillans or the university presses at Oxford and Cambridge, facilitated the development of more efficient, technically accurate and specialist scientific journals. In the final decades of the nineteenth century, as James Secord has noted, a “fundamental transformation took

place which created, in broad terms, the publishing regime in which British science would operate for the following century”.⁴⁴

One of the most notable developments of the period was that it was now finally possible to sustain a commercial journal on a single, discrete field of science. In the late 1850s *Chemical News* (1859–1932), edited by William Crookes in partnership with the publishers Charles Mitchell and then Griffin and Bohn, joined the monthly *Geologist* (1858–1864) as a “special-class scientific periodical”, as they were termed by the latter’s editor and proprietor Samuel James Mackie.⁴⁵ While Mackie’s designation echoed the legal category for journals exempt from stamp duty introduced, as seen above, by the 1836 newspaper act, stamp duty had been abolished in 1855 and the concept of “class” journalism was now applied more loosely to the parallel processes of scientific specialization and market segmentation. The new breed of scientific “class” periodicals dealt with just a single scientific discipline, and, as commercial enterprises, were wholly independent of the official societies in their respective fields, of which they were often critical. The other key difference was that these new “class” journals could, when the right formula was hit upon, be strikingly successful. As was noted in the previous section, chemistry had been one of the few areas that was already able to sustain its own specialist periodicals in the 1840s, but while Richard Taylor’s *Chemical Gazette* never sold more than a few hundred copies (300 in 1848, for instance), Crookes’s *Chemical News* was, after overcoming some initial difficulties, selling 10,000 copies each week by the end of the century, generating a considerable income for Crookes, who remained its editor until 1919.⁴⁶ If Mackie, as is related in Chapter 4, was far from matching Crookes’s levels of remuneration, his *Geologist* was bought out by Longmans in the mid-1860s and relaunched as the hugely successful *Geological Magazine* (1864–), which, its editor Henry Woodward noted, was another of the new type of profitable “Class periodical” that began to become established from the 1860s onwards.⁴⁷ Other examples include the *Astronomical Register* (1863–1886), which is discussed in Chapter 8, and the *Entomologist’s Monthly Magazine* (1864–), which superseded the earlier short-lived, not-for-profit entomological periodicals explored in Chapter 6.⁴⁸ It was both the reduction of production and distribution costs and, most significantly, the rapid growth of a literate, scientifically interested and affluent audience that enabled publishers to focus on differentiated readerships that were now, for the first time, sufficiently large to sustain specialist periodicals in a wide range of scientific fields.

This larger and more literate reading audience was also sufficient to enable publishers to experiment with new forms of scientific journalism, and by the 1860s the market for specialist periodicals that made science accessible to both popular and middlebrow reading audiences had become increasingly crowded. While the numbers of popular science periodicals had, after a brief proliferation in the 1820s, remained unchanged until the 1850s, they more than doubled in the following decade.⁴⁹ Titles such as *Recreative Science* (1859–62), the *Intellectual Observer* (1862–68), the *Popular Science Review* (1861–95), the *Quarterly Journal of Science* (1864–78) and *Hardwicke’s Science-Gossip* (1865–93) all sought to engage new audiences for science with different formulas that combined education with entertainment at highly competitive prices. *Hardwicke’s Science-Gossip*, for example, cost just 4d for twenty-four octavo pages and claimed to be the cheapest scientific journal yet published. Its editor, Mordecai Cubitt Cooke, had initially proposed that the new monthly should be called the *Veil of Isis*, but his more market-savvy publisher, Robert Hardwicke, instead proposed *Science-Gossip* (fig. 1.3). In line with this self-consciously demotic title, Cooke outlined his editorial objective as being to “gossip with our readers, as a man chats to his friend ... talking of scientific subjects in the language of the fireside, and not as *savans*”.⁵⁰

With this emphasis on quotidian chat, *Science-Gossip* addressed itself principally to the growing ranks of amateur and plebeian naturalists, whose interests were also addressed by regional journals like the *Naturalist* (1864–), published by the Yorkshire Naturalists' Union. Just as such local periodicals helped, as Samuel Alberti has argued, to define a new role for amateurs in which they remained integral to the production of natural historical knowledge, so the popular appeal of *Science-Gossip* and the other popular science periodicals that proliferated from the 1860s did not mean that they were scientifically insignificant.⁵¹

After all, Cooke received assistance from professional experts in answering readers' queries, and *Science-Gossip* also occasionally published important articles by leading authorities such as the dermatologist William Tilbury Fox or up-and-coming naturalists like the young E. Ray Lankester that brought it new readers from the elite scientific community. Even Charles Darwin was not above contributing to *Science-Gossip*, writing in 1867 on how hedgehogs seemed to use their prickles to carry fruit. Darwin's contribution was in response to previous correspondence and observations from *Science-Gossip*'s readers, and shows that the participatory nature of such popular periodicals continued to be valued by the most eminent men of science. This affords an important corrective to Susan Sheets-Pyenson's contention that, by the 1860s, a passive top-down popular science had largely replaced the more inclusive "low science" facilitated by science periodicals in earlier decades.⁵² Although Cooke, mindful of putting "readers who have not had a scientific training" at their ease, insisted that "it is not our project or ambition to become what is called a 'scientific journal'", *Science-Gossip*'s mixed format, combining popularity with expertise and addressing a diverse range of readers, actually helped provide a model for what was the most significant scientific journal to emerge in late nineteenth-century Britain.⁵³

In the crowded marketplace for popular scientific periodicals in the late nineteenth century, publishers and editors regularly copied formats that had proved themselves successful. Cooke observed, in private autobiographical notes, that *Science-Gossip* "had many imitators and followers, besides 'Nature'". It might seem surprising that Cooke would claim that his populist and gossipy periodical had any connection to the journal that would, of course, go on to become the international benchmark for modern science publishing. However, *Nature*, which needed to break even in the commercial marketplace just as much as *Science-Gossip* (even if it failed to do so for the first two decades), was intended to appeal to both scientific practitioners and the general public when it was launched, published by Macmillan with Norman Lockyer as editor, in 1869. Lockyer certainly sought the same cost-effective mix of expertise and popular appeal as Cooke's *Science-Gossip*, and one of *Nature*'s twentieth-century editors, John Maddox, acknowledged that "to begin with, the journal was a gossip sheet".⁵⁴ The increasing specialization of science in this period meant that, in time, *Nature* could only accommodate the needs of its more expert readers, with *Knowledge* (1881–1918), edited by Richard Proctor, later targeting the same popular audience that Lockyer, from the mid-1870s onwards, was compelled to abandon. But *Nature* was not the only one of the late nineteenth-century's most authoritative specialist journals to have originally been intended for a more general audience, with the *Geological Magazine* similarly beginning as a new incarnation of the avowedly populist and heterodox *Geologist* and, at least initially, attempting to retain the same readership. *Nature*, as Melinda Baldwin has argued, also imitated aspects of Crookes's successful *Chemical News*, and the two weeklies shared an emphasis on speed and brevity in their reporting of news of the latest research that increasingly became a hallmark of science journalism into the twentieth century.⁵⁵

The consolidation of *Nature* as a journal that was addressed exclusively to expert scientific practitioners, but was nonetheless commercially viable, helped create a more stratified marketplace for science periodicals in the final decades of the nineteenth century. The increasing specialization of the trade press, with the emergence from the 1860s onwards of highly technical journals like the *Chemist and Druggist* (1859–; fig. 1.4) and the *Electrician* (1862–1864; 1878–1952) addressed exclusively to professional practitioners in their respective trades, was one important factor in the process of stratification. New medical periodicals similarly reflected the development of more specialist areas of practice, such as, for instance, the *British Gynaecological Journal* (1885–1907) and the *British Journal of Dermatology* (1888–). Closer to the trade press were a range of new journals addressing audiences engaged in specific medical occupations, with the growing importance of nursing reflected in a number of titles including the *Nursing Record* (1888–1956), the *Nursing Mirror* (1888–1977) and *Nursing Notes* (1891–1945). As Sally Frampton shows in Chapter 9, these new journals, representing the interests of previously marginalized occupational groups, were often resented by established medical periodicals, but they nonetheless contributed to the growing specialization and stratification of the scientific, medical, and technical press in the late nineteenth century.

The process was further augmented by the advent, in the 1870s and 1880s, of still more specialist journals, financed and published by university presses, that were restricted to small coteries of professional academics. The *Journal of Physiology* (1878–), edited by Michael Foster, was a mouthpiece for the innovative approach to physiological science that Foster was pioneering at Cambridge University, and quickly became viewed as the “‘house organ’ for the Cambridge School” of experimental physiology, with more than a quarter of its articles deriving from practitioners in the Cambridge laboratory.⁵⁶ The *Journal of Physiology* was, like *Nature*, originally published by Macmillans, although after less than two years Foster assumed the role of proprietor, with financial assistance from colleagues at Trinity College, and the increasingly in-house *Journal* was now sold through the Cambridge Scientific Instrument Company. By the mid-1890s, the *Journal* was being published by C. J. Clay, official printer to Cambridge University Press, and the Press would itself take over publication in the early twentieth century. In 1887 Oxford University Press launched a science periodical of its own, the *Annals of Botany* (1887–), with the Delegates willing to take on such a publication for the very first time “without any view of securing a profit to the Press”, although they insisted on a “guarantee fund” of £200 which by 1889 they had drawn to cover their losses.⁵⁷ A lucrative new market was emerging among subscribers in libraries, universities and technical institutions across the world, however, and the *Annals of Botany* was sufficiently solvent by the end of the following decade for the fund to be returned. Like the *Journal of Physiology*, the *Annals* had established itself as the most authoritative specialist periodical in its field by the close of the nineteenth century. With their innovative processes of peer review, such academically orientated periodicals were, along with more overtly commercial journals like *Nature*, increasingly supplanting learned societies as the central institutions where new forms of specialist expertise were adjudicated and guaranteed.⁵⁸

The printed scientific paper increasingly assumed the intellectual authority that was previously the preserve of oral contributions at meetings of learned societies, which might be published only several months or years later and often in an altered form. The societies had initially responded, as Csiszar shows in Chapter 3, by issuing their own proceedings in formats similar to those of commercial periodicals, but with the advent of *Nature* and academic journals like the *Journal of Physiology*, these official proceedings could no longer

match the speed or specialization of the commercial scientific press. In light of these changes, as well as the concomitant expansion in published papers across the sciences, many societies sought a new role as arbiters and organizers of scientific information. The most conspicuous example of this recalibration of the role of learned societies in relation to the press was the publication of the Royal Society's *Catalogue of Scientific Papers* (1867–1902) which was another factor that, by including only articles from a select list of validated journals, helped to consolidate the demarcation between academic and popular science periodicals in the final decades of the century. More significantly, the need for such a *Catalogue* also signalled perhaps the most pressing concern in science publishing over the same period.

The massive growth in the number of scientific periodicals over the nineteenth century, had, inevitably, resulted in an exponential increase in the number of papers published. The solution, somewhat counter-intuitively, was to create even more science journals, although of a new form, pioneered from the 1850s in Germany. These were abstract journals containing systematic digests of the contents of other periodicals in a particular field, with, for instance, the *Zoological Record* (1870–) guiding practitioners with an interest in systematics to the relevant literature in their respective areas. Although originally a commercial enterprise, the *Zoological Record* was, from 1886, published by the Zoological Society, and, as with the Royal Society's *Catalogue of Scientific Papers*, the task of collating such vast swathes of information could not be left to the marketplace and instead needed to be subsidized by learned societies. It has been estimated that, by the close of the nineteenth century, there was one abstract journal published for every three hundred conventional science periodicals, with *Science Abstracts* (1898–; renamed *Physics Abstracts* in 1902), published by the Institution of Electrical Engineers, perhaps the most successful and longstanding example, as is discussed in Chapter 7.⁵⁹ The volume of serialized information produced each year even in a relatively small sub-field like zoological systematics or electromagnetism was so prodigious, however, that abstract journals were often notoriously incomplete and unreliable. The production of them was also prohibitively costly, and financing *Abstracts of Physical Papers* (1895–1898), a short-lived forerunner of *Science Abstracts*, cost the Physical Society far more than their entire annual income from members' subscriptions and threatened its very existence.⁶⁰

There were also other, more existential hazards involved, and in 1896 the British Library's bibliographer Frank Campbell warned that the "development of Periodical Literature has been such as to constitute a very considerable danger to the progress of knowledge".⁶¹ The threat of being deluged with a flood of printed paper was at its most acute in the sciences. Indeed, the size, complexity and heterogeneity of the information that needed to be processed in order to keep up-to-date with developments in just one particular area was such that the proliferation of science periodicals, which increased exponentially in the period from 1860 to 1900, threatened to overwhelm and even destroy the whole enterprise of scientific research.

The emergence in late nineteenth-century Britain of scientific periodicals that were connected with the networks and practices of professionalized university-based science was clearly a development of great significance. The purpose of this chapter, however, has been to show that such journals were far from representative of the bulk of scientific, medical, and technical periodicals in the period, and that many other forms of publication were developed over the course of the century that addressed and fostered a wide range of communities of

practice. By offering a survey of these periodical forms, this chapter thus underpins the object of the volume to expose and explore the importance of scientific periodicals in understanding the complex and shifting social and epistemic topography of science in nineteenth-century Britain, both in the pre-professional period and as science became increasingly professionalized. The survey is inevitably broad-brush, but subsequent chapters explore further the often highly creative initiatives of editors, publishers, societies, and readers in exploiting developments in print culture to develop and maintain scientific communities.

Illustrations

Fig. 1.1. Scientific, medical and technical periodical titles listed in Henry Carrington Bolton's *A Catalogue of Scientific and Technical Periodicals, 1665–1895, Together with Chronological Tables and a Library Check-List*, 2nd ed. (Washington: Smithsonian Institution, 1897) and W. R. LeFanu's 'British Periodicals of Medicine: A Chronological List. Part 1: 1684–1899', *Bulletin of the Institute of the History of Medicine* 5 (1937), 735–61, 827–55.⁶²

Fig. 1.2. *Lancet*, 6 January 1827, cover. Credit: [Wellcome Collection](#). [CC BY](#).

Fig. 1.3. *Hardwicke's Science-Gossip*, August 1892, cover. Image from the Biodiversity Heritage Library (www.biodiversitylibrary.org), contributed by Natural History Museum Library, London.

Fig. 1.4. *Chemist and Druggist*, 15 January 1864, p. 1. Reproduced with the permission of Leeds University Library.

ENDNOTES

- ¹ *Monthly Review*, 2nd ser. 29 (1799), 303, 302.
- ² W. R. LeFanu ‘British Periodicals of Medicine: A Chronological List. Part 1: 1684–1899’, *Bulletin of the Institute of the History of Medicine* 5 (1937), 735–61, 827–55, and idem., *British Periodicals of Medicine: A Chronological List, 1640–1899*, revised edn., ed. Jean Loudon (Oxford: Wellcome Unit for the History of Medicine, 1984).
- ³ R. M. Gascoigne, *A Historical Catalogue of Scientific Periodicals, 1665–1900: With a Survey of their Development* (New York: Garland, 1985), Samuel H. Scudder, *Catalogue of Scientific Serials of All Countries Including the Transactions of Learned Societies in the Natural, Physical and Mathematical Sciences, 1633–1876*, reprint (New York: Kraus Reprint Corp., 1965 [1879]), and Henry Carrington Bolton, *A Catalogue of Scientific and Technical Periodicals, 1665–1895, Together with Chronological Tables and a Library Check-List*, 2nd ed. (Washington: Smithsonian Institution, 1897).
- ⁴ John S. North, *The Waterloo Directory of English Newspapers and Periodicals, 1800–1900*, Series 2, 50 vols, (1994–).
- ⁵ Gowan Dawson, Richard Noakes, and Jonathan R. Topham, “Introduction”, in *Science in the Nineteenth-Century Periodical: Reading the Magazine of Nature* (Cambridge: Cambridge University Press, 2004), 1–34, esp. pp. 7–10.
- ⁶ Aileen Fyfe, Julie McDougall-Waters, and Noah Moxham, “350 Years of Scientific Periodicals”, *Notes and Records of the Royal Society* 69 (2015), 227–39.
- ⁷ Aileen Fyfe, “Journals, Learned Societies and Money: *Philosophical Transactions* ca. 1750–1900”, *Notes and Records of the Royal Society* 69 (2015), 277–99, and Jonathan R. Topham, “Scientific and Medical Books, 1780–1830,” in *The Cambridge History of the Book in Britain*, Volume 5, 1695–1830, ed. by Michael Turner and Michael Suarez (Cambridge: Cambridge University Press, 2009), 827–33.
- ⁸ Thomas Broman, “Periodical Literature”, in *Books and the Sciences in History*, ed. by Marina Frasca-Spada and Nick Jardine (Cambridge: Cambridge University Press, 2000), 225–38, on p. 230; see also Alex Csiszar, *The Scientific Journal: Authorship and the Politics of Knowledge in the Nineteenth Century* (Chicago: University of Chicago Press, 2018).
- ⁹ See Porter, Roy, “Lay Medical Knowledge in the Eighteenth Century: The Evidence of the *Gentleman’s Magazine*”, *Medical History* 29 (1985), 138–68, idem., “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. by Roy Porter (Cambridge: Cambridge University Press, 1985), 283–314, and Jonathan R. Topham, “Anthologizing the Book of Nature: The Circulation of Knowledge and the Origins of the Scientific Journal in Late Georgian Britain,” in *The Circulation of Knowledge Between Britain, India and China: The Early-Modern World to the Twentieth Century*, ed. Bernard Lightman, Gordon McOuat, and Larry Stewart (Leiden and Boston: Brill, 2013), 119–52.
- ¹⁰ See, in this context, the striking statistics compiled by Fielding H. Garrison in his “The Medical and Scientific Periodicals of the Seventeenth and Eighteenth Centuries,” *Bulletin of the Institute of the History of Medicine* 2 (1934), 285–343, on p. 300.
- ¹¹ On these early medical journals see David A. Kronick, “Medical ‘Publishing Societies’ in Eighteenth-Century Britain,” *Bulletin of the Medical Library Association* 82 (1994): 277–82, Roy Porter, “The Rise of Medical Journalism in Britain to 1800”, in *Medical Journals and Medical Knowledge: Historical Essays*, ed. W. F. Bynum, S. Lock, and R. Porter

- (London and New York: Routledge, 1992), 6–28, and Iain Chalmers, Ulrich Tröhler, and John Chalmers, “*Medical and Philosophical Commentaries* and Its Successors,” in *Andrew Duncan, Senior: Physician of the Enlightenment*, ed. John Chalmers (Edinburgh: National Museums Scotland, 2010), 36–55.
- ¹² See G. E. Fussell, “Early Farming Journals,” *Economic History Review* 3 (1932): 417–22, Nicholas Goddard, “The Development and Influence of Agricultural Periodicals and Newspapers, 1780–1880,” *Agricultural History Review* 31 (1983): 116–31, Bernard A. Cook, “Agriculture,” in *Victorian Periodicals and Victorian Society*, ed. J. Don Vann and Rosemary T. VanArsdel (Toronto: University of Toronto Press, 1995), 235–48, and F. A. Buttress, *Agricultural periodicals of the British Isles, 1681-1900, and Their Location* (Cambridge: University of Cambridge, School of Agriculture, 1950).
- ¹³ Mary Croarken, “Tabulating the Heavens: Computing the Nautical Almanac in 18th-Century England,” *IEEE Annals of the History of Computing* 25 (2003): 48–61, idem., “Human Computers in Eighteenth- and Nineteenth-Century Britain,” in *The Oxford Handbook of the History of Mathematics*, edited by Eleanor Robson and Jacqueline Stedahl (Oxford: Oxford University Press, 2009), 375–403, Shelley Costa, “The Ladies’ Diary: Gender, Mathematics and Civil Society in Early Eighteenth-Century England,” *Osiris*, 17 (2002), 49–73, and Joe Albree and Scott H. Brown, “‘A Valuable Monument of Mathematical Genius’: The *Ladies’ Diary* (1704–1840)”, *Historia Mathematica*, 36 (2009), 10–47, and Sloan Evans Despeaux, “Mathematical Questions: A Convergence of Mathematical Practices in British Journals of the Eighteenth and Nineteenth Centuries,” *Revue d’histoire des mathématiques* 20 (2014): 5–71.
- ¹⁴ On mathematical periodicals see Sloan Evans Despeaux, “International Mathematical Contributions to British Scientific Journals, 1800–1900”, in *Mathematics Unbound: The Evolution of an International Mathematical Research Community*, ed. by Karen Hunger Parshall and Adrian C. Rice, *History of Mathematics*, 23 ([Providence, RI]: American Mathematical Society and London Mathematical Society, 2002), 61–88, and idem., “A Voice for Mathematics: Victorian Mathematical Journals and Societies,” in *Mathematics in Victorian Britain*, ed. by Raymond Flood, Adrian Rice, and Robin Wilson (Oxford: Oxford University Press, 2011), 155–74.
- ¹⁵ W. Botting Hemsley, *A New and Complete Index to the Botanical Magazine from Its Commencement in 1787 to the End of 1904, Including the First, Second, and Third Series; To Which is Prefixed a History of the Magazine* (London: Lovell Reeve & Co., 1906), and Ray Desmond, *A Celebration of Flowers: Two Hundred Years of Curtis’s Botanical Magazine* (Kew: Royal Botanic Gardens, in association with Collingridge, 1987).
- ¹⁶ Topham, “Anthologizing,” Iain Watts, “‘We Want No Authors’: William Nicholson and the Contested Role of the Scientific Journal in Britain, 1797–1813,” *British Journal for the History of Science*, 47 (2014), 397–419, W. H. Brock and A. J. Meadows, *The Lamp of Learning: Taylor & Francis and the Development of Science Publishing*, 2nd edn (London: Taylor and Francis, 1998 [1984]), and S. Lilley, “‘Nicholson’s Journal’, 1797–1813”, *Annals of Science* 6 (1948–50), 78–101.
- ¹⁷ Watts, “We Want No Authors.”
- ¹⁸ James A. Secord, “Science, Technology, and Mathematics,” in *The History of the Book in Britain*, vol. 6, 1830–1914, ed. David McKitterick (Cambridge: Cambridge University Press, 2009), 443–74, esp. pp. 451–56, and Csiszar, *The Scientific Journal*.
- ¹⁹ Jonathan R. Topham, “The Scientific, the Literary and the Popular: Commerce and the Reimagining of the Scientific Journal in Britain, 1813–1825,” *Notes and Records of the Royal Society*, 70 (2016): 305–24, and Brock and Meadows, *Lamp of Learning*.

- ²⁰ Mussell, James, “‘This is Ours and For Us:’ The *Mechanic's Magazine* and Low Scientific Culture in Regency London,” in *Repositioning Victorian Sciences*, ed. David Clifford *et al.* (London: Anthem Press 2006), 107–18, and Jonathan R. Topham, “John Limbird, Thomas Byerley, and the Production of Cheap Periodicals in the 1820s,” *Book History* 8 (2005), 75–106.
- ²¹ Jonathan R. Topham, “Publishing ‘Popular Science’ in Early Nineteenth-Century Britain,” in *Science in the Marketplace: Nineteenth-Century Sites and Experiences*, ed. Aileen Fyfe and Bernard Lightman (Chicago and London: Chicago University Press, 2007), 135–68. For further titles, see Susan Sheets-Pyenson, “Popular Science Periodicals in Paris and London: The Emergence of a Low Scientific Culture, 1820–1875,” *Annals of Science* 42 (1985), 549–72.
- ²² Michael Brown, “‘Bats, Rats and Barristers’: The *Lancet*, Libel and the Radical Stylistics of Early Nineteenth-Century English Medicine,” *Social History* 39 (2014), 189–209, Topham, “John Limbird”, and Mary Bostetter, “The Journalism of Thomas Wakley,” in *Innovators and Preachers: The Role of the Editor in Victorian England*, ed. Joel Wiener (Westport, CT: Greenwood, 1985), 275–92.
- ²³ W. F. Bynum and Janice C. Wilson, “Periodical Knowledge: Medical Journals and Their Editors in Nineteenth-Century Britain,” in *Medical Journals and Medical Knowledge: Historical Essays*, ed. W. F. Bynum, S. Lock, and R. Porter (London and New York: Routledge, 1992), 6–28.
- ²⁴ Brown, “Bats, Rats, and Barristers”, 183, n.4.
- ²⁵ Susan Sheets-Pyenson, “From the North to Red Lion Court: The Creation and Early Years of the *Annals of Natural History*,” *Archives of Natural History* 10 (1981), 221–49; *Examiner*, 31 January, 1836, p. 80.
- ²⁶ *Analyst* 1 (1834), “Advertisement” and [iii].
- ²⁷ W. H. Brock, “The Development of Commercial Science Journals in Victorian Britain”, in Meadows, *Development of Science*, 95–122, and David E. Allen, “The Struggle for Specialist Journals: Natural History in the British Periodicals Market in the First Half of the Nineteenth Century,” *Archives of Natural History* 23 (1996), 107–23.
- ²⁸ Allen, “The Struggle for Specialist Journals”, Susan Sheets-Pyenson “A Measure of Success: The Publication of Natural History Journals in Early Victorian Britain”, *Publishing History* 9 (1981), 21–36, Sheets-Pyenson, “From the North to Red Lion Court”, and Ray Desmond, “Loudon and Nineteenth-Century Horticultural Journalism”, in *John Claudius Loudon and the Early Nineteenth Century in Great Britain*, ed. by Elisabeth B. MacDougall (Washington, D.C.: Dumbarton Oaks Trustees for Harvard University, 1980), 77–97.
- ²⁹ *First Report from the Select Committee on Postage; Together with the Minutes of Evidence, and Appendix*, House of Commons Parliamentary Papers, Session 1837–38, 33: 1–516, on pp. 319 and 325.
- ³⁰ Brock and Meadows, *Lamp of Learning*, 103.
- ³¹ Gowan Dawson, “Thomson, William (1824–1907),” in *Dictionary of Nineteenth-Century Journalism*, ed. by Laurel Brake and Marysa Demoor (London: British Library, 2009), 625, Crosbie Smith and M. Norton Wise, *Energy and Empire: A Biographical Study of Lord Kelvin* (Cambridge: Cambridge University Press, 1989), and Sloan Evans Despeaux, “Launching Mathematical Research without a Formal Mandate: The Role of University-Affiliated Journals in Britain, 1837–1870,” *Historia Mathematica*, 34 (2007): 89–106, and Tony Crilly, “The *Cambridge Mathematical Journal* and Its Descendants: The Linchpin of

- a Research Community in the Early and Mid-Victorian Age,” *Historia Mathematica* 31 (2004): 455–97.
- ³² Iwan Rhys Morus, *Frankenstein's Children: Electricity, Exhibition, and Experiment in Early-Nineteenth-Century* (London: Princeton University Press, 1998), 46.
- ³³ Andrew King, “‘Class’ Publications”, in *Dictionary of Nineteenth-Century Journalism*, ed. by Laurel Brake and Marysa Demoor (London: British Library, 2009), 126. See also Martin Hewitt, *The Dawn of the Cheap Press in Victorian Britain: The End of the “Taxes on Knowledge,” 1849–1869* (London: Bloomsbury Academic, 2014).
- ³⁴ See Ben Marsden and Crosbie Smith, *Engineering Empires: A Cultural History of Technology in Nineteenth-Century Britain* (London: Palgrave Macmillan, 2005), 240–41, Ruth Richardson and Robert Thorne, *The “Builder:” Illustrations Index* (London: Builder Group and Hutton, 1994), Ruth Richardson, “‘Notorious Abominations:’ Architecture and the Public Health in ‘The Builder’, 1843–83”, in *Medical Journals and Medical Knowledge: Historical Essays*, ed. W. F. Bynum, S. Lock, and R. Porter (London and New York: Routledge, 1992), 90–107, Michael Brooks, ‘The Builder in the 1840s: The Making of a Magazine, the Shaping of a Profession’, *Victorian Periodicals Review*, 14 (1981), 86–93, “The Economist,” 1843–1943: A Centenary Volume (London: Oxford University Press 1943), Ruth Richardson and Robert Thorne, “Architecture,” Albert Tucker “Military,” John E. C. Palmer and Harold W. Paar, “Transport,” and David J. Moss and Chris Hosgood, “The Financial and Trade Press,” in *Victorian Periodicals and Victorian Society*, ed. J. Don Vann and Rosemary T. VanArsdel (Toronto: University of Toronto Press, 1994), 45–61, 62–80, 179–98, 199–218, and Matthew Taunton, “Mining Press,” Christian Wolmar, “Railway Press,” and Ana Parejo Vadillo, “Transport Press,” in *Dictionary of Nineteenth-Century Journalism*, ed. by Laurel Brake and Marysa Demoor (London: British Library, 2009), 412, 527, 639–40.
- ³⁵ Graeme Gooday, *Domesticating Electricity: Technology, Uncertainty and Gender, 1880–1914* (London: Pickering and Chatto, 2008).
- ³⁶ *Chemist* 1 (1840), 1.
- ³⁷ Brock and Meadows, *Lamp of Learning*, 99–100, 130–31, William H. Brock, “The Chemical News, 1859–1932,” *Bulletin of the History of Chemistry* 12 (1992), 30–35, idem., “The Making of an Editor: the Case of William Crookes” in *Culture and Science in the Nineteenth-Century Media*, ed. Louise Henson, et al. (Aldershot: Ashgate, 2004), 189–98, and idem., *William Crookes (1832–1919) and the Commercialization of Science* (Aldershot: Ashgate, 2008).
- ³⁸ W. H. Brock, “Patronage and Publishing: Journals of Microscopy 1839–1989,” *Journal of Microscopy* 155 (1989), 249–66.
- ³⁹ Allen, “The Struggle”, 115–18.
- ⁴⁰ William Thomas Stearn, “The Life, Times and Achievements of John Lindley, 1799–1865,” in *John Lindley, 1799–1865: Gardener, Botanist, and Pioneer Orchidologist*, ed. William T. Stearn (Woodbridge, Suffolk: Antique Collectors' Club in association with The Royal Horticultural Society, 1999), 15–72, on pp. 58–59.
- ⁴¹ P. W. J. Bartrip, *Mirror of Medicine: A History of the “British Medical Journal”* (Oxford: British Medical Journal and Clarendon Press, 1990), and idem., “The British Medical Journal: A Retrospect,” in *Medical Journals and Medical Knowledge: Historical Essays*, ed. W. F. Bynum, S. Lock, and R. Porter (London and New York: Routledge, 1992), 126–45.
- ⁴² Robert J. Rowlette, *The Medical Press and Circular, 1839–1939: A Hundred Years in the Life of a Medical Journal* (London: [The Medical Press and Circular], 1939).

- ⁴³ Andrew King, “Medical Journals: Alternative, Complementary, Fringe,” in *Dictionary of Nineteenth-Century Journalism*, ed. by Laurel Brake and Marysa Demoor (London: British Library, 2009), 406–07, and Jennifer Ruth, “‘Gross Humbug’ or ‘The Language of Truth’? The Case of the *Zoist*,” *Victorian Periodicals Review* 32 (1999): 299–323. See also Olwen C. Niessen, “Temperance,” in *Victorian Periodicals and Victorian Society*, ed. by J. Don Vann and Rosemary T. VanArsdel (Aldershot: Scolar Press, 1994), 251–77.
- ⁴⁴ Secord, “Science, Technology, and Mathematics,” 456–57.
- ⁴⁵ [Samuel James Mackie], “Notice to Subscribers, Contributors, & Advertisers,” *Geological and Natural History Repository* 1 (1865–67), [iii], and “The Geologist,” *Geologist* 1 (1858), 1–5, on p. 1.
- ⁴⁶ See William H. Brock, “*Chemical News*,” in *Dictionary of Nineteenth-Century Journalism*, ed. Laurel Brake and Marysa Demoor (London: British Library, 2009), 110–11.
- ⁴⁷ Henry Woodward, “The ‘Coming of Age’ of the *Geological Magazine*,” *Geological Magazine* n.s. 3 (1886), 45–48, on p. 48.
- ⁴⁸ See also Bernard Lightman, “The Mid-Victorian Period and the *Astronomical Register* (1863–1886): ‘A Medium of Communication for Amateurs and Others,’” *Public Understanding of Science* 27 (2018), 629–36.
- ⁴⁹ Ruth Barton, “Just Before Nature: The Purposes of Science and the Purposes of Popularization in some English Popular Science Journals of the 1860s,” *Annals of Science* 55 (1998), 1–33, on p. 2.
- ⁵⁰ [Mordecai Cubitt Cooke], “Science Gossip,” *Hardwicke’s Science-Gossip*, 2 (1866), 1.
- ⁵¹ Samuel J. M. M. Alberti, “Amateurs and Professionals in One County: Biology and Natural History in Late Victorian Yorkshire,” *Journal of the History of Biology* 34 (2001), 115–47.
- ⁵² Sheets-Pyenson, “Popular Science Periodicals in Paris and London: The Emergence of a Low Scientific Culture, 1820–1875,” *Annals of Science* 42 (1985), 549–72, on p. 555.
- ⁵³ [Mordecai Cubitt Cooke], “Our Compliments to Our Readers,” *Hardwicke’s Science-Gossip*, 4 (1868), 1–2.
- ⁵⁴ Quoted in Mary P. English, *Mordecai Cubitt Cooke: Victorian Naturalist, Mycologist, Teacher and Eccentric* (Bristol: Biopress, 1987), 112.
- ⁵⁵ Melinda Baldwin, *Making “Nature”: The History of a Scientific Journal* (Chicago: Chicago University Press, 2015), 27–28.
- ⁵⁶ Gerald L. Geison, *Michael Foster and the Cambridge School of Physiology* (Princeton: Princeton University Press, 1978), 188.
- ⁵⁷ Jonathan R. Topham, “Science, Mathematics, and Medicine,” in *The History of Oxford University Press: Volume II: 1780 to 1896*, ed. by Simon Eliot (Oxford: Oxford University Press, 2013), 513–57, on p. 553.
- ⁵⁸ On the emergence of peer review, see Alex Csiszar, “Troubled from the Beginning,” *Nature* 532 (2016), 306–08.
- ⁵⁹ William H. Brock, “Science,” in *Victorian Periodicals and Victorian Society*, ed. by J. Don Vann and Rosemary T. VanArsdel (Aldershot: Scolar Press, 1994), 81–96, on p. 87.
- ⁶⁰ See A. J. Meadows, “Access to the Results of Scientific Research: Developments in Victorian Britain,” in *The Development of Science Publishing in Europe*, ed. A. J. Meadows (Amsterdam: Elsevier, 1980), 43–62, on p. 52.
- ⁶¹ Quoted in Alex Csiszar, “Seriality and the Search for Order: Scientific Print and Its Problems During the Late Nineteenth Century,” *History of Science* 48 (2010), 399–434 (405).

⁶² The chart displays the number of journal titles in publication in each decade of the nineteenth century. The entries in Bolton's and LeFanu's lists were cross-referenced with entries in COPAC (www.copac.ac.uk), Zeitschriftendatenbank (www.zeitschriftendatenbank.de), the Hathi Trust Digital Library (www.hathitrust.org), and the US National Library of Medicine's PubMed catalogue (www.ncbi.nlm.nih.gov/pubmed/) to establish the exact publication dates of each title. Where this was not possible, or where information was inconsistent, journal titles were excluded from the data sample. The 'combined' category records titles that are listed in Bolton's list, LeFanu's list, or in both, and is hence smaller than the sum of the two component parts. We are grateful to Konstantin Kiprijanov for compiling the data and producing this chart; the original data are available as a list and in tabular form for download at conscicom.org.