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Technicians of Print and the Making of Natural Knowledge

W. H. Brock and A. J. Meadows, The Lamp of Learning: Two Centuries of Publishing at Taylor & Francis (London and Bristol, PA: Taylor and Francis Ltd., 1998), 288pp. ISBN 0-7484-0265-9 Hb £29.95.

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When this invaluable account of 'one of the most successful of all publishers and printers of nineteenth- and twentieth-century science' was first issued in 1984, it began with a survey of the underdeveloped literature on the history of scientific periodicals, and more generally of science publishing. A decade and a half later, in this considerably expanded second edition—issued to celebrate the bicentenary of the launch of the *Philosophical Magazine* in 1798—the authors had only a couple of extra titles to add. Since then, a number of important works have addressed this theme, but the field remains wide open.[1] Most of the key technicians of print—the publishers, printers, and engravers—who were responsible for the production of scientific books in nineteenth-century Britain are still unknown. Neither has serious attention been devoted to the manner in which such technicians interacted with men of science on a day-to-day basis, or to the impact of their craft skills or trade practices on the development of science. My object in this brief account is to use the example of Richard Taylor, as represented by Brock and Meadows' pioneering study, to review some of these important issues.

Prosopography

In their introduction, Brock and Meadows quote Susan Sheets-Pyenson's description of publishers and printers as acting 'as midwives in the creative process of bringing forth periodicals and books' and making 'decisions about which forms of scientific literature could survive in the market place' (xii). As their study shows, Richard Taylor (1781–1858) and, later, his natural son and business partner William Francis, played significant roles in the development of both the journals of scientific societies and the commercial science journals which came to dominate nineteenth-century British science. In giving a 'biography' of the firm, the authors thus accomplish an important end. Their study, however, stands almost alone as a scholarly study of a nineteenth-century scientific publisher, and we lack a wider perspective on the personnel of the scientific book trade of the period.[2] Most of the names on the title-pages, colophons, and illustrations of scientific books of the nineteenth century mean nothing to the historian, and many of them have not even been included in the *DNB*.[3] Brock and Meadows' study provides insights which suggest the value not only of further 'biographical' studies of individual firms, but also of prosopographical studies of the scientific book trade as a whole. What were the backgrounds of those who took such a key role in the production of scientific literature? Did they share similar educational, social or cultural experiences? Where they newcomers to the trade, or established businesses?

Brock and Meadows adroitly situate Richard Taylor's rise as a leading printer of scientific and other learned material in relation to his background in the vibrant culture of late eighteenth-century Unitarianism. Taylor was the scion of an influential Unitarian mercantile family in Norwich: the son of a prosperous wool comber and factor and great-grandson of a leading nonconformist divine. Living in a leading centre of nonconformity, his family were intimate with the Martineaus and the botanist James Edward Smith, and moved in the same circles as Henry Crabb Robinson, Elizabeth Fry, Amelia Alderson (later Opie), and Anna

Barbauld. Taylor was born into this vibrant cultural and social sphere at a moment when the English dissenters were beginning to wield their new-found wealth with a view to gaining both political representation and cultural influence. His own father was involved in attempts to repeal the Test and Corporation Acts (although these efforts were dealt a blow by the reaction to the French Revolution) and contributed poetry to the short-lived Norwich-based magazine, *The Cabinet* (1794–95). Nationally, as Marilyn Butler has pointed out there was, for a moment, a 'Dissenter monopoly' in literary criticism since '[a]ll four owner-editors of the journals dealing seriously with literary matters in 1790—the *Monthly Review*, the *Critical Review*, the *English Review* and the *Analytical Review*—were Dissenters, and all these journals [...] supported reform'.[4]

This background furnished Taylor with both cultural assumptions and business connections which were pivotal in shaping his future career. Significantly, his six brothers achieved success in science, manufacturing, music, and printing, his eldest brother John being a leading figure in Metropolitan science. Like them, Taylor began his professional life as an apprentice, but his apprenticeship exploited the connections of the Unitarian network between the commercial world of London and the manufacturing centres of the provinces, providing 'a form of introduction and principle of cohesion' (4). Taylor was apprenticed in 1797 to the Unitarian printer Jonas Davis on the personal recommendation of his father's friend, the botanist James Edward Smith, who dealt with Davis as the printer of the *Transactions* of the Linnean Society (which Smith had founded in 1788). Davis retired before Taylor even completed his apprenticeship—Taylor's father for a time becoming a sleeping partner in the business with another printer—but Unitarian connections continued to be important. Smith ensured that Taylor retained the Linnean Society contract, and put other important printing contracts his way. One of the most notable was John Sibthorp's posthumous *Flora Graeca* (1806–40), a monumental ten-volume work, edited by Smith, each of the twenty-five copies of which cost an astronomical £260 to produce.[5] Mixing socially with the Unitarian John Aikin, Taylor obtained the printing contract for the *Monthly Magazine* (f. 1796), which was 'virtually a London continuation of the Norwich *Cabinet*' (22). Later, another Unitarian associate furnished the lucrative printing contract for the Equitable Assurance Society, and it was probably Taylor's brother who obtained for him the printing contract at the new University of London. Involvement in the Dissenting world of social activism also brought Taylor contracts, including ones from the educational innovator Joseph Lancaster and the social visionary Robert Owen. Taylor even shared premises with the Unitarian Society for a spell.

Brock and Meadows suggest that the 'happy accident' that Jonas Davis became the printer of the Linnean *Transactions* and the *Philosophical Magazine* (f. 1798) led to Taylor being a scientific printer (20). This was not, however, mere happenstance. It was a reflection of the culture of rational dissent. As we have seen, the Unitarian connection with James Smith accounted for Davis's Linnean contract. Furthermore, as Brock and Meadows reveal, Davis and Taylor shared many contacts in the world of metropolitan dissent—for instance through the Askesian Society—with the founder of the *Philosophical Magazine*, Alexander Tilloch. Of course, Taylor's scientific interests also became important, both in cementing the connection with Tilloch, and in making new connections. His involvement in the Linnean and Astronomical Societies, the British Association, and the Society of Antiquaries, and his brother's involvement in the Royal and Geological Societies, clearly assisted him in gaining additional contracts and a reputation which carried to other societies.

How typical was Taylor's experience of the scientific book trade at this period? At least one other publisher of scientific and medical books at the end of the eighteenth century—Priestley's publisher, Joseph Johnson—built his business on similar connections within rational dissent.[6] However, evidence about the cultural connections of those involved in the

production of scientific books is still patchy and requires further attention. In one respect, however, Taylor's trajectory clearly reflected a common pattern in the period. Like many of his contemporaries, Taylor was a newcomer to the trade who built a large and heavily capitalized business from relatively small beginnings. The book-trade was in a state of flux in the late eighteenth and early nineteenth centuries, as its members attempted to come to terms both with the expanding market for print, and the changed commercial context in the wake of the 1774 House of Lords ruling against perpetual copyright. In these circumstances, the existing structure of the trade—in which copy-holding booksellers sought protection from piracy by banding together in 'congers', the entrance to which was strictly controlled—came under increasing strain. New entrants to the trade were able to make considerable fortunes by pioneering new kinds of literary product aimed at the emerging reading audiences of the period. Scientific periodicals—Taylor's chief publishing output—were just such innovative products, on which a business could be built. Brock and Meadows cite the £240–£360 annual profit which they estimate Taylor cleared (before overheads) on the *Philosophical Magazine* as evidence of its 'unprofitability' (101), but they later concede that this was a significant income (127).

To a certain extent, the new entrepreneurial publishing houses of the early nineteenth century are the wrong point of comparison for Taylor. Most of those who established such houses at this period did so from a background in retail bookselling. Taylor was not a retail bookseller, and, with a handful of exceptions—most notably Faraday's various volumes of *Experimental Researches*—he was not a book publisher. He was a printer who, like a significant number of nineteenth-century printers, combined printing with periodical publishing. Brock and Meadows point out that there were difficulties in combining the role of publisher and printer, since no one publishing firm could ensure the regular supply of copy required to keep printing machinery steadily employed. The situation was different, however, in the case of periodical publishing, where the supply of in-house copy was indeed regular. Taylor's printing business doubtless benefited from the regular demand provided by his own periodicals, while being his own printer must have kept prices down on the publishing side. This fruitful interaction between printing and publishing clearly contributed to Taylor's pre-eminent success as a publisher of scientific periodicals in nineteenth-century Britain. How typical it was, however, is a question which remains to be answered.

Literary Life

Many of the most important publishing houses of the early nineteenth-century established their reputations around the quality of their relationships with leading authors. John Murray, for instance, was renowned for his generous payments to fashionable authors, and his house in the West End became a key locus of literary life. Like several of his peers, he was able to use his ownership of a leading periodical, the *Quarterly Review*, as the financial and material basis for a literary coterie. Richard Taylor's relations with authors were rather different. For one thing, as we have seen, he was not primarily a book publisher, nor was he offering large sums to attract fashionable authors. Nevertheless, as Brock and Meadows show, Taylor maintained significant relationships with a wide range of scientific men, both as a printer, and as a leading journal publisher and editor. Indeed, he had claims to be a man of science in his own right, and took a leading role in many scientific societies. His position here was, however, somewhat ambiguous. Henry Ellis, secretary to the Society of Antiquaries, had Taylor in mind when he complained in 1844 of the dangers of taking the society's 'tradesmen' from its own members (41), and Brock and Meadows consider that Taylor's connection with trade probably accounts for his never having been elected a fellow of the Royal Society. The historical traces of such sometimes-troubled relationships between

technicians of print and men of science are often slight, but they provide critical evidence of the role of the book trade in the making of scientific knowledge.

One important factor in uncovering Taylor's position in scientific London is to consider its spatial dimensions. While John Murray's premises were, after 1812, in fashionable Albermarle Street, a matter of yards from the Royal Institution, Taylor's were located in the more mundane surroundings Murray had left behind in Fleet Street. Taylor's master, Jonas Davis's printing shop had been in Chancery Lane, London's foremost legal thoroughfare. When the business was divided in 1803, Taylor moved further east, along Fleet Street, and the firm remained in that neighbourhood into the present century—on Shoe Lane from 1805 to 1827, and then in Red Lion Court. This was one of the prime centres of the printing trade, giving easy access to the publishers and wholesalers in the neighbourhood of St. Paul's. In 1855, more than a third of London's printing offices, including almost all the large firms, were located within the route: 'Blackfriars Bridge, St. Paul's Cathedral, Smithfield Market, Holborn, Drury Lane, the Strand as far as Charing Cross and back to Blackfriars by way of Fleet Street and Tudor Street'.[7] In particular, of course, Fleet Street and the Strand were the favoured locations of newspaper and periodical printers.

The neighbourhood of Fleet Street put Taylor within easy reach of a number of key scientific societies in the vicinity of the Strand. It is a curiosity that his premises in Red Lion Court were adjacent to those in Crane Court in which the Royal Society had met between 1710 and 1780, but even following its removal to Somerset House in the Strand, the Royal Society was not far away. Neither were the other societies housed in Somerset House, including the Royal Astronomical Society (from 1835), the Royal Geological Society (from 1828), and the Society of Antiquaries. Of course, many of the new specialist societies of the early nineteenth century were located in the West End, but they were mostly within a mile, and Taylor's involvement in many of them must have eased communication. Nevertheless there were occasions on which men of science like Michael Faraday, based in the West End at the Royal Institution, were prohibited by distance from quickly conferring with him.[8]

That Faraday wanted to confer with Taylor on practical matters was a testament to the latter's extensive knowledge of the affairs of scientific London. As the editor of the *Philosophical Magazine* and the *Scientific Memoirs*, the printer of many society publications, and the publisher of an annual sheet almanac listing scientific meetings, Taylor could provide a clearing-house for scientific intelligence. He acknowledged as much in 1838, when he reported that his office was 'known as the Depôt for the Publications of the Royal Society and several other scientific works of established reputation' (55). When, two years later, the civil engineer Charles Manby wanted to know which bookseller could best supply his needs, Michael Faraday pointed out that not only was Taylor publisher of his own *Experimental Researches*, but that he would be able to supply any of Dalton's works that were available.[9] Indeed, Taylor was such a well-known figure in scientific London, that he was sometimes charged with rather mundane commissions. Thus, when in 1851 Charles Darwin was unsure how to contact Thomas Henry Huxley, he sent his letter (and a copy of his *Living Cirripedia*) via Taylor.[10] In the event, Huxley was often to be found in Fleet Street, meeting with other scientific Bohemians—including William Francis—in the aptly (though coincidentally) named dining club, the Metropolitan Red Lions.[11]

In a rather less menial way, Taylor's printing office became a focus for foreign scientific correspondence. Contributions for the *Philosophical Magazine* and the *Scientific Memoirs* arrived both directly from overseas, and indirectly from men of science in London, who passed on materials they thought would be of interest.[12] Visiting scientists sought Taylor out, more particularly after William Francis had established an extensive scientific acquaintance during his continental education.[13] At the turn of the eighteenth century, the printing office of John Nichols, editor of the *Gentleman's Magazine*, had made the claustrophobic

thoroughfare of Red Lion Court familiar to 'every topographer and antiquary in England'.[14] Taylor's large office—over which he continued to have his domestic quarters until the late 1830s—undoubtedly did the same for men of science, at least within the metropolis. Moreover, while it does not seem that he operated a regular *salon*, there were certainly occasions when the visit of a man of science led Taylor to hold a scientific dinner.[15] The analysis of such social interaction is still in its infancy, yet its importance in the making of scientific knowledge demands attention.

Printing Science

As well as his Unitarian contacts and his personal acquaintance with men of science, Taylor's many printing contracts for scientific publications owed much to his technical capacity and financial competitiveness as a printer. According to Brock and Meadows, his printing of Sibthorp's *Flora Graeca* established his reputation for fine printing. He obtained other specialist printing work demanding high levels of accuracy in foreign languages and non-Latin scripts, and became London's leading printer of Anglo-Saxon. Similar specialist fonts and technical skill were also critical in scientific printing. This was most obvious in the case of mathematics. Not all printers had the type required even for simple mathematical operators. In mid-eighteenth-century Cambridge, William Ludlam found that '+' signs were printed using the symbol '†' turned on its side, and he was forced to manufacture his own type for the symbol '±'.[16] Even when the more basic types were available, notational innovation could cause considerable problems. When, in 1813, Babbage submitted his papers for the *Memoirs of the Analytical Society* to the University Printer in Cambridge, the job was delayed by having to send for large brackets and small numerals from London. In addition, there was the question of the competency of the compositors in handling mathematical typesetting. While the University Printer claimed that his compositors were particularly skilled in such work, Babbage found them 'heretical' in mangling papers written in the 'true faith' of analysis.[17]

It was not only mathematical printing which required particular skills and type. Taylor's success as a scientific printer owed much to his reputation for being able to achieve high levels of accuracy in setting scientific material. When, in August 1832, William Buckland wrote to the secretary of the British Association, William Vernon Harcourt, concerning the publication of its first *Report*, he was pleased to hear that the publisher John Murray was to employ Taylor as the printer. It was, he stated, 'wise in him to do so'. A year later Harcourt told the Unitarian antiquary James Yates that he was disposed to think that they could '*dispense with a publisher*'. With so many members and so cheap a publication they would 'run no risk in doing so' and they would be free to fix their own price and accommodate their 'reporters more liberally'. The printer was a different matter. Taylor's 'practice in the correction of scientific matter and [...] superiority also in command of type over our provincial printers' were, Harcourt observed, 'material considerations'.[18] Indeed, Taylor maintained 'a considerable library' for use in making corrections to scientific matter (56). These were presumably also the considerations which resulted in so many scientific books being printed by Taylor, but we do not yet know whether this was the choice of publishers or authors, or of how it was negotiated between them.

Brock and Meadows do not give detailed consideration to the scientific printing practices for which Richard Taylor was particularly prized. Indeed, the whole process by which scientific manuscripts were converted into printed pages at this period has remained largely unexplored.[19] Adrian Johns has recently shown that in the early modern period this was a process fraught with difficulty for scientific authors, and dependent on considerable craft skill.[20] Moreover, as Allan Dooley's study of the printing of literary works in the nineteenth

century shows, texts continued to be very significantly shaped by the technologies of printing and the practices of those who used them in the machine-press era.[21] Yet scientific printing in the nineteenth century remains largely unconsidered. We know little of the processes of authorial and editorial revision of manuscript, *mise-en-page*, proofing, and correction. This is particularly shocking in the case of scientific papers, where the archives of the various societies, and of Taylor and Francis, offer so much scope for study. So little has this process been considered, that even the publication dates of the individual issues of many society transactions remain unknown.

Another neglected aspect of the printing of scientific papers is the issuing and distribution of offprints. Brock and Meadows' study does not tell us whether this was a private affair between printer and authors, or whether it was mediated by the societies. As printer to many of the scientific societies, Taylor was in a privileged position when it came to making the most of reprints. Most famously, he capitalized on the interest in Faraday's learned papers, by reprinting them in several series of *Experimental Researches*. In this specialist domain, Taylor had advantages over fashionable book publishers like John Murray, whose suggestion that Faraday might elaborate his existing papers into an extended work was politely but firmly rebuffed.[22] In addition, Taylor's printing office was the site for a constant interplay between official transactions and his own commercial journals, particularly the *Philosophical Magazine*. Even before he became the printer to the Royal Society, Taylor evidently received proof copies of papers from the *Philosophical Transactions*, so that he could be ready to reprint them in the *Philosophical Magazine* at the earliest opportunity.[23] However, such privileges could lead to breaches of protocol. Thus, in 1838, Taylor was so impatient to bring out one of Faraday's Royal Society papers in the *Philosophical Magazine* that he published a 'very incorrect copy of the abstract intended to form a part of the Proceedings of the Society, without waiting for the numerous corrections it required', and had to republish the corrected version with an apology.[24]

Taylor was not only particularly able in handling scientific material, but he was also one of the pioneers of the new technologies which transformed nineteenth-century printing. It was he, who with Thomas Bensley and George Woodfall, financed Friedrich Koenig's construction of the first functioning mechanized presses in 1809–14. In terms of a return on sales, the speculation was unsuccessful. The one purchase—by *The Times*—proved a financial shambles. In addition, with editions sizes on books still generally small, the economies of scale were not yet such as to attract other printers. Nevertheless, Taylor installed one of Koenig's machines to print the *Philosophical Magazine*, and although he had to print newspapers to make it pay, it clearly did begin to pay, so that in 1828 he acquired another. His early entry into steam printing was thus evidently significant for his development as a leading periodical printer. When it came to books, however, Taylor, like his contemporaries, initially found that machine presses were not suitable for the small print runs. Nevertheless, his career also offers an important opportunity to explore the introduction of mechanization into the production of scientific books.

By charting the history of one of the leading technicians of scientific communication in nineteenth-century Britain, Brock and Meadows have provided us with ample demonstration of the importance of such figures for the making of nineteenth-century science. Yet, as I have shown in this account, there remain many questions about the activities of such technicians which require more extensive and systematic attention. Even the history of commercial science journals, which forms the heart of this book, is only in its infancy. Brock and Meadows have ably charted Taylor's central role in steering the *Philosophical Magazine* through fierce competition and numerous mergers to its ultimate position of dominance, and they provide a similar history for his *Annals and Magazine of Natural History*. Indeed,

thanks to studies by Susan Sheets-Pyenson, David Allen, and Brock himself, the broad phases in the development of commercial science journals from the 1790s have begun to be known. However, no detailed study yet exists of an extended run of a commercial science journal, or of the mutual interplay between such journals and either the publications of scientific societies, or the more general press. With so many large and important questions remaining, it is profoundly to be hoped that the valuable pioneering work which Brock and Meadows have carried out will inspire a new generation of scholars to work towards a wider and deeper understanding.

Notes

[1] Johns (1998), Frasca-Spada and Jardine (2000), Topham (2000a), and Secord (2000).
[2] Other modern studies with useful accounts of scientific and medical publishing include McKitterick (1998) and Zachs (1998).
[3] Topham (2000a), p. 584.
[4] Butler (1993), p. 130.
[5] Lack (1999), p. 214.
[6] Braithwaite (2003).
[7] Howe and Waite (1948), p. 147.
[8] James (1991–), letter 1606.
[9] James (1991–), letter 1297.
[10] Burkhardt *et al.* (1985–), vol. 5, p. 74.
[11] Secord (2000), 473.
[12] See, e.g., James (1991–), letters 2087–88.
[13] James (1991–), letters 1323, 1916.
[14] Rees (1896), p. 115.
[15] James (1991–), letter 1916.
[16] McKitterick (1998), p. 220.
[17] Topham (2000b), pp. 238–29.
[18] Morrell and Thackray (1984), pp. 149, 177.
[19] See, however, Secord (2000), pp. 116–20.
[20] Johns (1998).
[21] Dooley (1992).
[22] James (1991–), letter 213.
[23] James (1991–), letter 268.
[24] James (1991–), letter 1064.

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