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Chapter 2

Steam and the Landscape of Knowledge: W. & R. Chambers in the 1830s–1850s

Aileen Fyfe

Introduction

In June 1835, William and Robert Chambers signalled their commitment to the new industrial technologies of printing:

Nothing, in our opinion, within the compass of British manufacturing industry, presents so stupendous a spectacle of moral power, working through the means of inert mechanism, as that which is exhibited by the action of the steam-press.ⁱ

The brothers had only recently made the transition from booksellers to magazine editors and publishers, and their additional decision to become printers was more recent still. They argued that the enormous success of their cheap, instructive weekly magazine, *Chambers's Edinburgh Journal*, had forced them to adopt the innovative technologies of steam-printing and stereotyping. Yet their words in 1835 make clear that they regarded the steam-powered printing machine as far more than just a mechanical tool with an economic benefit. Steam-printing was a 'moral power' without which 'the tide of knowledge and human improvement would be forced back, greatly to the injury of society'.ⁱⁱ

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Historians of the book have long recognized that there were significant changes in the production and distribution of printed matter in the nineteenth century. In contrast to the voluminous scholarship on the 'printing revolution' of the fifteenth century, the nature of these changes remains little studied. We know that prices came down and readership went up, and statistical research has highlighted the middle decades of the century as the key point of transition.ⁱⁱⁱ We assume that the use of steam-powered printing had much to do with this, and we may also suspect that the steam-powered railway system was important to the story. There is an obvious plausibility to such assumptions. Steam-powered printing made possible faster production speeds, hence larger outputs in a given time, and it reduced the unit-costs on very large print runs.^{iv} Railways provided a system for the rapid transportation of goods, correspondence and people, and helped to weave Britain's many regional markets into a national one.^v Historians of reading have also pointed out that railway carriages provided new spaces and times for reading, while the bookstalls on railway platforms offered a new retail outlet.^{vi} But beyond such broad-brush comments on the impact of new technologies, we actually know very little about the reasons why they were adopted by specific people at specific times.

It is my concern in this chapter to examine one particular publishing firm, and to consider why they adopted, and how they used, these technologies. W. & R. Chambers was pioneering in its early use of the new technologies, and its rich archive allows us to supplement their enthusiastic published statements with an account of what was actually going on behind the scenes.^{vii} 'Steam' is a convenient shorthand for the new technologies which transformed space and time, and was used as such by Victorian commentators,^{viii} though it is not a wholly accurate description. The changes in transportation options were

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indeed steam-powered (railways and steamships), but the innovations in printing and publishing included the process of stereotyping and the creation of edition bindings, as well as the steam-powered machines for printing and paper-making. I will endeavour to focus on the steam technologies, but some of the others will inevitably appear.

My focus on 'knowledge' is, however, no mere shorthand. In the early days of steam-powered printing, its use was distinctly connected to publications which provided some form of useful knowledge. Its first commercial user was *The Times* newspaper, in 1814, and thus steam was harnessed to the provision of political and commercial information. During the 1810s and 1820s, steam-powered printing was too expensive a capital investment to appeal to many printers or publishers, but by the end of the 1820s, it was enthusiastically adopted by a new sector of the book trade. Groups with philanthropic desires to educate and improve the working classes had been campaigning for a better supply of printed matter cheap enough to be accessible to those made newly literate by the Sunday and charity schools. The Bible and tract societies had been set up to meet this demand, and by the late 1820s, secular groups were beginning to argue that cheap print need not be wholly religious, but should be more broadly educational.^{ix} The religious societies were joined by the Society for the Diffusion of Useful Knowledge (SDUK) and by such commercial publishers as Charles Knight and W. & R. Chambers.^x These publishers all shared a commitment to education and improvement – though they differed over the inclusion of religion – and they all saw steam-printing and stereotyping as a means to produce the large quantities of publications that they deemed to be necessary, while also reducing unit costs. Thus, in Britain, steam-powered printing was initially very closely linked to the provision of knowledge, broadly defined.^{xi} It was not

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until the late 1840s that this connection would be over-shadowed by the spectacular effects of the application of steam to fiction publishing, where it created a mass readership for penny story magazines and railway novels.

It should now be clear why 'steam' and 'knowledge' go together, but what about 'landscape'? The firm of W. & R. Chambers was located in Edinburgh, 400 miles north of the centre of the British book trade. New technologies and the expertise to use them were not uniformly available throughout Britain, so the firm's physical location influenced its production options. And Chambers had to overcome some very practical logistical problems about how to deliver its publications to their readers. The issue was not simply distance, but the nature of the intervening landscape and the extent to which it was served by suitable transportation options. Uneven and differentiated transport facilities, combined with different regional cultures of education and literacy, created challenges for Chambers's efforts to sell their wares. I will argue that Chambers had an obvious natural market in central and lowland Scotland, and it was through their careful and imaginative use of new technologies that the brothers were able to transform their firm into a national player, and to make inroads into a transatlantic market.

Further, I would suggest that Chambers, though their use of steam technologies, made a significant impact on what we might think of as the metaphorical landscape of knowledge in Britain and the transatlantic world. Thanks to their efforts, the existing provision of expensive, scholarly books for elite readers was joined by a range of new publications which were not only cheaper but different in form: things like penny magazines, secular tracts and part-works.^{xiii} The resulting spectrum of knowledge publications varied in their format, level of detail, literary style and content, and when

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this is coupled with the fact that they all had their own geographical and economic patterns of availability, we can start to see how the provision of knowledge was uneven and differentiated. We might, therefore, think of it as a landscape of knowledge, the charting of which will reveal the patterns of communicative practices which are central to the place of science in modern society.^{xiii}

The Firm of W. & R. Chambers

Most of the population of Britain in the first half of the nineteenth century had only limited access to print and the educational opportunities it offered. The major publishing houses tended to concentrate on the relatively easy profits to be gained from a known market of affluent and educated readers, and paid little attention to the needs of clerks, shop-boys and school teachers, let alone to those of tailors, carpenters and factory workers. In contrast, William Chambers and his younger brother Robert were among the small number of younger men who considered the needs of readers with only a basic education and very limited spare cash. Although the brothers ultimately became major players in the Edinburgh book trade, and substantial employers in their own right, they – especially William – saw themselves as self-made men and this motivated a deep commitment to education, instruction and self-improvement.^{xiv}

They were the sons of a handloom weaver, and grew up in the country town of Peebles, about 25 miles south of Edinburgh. Robert later described his hometown as 'neat and agreeable', but with a 'decidedly dull aspect'.^{xv} William began an apprenticeship with an Edinburgh bookseller at the age of fourteen. Robert remained in education until he was sixteen, but was forced to abandon his hopes of proceeding to university when his father lost yet another job. He then set up a small bookshop on Leith Walk, the main road from

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Edinburgh northwards to the port of Leith. A year later, in 1820, having finished his apprenticeship, William opened his own shop on the same street.

By the early 1830s, both William and Robert were doing well enough to move to better premises in Edinburgh, and Robert was becoming known in the Edinburgh literary world through his writings on Scottish history. William was watching the progress of the cheap miscellany magazines which had sprung into existence during the political agitation leading up to the 1832 Reform Act. Both in London and Edinburgh, periodicals were being launched at the price of a penny or a penny-and-a-half. William saw the need for such publications – indeed, he and Robert had briefly run one of their own in 1821–22 – but he was critical of their sloppy compilations of extracts and clippings without an overall plan. William Chambers believed that the press had a real power to improve its readers, and he felt that he could produce a better magazine than the others.

The first number of *Chambers's Edinburgh Journal* appeared on Saturday, 4th February 1832. For one and a half pennies, readers would each week receive a large folded sheet with four columns of text on each of its four pages. That first issue made no secret of William's ambitions. The front page announced his conviction that 'a universal appetite for instruction' now existed, and that his new magazine would supply 'a meal of healthful, useful, and agreeable mental instruction' in a format and at a price to suit 'the convenience of every man in the British dominions'. As well as presenting the *Journal* as a medium for the diffusion of knowledge, and ambitiously outlining its audience, William's opening announcement criticized the work of those charitable organizations who also claimed to diffuse knowledge. He mentioned no names, but he must have had the SDUK and the Society for Promoting Christian Knowledge in his sights. According

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to him, they had failed partly because of their structural inflexibility but especially because of the constraints that their political or religious affiliations placed upon them.^{xvi} Throughout its long life, *Chambers's Journal* would eschew party politics and religious sectarianism in its efforts to appeal to the broadest possible audience.^{xvii}

The Natural Market: Lowland Scotland

William Chambers launched his new *Journal* in the second centre of the British book trade. Being based in Edinburgh, rather than London, had advantages and disadvantages. Edinburgh had a long history of printing, and although it was no longer a seat of government, it continued to be the centre of the Scottish legal system and the home of an eminent university. In the 1830s it was still the centre of the Scottish publishing trade: Edinburgh publishers issued around 4,600 titles in that decade, compared with just 1,500 from Glasgow and 210 from Aberdeen. Nevertheless, the Edinburgh publishing trade was small in comparison with London, whose publishers issued over 35,000 titles in the 1830s.^{xviii} Being so far from the London trade would occasionally create problems for Chambers, when supplies, machinery or expertise seemed only to be available in London. On the other hand, being outside London gave the new *Journal* a clearer field in which to seek its market, rather than having to compete directly with the myriad of new publications which seemed to spring up daily in the capital. Britain in the 1830s was not yet an integrated national market and in lowland Scotland, Edinburgh-based publications had the clear advantage of being available more quickly and with lower transport costs than did those from London.

The natural market for *Chambers's Journal* also happened to be an area with a substantial population, characterized by relatively high literacy rates and a thirst for

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knowledge and self-improvement. The majority of Scotland's 2.4 million inhabitants lived in the lowlands and south of Scotland, particularly in the cities of Edinburgh and Glasgow. Both William and Robert Chambers were convinced of the distinctiveness of Scotland from England, and they had, between them, written three descriptive works on Scotland to this end.^{xix} As William put it, the institutions and character of Scotland 'differ as much from those of the sister country, as the mountainous and romantic regions of the north differ from the broad luxuriant meadows of the south'.^{xx} One of the things of which Scots like the Chambers were proud was that they had better access to education than their English neighbours, as demonstrated both by the higher literacy rates of the entire population, and the higher percentage of the population receiving formal education.^{xxi} In reality, as William Chambers knew, the Scottish educational system was not as good as it could be, and the range of educational works which W. & R. Chambers produced can all be seen as helping to improve the education of the people. Nevertheless, it was good enough for Chambers to expect a ready market for his *Journal* in Scotland, and particularly in the lowlands. He wrote in 1830 that:

To those who are not intimate with the character of the Scottish people in their own country, it would be difficult to convey an adequate idea of that burning desire which almost every parent has, to see his children educated ... It is not confined to persons in easy circumstances; it descends to the meanest of the peasantry, and will be found mingling with the every-day feelings of the poorest family in the land.^{xxii}

In such a context, there was a respect for education and a thirst for learning which would generate a market for the improving and instructional journal Chambers wished to produce. These cultural conditions meant that at its launch, Chambers could expect his

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Journal to have relatively easy geographical access to an appreciative potential audience, and to enter that market with less competition than a London publisher would face.

The extent to which *Chambers's Journal* was originally situated within its lowland Scottish context is graphically illustrated by William Chambers's first efforts at publicity. His existing trade connections helped him make contact with booksellers in an impressive array of Scottish towns. In February 1832, over a thousand posters advertizing the *Journal* were dispatched to 28 towns (see Figure 2.1). The largest numbers of posters (a hundred each) went to Glasgow, Perth, Dundee and Aberdeen; then there were forty posters to Galashiels, Falkirk, Hawick, Stirling, Berwick and Greenock; and smaller numbers to other towns. Other than Inverness, Elgin and Aberdeen, all the towns were in central or southern Scotland. It was not until March 1832 that Chambers started to target more distant audiences, sending posters to Wick, Thurso and Kirkwall in the north of Scotland and making an attempt to reach English readers, with two hundred posters for London and fifty for Newcastle. At the end of April, the *Journal* reported that its total print run was now 31,000 copies, but barely 3,000 of those left Scotland.^{xxiii}

[Insert Figure 2.1 here – portrait]

Figure 2.1 Distribution of publicity material for *Chambers's Edinburgh Journal* in February and March 1832. Derived from John Johnstone's invoice to Chambers, August 1832 in WRC 312 (LL 1832-40, misfiled under K)

The wisdom of focusing on local markets can be seen from figures collated by *Tait's Edinburgh Magazine* and reprinted in *Chambers's Journal* in 1834, relating to the sales figures for magazines in 'a certain unnamed country town in Scotland'. Both London and Edinburgh magazines were available, but the Edinburgh ones proved more popular: there

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were 700 sales of *Chambers's Journal* against 260 of the *Penny Magazine*, and Edinburgh-based monthlies such as *Blackwood's* and *Tait's* were more in demand than such London titles as the *Metropolitan Magazine* or the *Monthly Magazine*. The higher sales of *Chambers's Journal*, despite its extra ha'penny in price, might suggest a distinct preference by readers or illustrate the competitive advantage Edinburgh publishers had in the Scottish market. The figures in *Tait's Magazine* also demonstrated very clearly that low prices were effective at increasing circulation. Although this 'country town' could find over a thousand readers of the various penny periodicals, the most successful monthly (*Blackwood's Magazine*, 2s, 6d.) could find only fourteen readers, and none of the quarterly reviews made it into double figures.^{xxiv}

[Insert Figure 2.2 here – portrait]

Figure 2.2 Distribution (each week) of *Chambers's Edinburgh Journal*, as reported in February 1834. Note that about half of the London copies went onwards into the country; and an unknown proportion of the Edinburgh copies went to Dublin for Ireland. Derived from figures given in *CEJ*, 1 February 1834, 1.

At the same time, *Chambers's Journal* published a geographical breakdown of its own circulation, suggesting that readers could use it as an index to 'the degrees of intelligence and appetite for reading which prevail in different parts of the empire'. The figures reiterated Chambers's strong base in lowland Scotland, but also pointed to a growing demand in other parts of the United Kingdom (Figure 2.2). The *Journal* was being distributed to all corners of Scotland, ranging from the large numbers sold in Edinburgh and Glasgow to the few dozen sold on the Isle of Skye or in the Orkneys. The English figures were more difficult to assess, since many copies of the *Journal* were

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distributed via intermediary agents. London certainly took delivery of the largest number of copies, but about half of those were believed to be forwarded to country booksellers. The available figures suggested that the English readership was rather more patchy than the Scottish readership. Older towns like York and Bristol took no more copies than did Shetland, supporting Scottish prejudices about the lack of enthusiasm for cheap print and self-improvement in most of the English towns. The most marked desire for the *Journal* came from the major industrial cities of northern England, with large numbers going to Liverpool, Manchester, Leeds and Newcastle every week.^{xxv}

Stereotype Plates: A First Attempt at a National System

Both sets of 1834 figures demonstrate that *Chambers's Journal* was performing well in its local, Scottish market, but that England was becoming increasingly important. This raised crucial issues about the practical distribution problems of trying to reach distant locations from an Edinburgh base. The fast communication system of Britain in the early 1830s was the Royal Mail coaches and the privately-run express stagecoaches. On good roads, with regular changes of horses and few stops, these coaches could average more than ten miles an hour. This meant it took two days to reach London from Edinburgh.^{xxvi} Neither of these types of coaches, however, had space for cargo: they were used for the mails and for passengers. Newspapers did have the right to be sent through the mails, but *Chambers's Journal* was an unstamped periodical, as this was the only way that it could be sold at so low a price while the stamp duty was four-pence. Although it prevented the *Journal* using the mail coaches, the advantage of not carrying news was that it could be printed three or four weeks in advance of the specified publication date.^{xxvii} This gave sufficient time for packages of the journal to travel to London, Dublin, Shetland or

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Cornwall (by horse carrier or by water) and be released to the public on the same day throughout the entire kingdom. Thus, national distribution was theoretically possible, but there were problems, principally of cost and timing.

These problems became apparent even before Chambers began to pay serious attention to the English market. As early as April 1832, they were bemoaning the fact that readers in Inverness and Dingwall were having to pay a surcharge on the cover price, 'owing to the high charges of the Highland coaches', which was seriously hindering the *Journal's* circulation in the north.^{xxviii} Moreover, the advance circulation of the *Journal* required great self-discipline from individual booksellers, who were supposed to keep their packages of the *Journal* closed until the official publication date. In November 1832, Chambers had to insist that all their Glasgow agents signed a formal memorandum promising that none of them would allow the *Journal* to be put on sale before 3pm on the Friday. They would receive their packages on the Thursday, to allow time for orders to be forwarded to more distant booksellers, but Chambers did not dare allow the *Journal* to leave Edinburgh any further ahead of publication, lest the temptation prove too great for the booksellers.^{xxix}

In Scotland, Chambers handled most of the distribution direct from Edinburgh. For England, they decided early on to follow common practice and appoint an agent in London. As the centre of the publishing trade, London was the centre of distribution networks for most of England and Chambers needed someone with access to those networks. They appointed William S. Orr in April 1832.^{xxx} The very first issues of the *Journal* to travel south went by road, but as the demand grew it became obvious that another solution would be needed. One thousand copies of the *Journal* would have

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weighed about fourteen kilograms and occupied two-thirds of a cubic metre. By March 1832, it was already apparent that perhaps ten or twenty thousand copies would be needed in London each week. Water transport was the only realistic option for bulk of that sort.

There was a well-established shipping route between the port of Leith and the London docks, and Edinburgh publishers routinely transported bales of publications to London by water. Chambers, however, had a different set of requirements from the average Edinburgh publisher. First, their publications were so cheap that any surcharge for transport would be a substantial mark-up. Secondly, to build up a regular readership for a weekly magazine required a reliable method of delivery. With books and with quarterly or monthly magazines, delays of a few days due to adverse wind conditions made little difference, but to a weekly magazine, such delays could be disastrous. The cheapest option for Chambers was sailing ship, but the journey could take anything from four days to over a week. The new coastal steamers offered a journey time of three days no matter what the wind direction, but they cost more. Even worse, the coastal steamers of the 1830s had side-mounted paddle wheels which could be swamped by high waves. This meant that the Leith to London steamers could not run during the winter months. For two or three months of the year, Chambers would be forced to rely upon the sailing packets with their highly-variable journey times.

Such was the reality of the transport infrastructure of Britain in the early 1830s. At certain times of year, money could buy quicker and more reliable transit times, but a regular year-round service was impossible. Unable to do anything to improve the situation, Chambers instead found a way to work round it. Stereotyping was the key. Chambers decided, at the end of April 1832, to licence William Orr to publish a London

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edition of the *Journal*. Orr took all the financial risk of the London edition, and kept all the profit beyond a set fee per thousand copies printed. The arrangement recognized that Orr, given his London location and connections, was in a better position to make decisions about the size of the print run than Chambers in Edinburgh and it gave him a strong incentive to make every effort to improve the circulation of the *Journal* in England. In one easy stroke, the entire problem of shipping 20,000 copies of the *Journal* south every week was removed.

Simple as it seems, this was actually a very unusual solution in the book trade of the 1830s because few periodicals faced the same scale of problems. Quarterly and monthly magazines had lower circulations, more relaxed schedules and higher prices which could more easily absorb transportation costs. The only other high-circulation weeklies of the period were London-based and thus, one suspects, took it for granted that Scottish readers would accept occasional delays and extra transport costs as the norm. A Scottish magazine trying to compete with London magazines in their home base could not afford to make the equivalent assumption.

Organizing a London edition of *Chambers's Journal* did not require stereotyping – a single printed copy could be sent by mail coach – but by June 1832, Chambers started to have the *Journal* stereotyped. One set of plates remained in Edinburgh, while the second set was sent to London. The use of plates ensured that the two editions were absolutely identical, and saved 'the expense of setting up the types in London'. The impact was exaggerated by the fact that Orr was working with steam-printers, and so the plates could, within 'a few hours' be made 'to produce twenty thousand or more printed sheets'. By the end of the year, the total circulation had grown to 50,000 copies. Chambers

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praised stereotyping as 'a wonderful process', which had enabled them to 'extend the circulation of the work on the most liberal principles, and in a very quick manner, all over the country'.^{xxxix}

During the 1830s and 1840s, as the range of their publications expanded, Chambers continued to use stereotype plates to extend the geographical reach of their business. Within the United Kingdom, it was only the *Journal* which needed multiple printing centres coordinated by stereotype plates: the other tract and book publications had less tight deadlines, and could be distributed from Edinburgh.^{xxxix} Overseas, however, the small size of a set of plates could be advantageous for shipping purposes; and with the United States, plates had the peculiar advantage of being a physical property which could be bought and sold across the Atlantic in the absence of any copyright agreement. Chambers tried to sell a set of plates for the *Journal* to a New York printer in 1833, but could not agree a price. They finally made an arrangement in 1838 with Andrew Jackson, also of New York, who already printed the *Penny Magazine* and the *Saturday Magazine* from imported plates.^{xxxix} Chambers also sold plates for the *Cyclopaedia of English Literature* (1844) to Gould, Kendall & Lincoln of Boston and for the *Latin-English Dictionary* (1850) to Lea & Blanchard of Philadelphia.^{xxxix}

By the end of the 1840s, however, Chambers were becoming far less keen to use stereotype plates in this way, either within the United Kingdom or beyond. In the British case, the problem was with William Orr. Chambers wanted to take fuller control of their business, and be less dependent on the hapless Orr. With the USA, the problems were more complex. Differences in technological practice between America and Britain meant that selling a set of plates to the USA could involve far more than manufacturing,

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packaging and shipping the plates. It could require special preparation of the plates to fit the American printing machines, extra illustrations or publicity material to 'assist' the American publisher, or the dispatch of extra equipment and instructions to enable the American printers to produce the same results as their Edinburgh peers.^{xxxv} In addition, Chambers had no control over how the exported plates were used: their payment had no regard to subsequent sales, which was galling when sales proved high; and there was a risk that American-printed copies might be sold in Canada, thus interfering with Chambers's own sales there. For all these reasons, W. & R. Chambers by mid-century transformed their system from one dependent on stereotype plates to one dependent upon steam power.

A Steam-Powered System

In 1832, William Chambers had proclaimed his ambition to supply 'the universal appetite for instruction' with good food at a price which would 'suit the convenience of *every man in the British dominions*'.^{xxxvi} This dream was threatened not only by the logistics of distribution, but by the basic question of just how many copies could be produced each week on a hand press. It was a terrible thought that one could potentially create a magazine filled with fascinating material that readers wanted to read, and yet be unable to produce enough copies to satisfy the demand. Stereotyping solved the immediate problem, but the long-term solution lay with steam power. Steam transformed Chambers's production capacity and, once coupled with the railway network, ultimately enabled these Edinburgh publishers to reach a national market without the aid of an intermediary.

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The printing for the first issues of *Chambers's Journal* was done in Edinburgh by John Johnstone, 'a genial old man' of a printer whose workshop was at the top of the High Street.^{xxxvii} He printed 30,500 copies of the first two issues, but his subsequent invoices hint at the strain that such a load was putting on his workshop: he initially printed 20,000 of the third issue, 16,500 of the fourth, and 18,171 of the fifth issue. All of these early issues had to be reprinted to meet demand.^{xxxviii} The basic problem was the limitation of hand-press production. Johnstone worked two presses, printing the back and front of the *Journal* sheet simultaneously. Assuming each press team could manage 250 sheets an hour, and that they worked without break for the full ten-and-a-half hour day, six days a week, Johnstone's workshop would produce about 15,750 copies of the *Journal*.^{xxxix} For many magazines, this would have been adequate, but *Chambers's Journal* already had a circulation of 20,000 a week, growing to 30,000 within a month. The first couple of issues had probably been prepared ahead of time, but once the weekly schedule began, the only way Johnstone could produce substantially more copies was by operating through the night. But night work brought all sorts of extra problems with it. A few years later, Chambers would claim that the workmen could not be persuaded to remain sober throughout the night. It seemed that 'the greater the urgency for the work, and the higher the price paid for its execution, the more extensive were the saturnalia that prevailed'. Time after time, the parcels destined for country booksellers could not be dispatched early enough to ensure their arrival by the Saturday of publication.^{xl}

Chambers later claimed that 'the dreadful harassment of mind which ensued' in those spring months of 1832, 'led us to think of removing the whole of our printing business to London'.^{xli} Orr seemed to be having no trouble getting the London edition

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printed (variously by William Clowes and by Bradbury & Evans) at reasonable prices and within the time available. Both of these establishments were using steam-powered printing machines, which enabled Orr to cope with the growing English demand for the *Journal* while Chambers and Johnstone were struggling to meet the Scottish demand. Chambers did not move to London, but they did become enthusiastic converts to steam-powered printing. The technology had existed for over 15 years, but was not yet widely adopted, and there were few steam-powered printing houses in Edinburgh. By July 1832, Chambers had transferred their printing to James Ballantyne, whose extensive steam-printing works had been funded by his connection with Walter Scott. Ballantyne routinely printed about 25,000 copies of the *Journal* each week.^{xlii} Yet Chambers were still not wholly satisfied, and seem to have become determined to take as much control over all aspects of their business as possible. In the spring of 1833, they hired a young engine maker, Robert Gunn, to design a steam-printing machine of their own (Figure 2.3). It came into operation during the following winter, and after teething problems, Chambers were able to print their own publications. The *Journal* hailed the new machine as ‘a joyful prospect of future tranquillity’.^{xliii}

[Insert Figure 2.3 here – portrait]

Figure 2.3 W. & R. Chambers's steam-powered printing machine, depicted in the tract on ‘Printing’ in their *Information for the People* (1842)

The transition to steam-powered printing had two long-term implications for W. & R. Chambers. It encouraged them to expand their activities into a broader range of informative publications, and it also enabled them to replace their multi-centre, stereotype-coordinated system with a centralized system based in Edinburgh. Indeed, the

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excitement of acquiring their first printing machine can have barely evaporated before Chambers began acquiring additional machines. They bought additional machines in 1837, 1839 and 1841. With each machine costing £300 or £400, it is a clear sign of the success of the business that these improvements could be funded from ready money.^{xliv} At the same time, Chambers were acquiring the equipment and personnel to run their own compositors' gallery, stereotype foundry and bindery. By 1840, the only major department which was still contracted out was the illustrations, both wood-engraving and lithography.

In 1840, Chambers moved their editorial and business offices to 339 High Street, directly opposite St Giles's Cathedral and adjacent to their Roxburgh Close printing house (Figure 2.4). Now that all their departments were on a single site, it became obvious how disorganized and poorly laid out that site was. High Street is a part of the "Royal Mile" which runs from Edinburgh Castle down the slope of the old volcanic plug towards the Palace of Holyrood House. The land drops away sharply on either side of High Street, and Roxburgh Close is one of many narrow alleys which provide a very steep shortcut to the lower ground level. The new Chambers editorial offices were up on High Street, while the various workshops were crammed in behind and below, with entrances on several levels down Roxburgh Close. In 1845, William and Robert Chambers pumped nearly the entire £10,000 profit of that year into improving their business, principally by re-building and re-equipping their production plant.^{xlv}

[Insert Figure 2.4 here – portrait]

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Figure 2.4 The W. & R. Chambers's premises are visible in this rare photograph from the mid-1850s: look for the tall smoky chimney just below and to the left of St Giles Cathedral. Photograph by Thomas Vernon Begbie, c. 1854.

The centre-piece of the new plant was a high-pressure beam engine rated at ten horse-power, five times more than the original engine.^{xlvi} It was going to be used to power not only the existing printing machines, but also four brand new cylinder perfecting printing machines (which would print both sides of the paper and get them correctly registered).^{xlvii} The brothers wrote in January 1845 that:

We write at present in a huge building of four stories, flanked by a powerful steam-engine, and with the noise of ten printing machines continually sounding in our ears.... A hundred and twenty persons are required for all the duties which proceed in this large structure, though these have exclusively a regard to works edited by ourselves. Upwards of a quarter of a million of printed sheets leave the house each week.^{xlviii}

The result was that Chambers were the proud owners of one of the most high-technology printing establishments in Edinburgh, perhaps even in Britain. The *New York Literary World* mentioned the firm as one of its top five of British publishing houses in an article of 1850, and lavished praise on an establishment which it claimed was 'eleven stories high', employing 'some five hundred persons', and where the presses 'throw off 150,000 whole sheets a day'. Despite the exaggeration, American readers would have been left with no doubt of the size and modernity of the new Chambers's establishment, which was 'considered unrivalled' for its 'extent and completeness'.^{xlix}

It was this printing establishment which gave Chambers the production capacity to take control of their entire British output, both of the *Journal* and of other publications.

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The London edition of the *Journal* was suspended at the end of 1846, and William Orr became merely a distribution agent (which Chambers hoped would limit their exposure to financial risk).¹ Although the London edition had had the benefit of reducing the strain on production in Edinburgh, it had originally been conceived to ease distribution problems. The fact that Chambers were no longer so worried about distribution reflects the extent to which their transportation options had changed since 1832, thanks largely to the railways.

The first railway line to have a significant impact on W. & R. Chambers was the Edinburgh and Glasgow Railway, which opened in 1842. In addition to the orders for booksellers in Glasgow and the west of Scotland, consignments for Belfast, Dublin and Liverpool (including North America) were dispatched via steamship from Glasgow. Until the opening of the railway, the consignments had usually travelled the 45 miles to Glasgow by road, but Chambers were swift to transfer their business to the railway. The firm's archive contains regular monthly invoices from the railway company for parcels, packages, boxes and bales, most of which were being shipped onward.^{li}

From 1846, the North British Railway began building southwards from Edinburgh, to join George Hudson's York, Newcastle & Berwick Railway. Even before the through-route was completed (with the opening of the railway bridge over the Tweed at Berwick, in August 1850) Edinburgh publishers could take advantage of the railway to send letters and parcels to London, using coastal steamers or stage-coaches to connect with the existing railway lines. It is notable, however, that, although the railway quickly superseded road transport on the Edinburgh-London route, the existence of coastal shipping kept Chambers's options open. The railway was certainly quicker than the

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coastal steamers (about 12 hours, rather than 3 days), but it was more expensive. On the other hand, its year-round reliability was not affected by winter storms as the steamers still were, despite better designs.

For Chambers, the railways were most important for speeding up communication (via the Royal Mail) with London, which enabled them to keep a closer eye on their agent's activities; and for providing a crucial backup to coastal shipping during the winter months. For most of the year, the steamers were reliable enough and quick enough to transport both the firm's book publications and the time-critical *Journal* and series of weekly and fortnightly part-works. During the winter months, Chambers were willing to pay the slightly higher costs of the railways to guarantee the reliable delivery of their weekly publications.

The extent to which railways had become accepted and reliable parts of the communications and distribution system for British business is clear from a letter from David Chambers in London to Robert Chambers in Edinburgh, which illustrates what happened when things went wrong. Younger brother David had been running the new London branch office for four months, and was in the midst of a big effort to capitalize on the January 1854 re-launch of *Chambers's Journal*. He was supposed to receive his consignments of the weekly publications (the *Journal* and the *Repository of Tracts*) at the start of the week before publication, to give him time to supply the booksellers of the midlands, the south of England and London by the Friday night. Both publications were printed sufficiently far ahead of time that dispatch by coastal steamer was possible, but since it was winter, David specifically requested that his parcels be sent 'by rail until the

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Steamers are sailing more regular'. He worried that any 'delay is most injurious to the Sale', especially for a new publication.^{lii}

On the morning of Monday 9th January, David received an invoice from Edinburgh confirming the dispatch of his consignment for the coming Saturday – but no consignment. The next day brought another invoice reporting the dispatch of a further two thousand copies – but still no sign of either consignment. The railway had successfully delivered the invoices overnight, but not the parcels. He was, as he said, 'at a complete stand still', unable to fill any of his orders.^{liii} The episode illustrates that both the Edinburgh and London offices had already become so used to railway reliability that they expected overnight deliveries of both letters and freight to be the norm, and were surprised and flustered when things went wrong.

So far as I can tell from extant evidence, this was an isolated incident. By the 1850s there are far fewer references to distribution problems, and one gets the impression that the combination of steam-powered production in Edinburgh coupled with steamship and railway delivery to London was working well. It enabled Chambers to reach far beyond their natural market in lowland Scotland, to become truly national publishers.

New Information Products

William and Robert Chambers had become steam-printers because of the demands placed on them by the success of *Chambers's Journal*, but the success of the *Journal* and the capacity of the printing machine inspired them to launch a much wider line of instructive publications. It was in this respect that they made their greatest impact on the metaphorical 'landscape of knowledge'. The *Journal* was one of several cheap weekly magazines which aimed to provide information and instruction to the lower middle

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classes and skilled working classes. The subsequent Chambers publications were even more innovative, and transformed both the sort of knowledge that was available to much of the population, and the format in which it appeared. They were all steam-printed which helps to explain why Chambers proclaimed the steam printing machine 'so stupendous a spectacle of moral power'.^{liv} For Chambers, the steam printing machine was a tool for education and improvement.

The firm's first steam printing machine worked at about 900 sheets an hour. This meant that the Edinburgh run of the *Journal* took only a third of the working week. To maximize the return on their investment in premises and equipment, Chambers needed to find ways to keep the machine running for more of the week. By 1835, the *Journal* had been joined by two other groups of instructive publications: a series of pamphlets and two series of cheap books. In later years, the firm regularly issued more individual titles, but they would never again launch so many new types of publication in so short a time.

The first of the new serial publications was launched in 1833 while Chambers were still relying upon Ballantyne to do their printing. *Chambers's Historical Newspaper* (1833–35) appeared as a monthly supplement to the *Journal*, and was an attempt to discuss recent events and issues while remaining outside the scope of stamp duty. More significant were the fortnightly tracts or pamphlets issued under the series title *Information for the People* (1833–34). Each pamphlet used the same format as the *Journal*: it was the same size, number of pages, lay-out and price. The key difference was that each pamphlet was devoted to a single topic, such as 'Astronomy', 'Emigration to Canada', 'Moral Philosophy' or 'The American War of Independence'. *Information* sometimes also included illustrations; the *Journal* never did. *Information* was planned as

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a series of fifty parts, which could be read individually or collected to form a basic encyclopaedia. The aim was similar to some of the publications of the SDUK, but Chambers happily pointed out that each of their issues contained as much text as the *Library of Useful Knowledge* at a quarter of the price.^{lv} By early 1834, Chambers were pleased to report that *Information* was regularly selling at least 16,000 copies per issue and sometimes twice that. To their relief, the circulation of the *Journal* did not seem to be affected. Chambers had persuaded a substantial number of people to purchase a new piece of reading material without compromising their existing reading habits.^{lvi}

New issues of *Information for the People* ceased in 1834, but the pamphlets were kept in print and continued to sell; and new, expanded and revised editions were issued in 1842, 1848 and 1856. Chambers used the format again for the *Cyclopaedia of English Literature* (1844), the *Miscellany of Useful and Entertaining Tracts* (1844–47), *Papers for the People* (1850–51) and the *Repository of Instructive and Amusing Tracts* (1852–53), although it is notable that some of the later series made the effort to be ‘amusing’ as well as instructive. These serials were unusual publications, but they were perhaps the most distinctive of the Chambers publications in the 1830s and 1840s. They had impressive sales and made substantial profits for the firm. For instance, by 1848, the 1842 edition of *Information* had sold just over 100,000 complete sets and made a profit of £11,200.^{lvii} As some of the later series titles hint, the closest model was probably the religious tract, hundreds of thousands of which were being distributed annually by city missionaries and scripture readers in Britain's industrial cities. Both religious tracts and Chambers's ‘secular tracts’ were produced in large numbers at low cost, and aimed to

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help readers improve themselves. Whereas the religious societies interpreted this to mean spiritual improvement aimed at a future life, Chambers offered instruction for this life.

Tracts could be produced and sold so cheaply because they used very little paper (easily the most expensive production cost), they were written by little-known writers (who were cheap), they were steam-printed in large runs and they were stereotyped to allow for later demand. Chambers would soon apply the same techniques to book publication. Other publishers in the late 1820s and 1830s had attempted to make books available more cheaply, but none had convincingly succeeded. John Murray's *Family Library* and Longman's *Cabinet Cyclopaedia* were only 'cheap' in comparison to the high price of original literature: 5s. or 6s. a volume was unaffordable for the working classes and many of the lower middle classes, and sales were disappointingly low.^{lviii} By the late 1830s, Chambers would demonstrate that it was possible to sell entire books for under two shillings: in their series of *People's Editions* and their *Educational Course*.

The *Educational Course* began in 1835 as a series of graded readers and textbooks which eventually took a student from learning to read and write, through arithmetic, history and geography, to Latin, modern languages and the natural sciences. The series of *People's Editions* (also known collectively as the *Instructive and Entertaining Library*) began in 1837. Both projects involved small expenditure on literary labour, because the *People's Editions* were reprints of out-of-copyright or non-copyright (e.g. foreign) books, while the *Educational Course* books were mostly written by school-teachers for low fees.^{lix} The books were set in small type to save paper, and the *People's Editions* used such small type that they had to be printed in double columns. They were also steam-printed in large runs. Virtually all steam-printing machines in Britain at that time were

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used for newspapers or periodicals, because they had the high circulations, and because book publishers were sceptical of the quality of their output. Yet Chambers had Robert Gunn's perfecting machine and a steam-printing machine sitting in their premises which – even with the *Journal* and the *Information* – was not fully occupied. In theory, there seemed no reason why they could not print sheets to be bound into a book.

Chambers began steam-printing books in 1835. Usually, they only printed their own publications, but in October 1835 they printed an edition of the *Constitution of Man* (1828), written by Robert Chambers's friend, the leading phrenologist George Combe. *Constitution* had already had three editions, co-published by the Edinburgh firm of John Anderson and the London firm of Longman, and sold at 6s. The *People's Edition* sold at 1s, 6d. The initial 2,000 copies were said to have sold out within ten days, and the stereotype plates were immediately put through the machine again to print another 5,000 copies, which again sold out quickly. Chambers printed another 15,000 copies in 1836.^{lx} Despite the cramped typography and a binding which was nothing more than plain boards, the success of the format was incredible. It was a wonderful proof both that steam-printed books were a possibility, and that large numbers of readers would enthusiastically welcome low-priced books. It inspired Chambers to launch their *Instructive and Entertaining Library*, the volumes of which were sold at prices between 1s, 6d. and 2s, 6d., and routinely sold several thousand copies.^{lxi}

Together, the instructive tracts and the steam-printed books made knowledge accessible to a large sector of the population which had previously had access to little print other than religious tracts, chapbooks and ballads. Chambers's educational and improving aims had much in common with the goals of philanthropic bodies like the

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Religious Tract Society or the SDUK. Unlike the first, it was a vision of knowledge which was entirely secular; and unlike the second, Chambers had the commercial know-how to make a success of their ambition.^{lxii}

Steam in the Transatlantic World

At the same time that W. & R. Chambers were transforming their British operations, they were also becoming more aware of the possibilities of the North American market. Chambers had long-established connections with firms in Toronto, Montreal and Halifax, but the real challenge was the United States, where the highly literate population of New England, with its cultural ethos of improvement, seemed an ideal market for Chambers's publications. By the mid-1840s, the United States had come out of a period of economic depression and its publishers had regained interest in doing business with the British book trade.^{lxiii} Moreover, transatlantic business was becoming easier to transact thanks to the arrival of steamship services, which carried news, literary gossip and correspondence quickly and reliably.

As discussed, Chambers initially hoped to use stereotype plates as a way of receiving payment for the reprinting of their publications in the United States, but had come to the conclusion that this was not an ideal solution. They sought instead to persuade American publishers to import printed copies from Edinburgh, just as agents in London and Dublin did. With no Anglo-American copyright law to enable them to enforce importation rather than reprinting, Chambers had to make cooperation financially attractive to American publishers.^{lxiv} In practice, this meant offering substantial discounts for bulk orders. In 1847, Gould, Kendall & Lincoln were offered a price of £3, 7s, 6d. per thousand if they took a minimum of five thousand copies of the *Journal*.^{lxv} The retail

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price of a thousand copies was £6, 5s, 0d., and British trade customers routinely received 30 per cent off, paying £4, 6s, 6d. per thousand.^{lxvi} By offering Gould, Kendall & Lincoln a further 15 per cent off, Chambers were trying hard to make it possible for an American importer to make a success of the *Journal*. By the early 1850s, Chambers routinely offered their American contacts a trade discount of 40 to 50 per cent for the instructive serials, with a usual minimum order of a thousand copies. Such discounts meant that they would make only a tiny profit from the American sales, but at least they were getting a small sum for each and every copy sold and they were retaining editorial control of the publications which circulated under their name.

As in Britain, extending the transatlantic reach of Edinburgh-printed copies of Chambers's publications required both production and distribution capacity. The steam-powered printing plant provided the first, but for the second, the question was what role transatlantic steamships would play. The first steam crossings of the Atlantic had occurred in 1838 and, from 1840, Samuel Cunard's British & North American Steam Packet Company carried the Royal Mail from Liverpool to Halifax and Boston on a fortnightly service using the Clyde-built paddle-steamer *Britannia* and her three sister-ships.^{lxvii} The voyage time was fourteen days to Boston, which was only marginally faster than the best sailing times, with the critical difference that it did not depend upon wind direction. The steamers of this first generation were only 200ft long and carried so much coal that they had little space for anything more than the Royal Mail and around one hundred first-class passengers. Any cargo needed to be small and urgent to justify the expense: newspapers and magazines might fit the bill, but not in large quantities. The faster transit of news and gossip helped bring the British and American book trades closer

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together, but the real impact of steam on the transatlantic book trade was with the second generation of Cunard ships, from 1848. The *America*, *Canada*, *Europa* and *Niagara* introduced a weekly service, began to serve New York (by then, the centre of the American publishing industry), and could carry up to 450 tons of cargo. Using them for cargo was still substantially more expensive than sailing ship, but they gave publishers the option of guaranteed rapid delivery for consignments of books and magazines. The question was when to use them, and for what?

The publication which was most likely to be affected by the decision to use steam-shippping or not was *Chambers's Journal*, with its weekly dated issues. It had a good reputation in the USA: the *Literary World* ranked it alongside Charles Dickens's *Household Words* as an exemplar which American publications would do well to emulate.^{lxviii} Several American publishers had requested copies of its stereotype plates, but Chambers consistently refused. Rather, in 1854 they arranged for Joshua Lippincott of Philadelphia, with whom they already had an arrangement, to import it at a discounted price. Seeing the necessity for reliable deliveries, but worried about the cost implications of weekly steam shipping, Lippincott made the decision to market the *Journal* in monthly parts. Given that over 60 per cent of the British sales were now in monthly parts, this decision was unlikely to affect sales significantly.^{lxix} Since Chambers routinely printed the *Journal* two or three weeks ahead of the publication date, steamship delivery would ensure that Lippincott's consignment could arrive in Philadelphia at the same time as the monthly part was due to appear in Britain.

Unfortunately for Lippincott, no sooner had he begun taking the *Journal* than a New York printer by the name of Peter D. Orvis began reprinting it in weekly issues

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without permission.^{lxx} His source was presumably a weekly issue sent by steam from Liverpool as soon as it was published in Britain. His issues must have been about a fortnight behind the British dates, but two weeks out of four he was beating Lippincott into the marketplace. Even though Lippincott could offer the *Journal* for the same price as Orvis, Orvis's huge advantage was that he was willing and able to pay for steam shipping of the single copy that he needed to reprint his edition. Lippincott, with his substantial order, was not willing to pay for weekly shipments, even though Chambers pointed out that this was the obvious solution.^{lxxi} Lippincott asked instead for a larger discount, and eventually managed to persuade Chambers to a barely profitable £3 per thousand, a massive 52 per cent off the British retail price.^{lxxii} It was to no avail, however, as Lippincott still claimed to be unable to make money from the *Journal*, and cancelled the order in May 1855. Chambers were disappointed, writing in response that 'We are sorry the Journal cannot be made to pay, but there seems to be no remedy for it, and we shall now discontinue sending any more.'^{lxxiii}

Apart from the *Journal*, Chambers appear to have been relatively little affected by the fact that unauthorized American reprinters were more willing to pay for steam shipping than were authorized bulk importers. Chambers's publications were highly regarded by American teachers, school inspectors and clergymen – the firm was generally held to have attained 'wide celebrity' for its publication of 'school books, text-books, and some of the best manuals extant for self-education'^{lxxiv} – but they did not generate the same levels of excitement as the latest Dickens novel. American publishers were not competing frantically to be the first to get a new Chambers work into print, as they were with the latest literary fiction. There certainly were cases where Chambers publications

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were reprinted without authorization (for instance, A. S. Barnes reprinted some of the science volumes of the *Educational Course* in the late 1840s, and the *Information for the People* was reprinted in Philadelphia), but most of the copies of Chambers secular tracts and books which survive in American libraries have Edinburgh imprints or carry the imprints of American publishers who acted as importers (Figure 2.5).

[Insert Figure 2.5 here – portrait]

Figure 2.5 Copies of the *Pocket Miscellany* imported into the USA by Gould & Lincoln were issued as *Chambers' Home Book* with a new title page

Just as Chambers did not immediately turn to the railways for all their British distribution requirements, but used them for particular routes, publications or times of year, so too in the Atlantic world, they did not immediately use steamships for everything. From the mid-1840s onwards, their business correspondence was going by steam, and the fact that their correspondence with Lippincott in the 1850s was more frequent than with Gould & Co in the 1840s reflects the increased mail service provided by Cunard. But since most of their consignments were of instructive tracts and books, which were both bulky and not time-critical, sailing ship remained the preferred option – especially when we bear in mind that the shipping costs were paid by the American importer and not by Chambers themselves. It was all very well for Chambers to tell Lippincott he should get the *Journal* by steam every week, but they were not the ones who would be paying for it. By about 1856, however, freight prices on the steamships were reduced. From that point, it seems as though steam became the norm for Chambers and their American partners, even for bulkier consignments. The last mention of sail that I have recorded was in

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October 1856, when Chambers requested Lippincott to return any unsold copies of the *Pictorial History of England* 'by first sailing vessel to Liverpool'.^{lxxv}

Conclusions

When William Chambers began to issue *Chambers's Edinburgh Journal*, he had a natural market in lowland Scotland, but faced substantial practical difficulties in making his dream of reaching 'every man in the British dominions' come true. In 1834, Chambers claimed that 'The nature of our publications was, in every respect, so extraordinary, that all the old modes of procedure may be described as having fairly broken down under it.' As a result, they had had to create 'a proper system of printing and publishing'.^{lxxvi} At first, it seemed as though the cunning use of stereotype plates would relieve the problems of both distribution and production. Ultimately, it was the introduction of steam-powered printing coupled with improving transportation technologies which made the real difference, both in Britain and in the wider world.

The impact of steam-powered printing was the most significant. Railways, coastal steamships and ocean-going steamships each had their problems and their advantages. Chambers had no direct control over the transportation infrastructure and tended to pick and choose particular options for specific purposes. Steam-powered transport was clearly useful, but not straightforwardly so. Steam-powered printing, however, was under Chambers's direct control and, as far as Chambers were concerned, it had no drawbacks.^{lxxvii} Given the size of print runs they were working with, steam allowed economies of scale which helped keep prices low and created truly innovative instructive products. Steam also gave Chambers the capacity to print for the whole world. No longer limited to the output of a hand-press team, Chambers belonged to the first generation of

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publishers who genuinely hoped to send their publications in substantial numbers throughout the United Kingdom, the British dominions and beyond. Capacity alone was not enough: the lack of copyright agreement made it far more difficult to do business in the United States than in the dominions; but it was a necessary precursor.

Although the comparison with the United States may seem to have an ambiguous message, I would argue that the fact that most of the copies of Chambers publications which circulated in America were printed in Edinburgh highlights just how effectively Chambers were able to produce and market their cheap informative works. We are well aware that – in a British context – the firm's choice of authors, careful use of paper, and enthusiastic application of the new technologies were innovative and essential to its goal of selling at really low prices. In the United States, low prices had been the norm since the start of the century, and the competition engendered during the American economic recession of the early 1840s had pushed the price of print even lower. It is unsurprising that British publications on science, history and geography should be in demand in the United States, but it is a surprise to find a British publisher managing to be competitive on the grounds of price in the United States. It was an American-based commentator who claimed that 'These enterprising brothers have done more, perhaps, than any other two individuals of the age for the promotion of sound and useful knowledge'.^{lxxviii} And what made it possible for them to have that impact on the landscape of knowledge in Britain and America was steam.

Notes

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Charles W. J. Withers (Aldershot: Ashgate, 2010), 51–78.

ⁱ “Mechanism of Chambers’s Journal,” *Chambers’s Edinburgh Journal* (hereafter *CEJ*)
6 June 1835, 151.

ⁱⁱ *Ibid.*

ⁱⁱⁱ Simon Eliot, *Some Patterns and Trends in British Publishing 1800–1919* (London: The
Bibliographic Society, 1994); Alexis Weedon, *Victorian Publishing: The Economics of
Book Production for a Mass Market, 1836–1916* (Aldershot: Ashgate, 2003).

^{iv} Michael Twyman, *Printing 1770–1970: An Illustrated History of Its Development and
Uses in England* (London: British Library, 1998); for the USA, Rollo G. Silver, “The
Power of the Press: Hand, Horse, Water and Steam,” *Printing History* 5:1 (1983): 5–16.

^v Jack Simmons, *The Victorian Railway* (London: Thames & Hudson, 1991).

^{vi} Keven J. Hayes, “Railway Reading,” *Proceedings of the American Antiquarian Society*
106 (1996): 301–26; Stephen Colclough, “‘Purifying the Sources of Amusement and
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History* 56 (2004): 27–51.

^{vii} On Chambers’s use of new technology, see Aileen Fyfe, “Information Revolution:
William Chambers, the Publishing Pioneer,” *Endeavour* 30 (2006): 120–25.

^{viii} See the opening discussion of ‘steam, gas and the telegraph’ in “Cheap Literature,”
British Quarterly Review 29 (1859): 313–45.

^{ix} For the religious publishers, see Leslie Howsam, *Cheap Bibles: Nineteenth-Century
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Press, 1991); Aileen Fyfe, *Science and Salvation: Evangelicals and Popular Science
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^x Valerie Gray, "Charles Knight and the Society for the Diffusion of Useful Knowledge: A Special Relationship," *Publishing History* 53 (2003): 23–74; Rebecca Kinraide, "The Society for the Diffusion of Useful Knowledge and the Democratization of Learning in Early Nineteenth-Century Britain" (PhD diss., University of Wisconsin-Madison, 2006); Sondra Miley Cooney, "Publishers for the People: W. & R. Chambers – the Early Years, 1832–50" (PhD diss., Ohio State University, 1970).

^{xi} Aileen Fyfe, "The Information Revolution," in *The History of the Book in Britain, Vol. 6: 1830–1914* ed. David McKitterick (Cambridge: Cambridge University Press, 2009) 567–94.

^{xii} Jonathan R Topham, "Publishing 'Popular Science' in Early Nineteenth-Century Britain," in *Science in the Marketplace: Nineteenth-Century Sites and Experiences*, eds Aileen Fyfe and Bernard Lightman (Chicago: University of Chicago Press, 2007) 135–68.

^{xiii} James Secord, "Knowledge in Transit," *Isis* 95 (2004): 654–72.

^{xiv} The main biographical source is William Chambers, *Memoir of Robert Chambers with Autobiographical Reminiscences of William Chambers* (New York: Scribner, Armstrong and Co, 1872). See also William Chambers, *The Story of a Long and Busy Life* (Edinburgh: W&R Chambers, 1882).

^{xv} Robert Chambers, *The Picture of Scotland*, 2 vols. (Edinburgh: Tait, 1827), vol. I, 178.

^{xvi} "The Editor's Address to his Readers," *CEJ*, 4 February 1832.

^{xvii} Laurel Brake, "The Popular 'Weeklies'," in *Edinburgh History of the Book in Scotland, Volume 3: Ambition and Industry 1800–1880*, ed. Bill Bell (Edinburgh: Edinburgh University Press, 2007), 359–69.

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Charles W. J. Withers (Aldershot: Ashgate, 2010), 51-78.

^{xviii} Figures from searches in *Nineteenth-Century Short Title Catalogue on CD-ROM*, series I and II, 1800–1870 (Newcastle: Averro, 2002).

^{xix} Chambers, *Picture of Scotland*; William Chambers, *The Book of Scotland* (Edinburgh: Robert Buchanan, 1830); Robert Chambers and William Chambers, *The Gazetteer of Scotland* (Edinburgh: Thomas Ireland, jnr, 1832).

^{xx} Chambers, *Book of Scotland*, v.

^{xxi} By the mid-nineteenth century, barely 10 per cent of Scottish men were illiterate, and only 25 per cent of Scottish women. David Vincent, *The Rise of Mass Literacy: Reading and Writing in Modern Europe* (Oxford: Polity Press, 2000), 9–10.

^{xxii} Chambers, *Book of Scotland*, 370.

^{xxiii} "Chambers's Edinburgh Journal," *CEJ*, 28 April 1832, 52.

^{xxiv} "Editorial," *CEJ*, 1 February 1834, 1.

^{xxv} *Ibid.*

^{xxvi} Mail coach connections are listed in Chambers and Chambers, *Gazetteer of Scotland*, 400. Journey time was over 42 hours, based on John Langton and R. J. Morris eds, *Atlas of Industrializing Britain 1780–1914* (London: Methuen, 1986).

^{xxvii} Three weeks was normal in 1843, see Chambers, *Long and Busy Life*, 64–5.

^{xxviii} "Chambers's Edinburgh Journal," *CEJ*, 28 April 1832, 52.

^{xxix} Memorandum from Glasgow agents, 12 November 1832, W. & R. Chambers Papers, Deposit 341, National Library of Scotland [WRC] 467 (Receipts 1832).

^{xxx} Sondra Miley Cooney, "William Somerville Orr, London Publisher and Printer: The Skeleton in W. & R. Chambers's Closet," in *Worlds of Print: Diversity in the Book Trade*, eds John Hinks and Catherine Armstrong (London: British Library, 2006) 135–47.

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^{xxx}i “Printing and Stereotyping,” *CEJ*, 29 September 1832, 278.

^{xxx}ii During 1833, plates of the *Journal* were sent to Dublin, but the Irish edition foundered within the year, because there was insufficient demand for the Irish agent to make a profit from it. Ireland was henceforth supplied from Edinburgh (via Glasgow, to Belfast and Dublin).

^{xxx}iii Entry for 21 June 1838 in WRC 414 (Transaction Notebook). The arrangement with Jackson came to an end in 1840 when he went out of business during the economic depression.

^{xxx}iv Gould to Chambers, 15 October 1845, in WRC 314 (Literary Labour 1844–47) and succeeding letters, and Lea & Blanchard to Chambers, 27 May 1850, in WRC 121 (Correspondence), fol. 40.

^{xxx}v Gould to Chambers, 27 February and 31 December 1846, WRC 314 (LL 1844–47).

^{xxx}vi “The Editor’s Address to his Readers,” *CEJ*, 4 February 1832, 1.

^{xxx}vii Chambers, *Memoir*, 214. In August 1832, Johnstone launched his own imitation of *Chambers’s Journal*, later known as *Johnstone’s Magazine*. It was absorbed into *Tait’s Magazine* (which Johnstone also printed) in 1834.

^{xxx}viii Johnstone invoice, 18 February 1832, WRC 454 (Printing etc 1832). Johnstone charged £36, 11s, 10d. for those two issues. Also, his invoices for 23 March and 4 April 1832, WRC 454.

^{xxx}ix For typical working hours in the Edinburgh print trade, see Bill Bell ed., *Edinburgh History of the Book in Scotland, Volume 3: Ambition and Industry 1800–1880* (Edinburgh: Edinburgh University Press, 2007).

^xi “Mechanism of Chambers’s Journal,” 150.

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^{xli} *Ibid.*

^{xlii} The first surviving invoice from Ballantyne is dated November 1832 but relates to July. It is with other invoices for November and December 1832 in WRC 467 (Receipts July–December 1832).

^{xliii} "Mechanism of Chambers's Journal," 151.

^{xliv} For the two Norton machines, see invoices for 1 February 1838, in WRC 470 (Receipts 1837), and for 1 August 1841, in WRC 474 (Receipts 1841). For Middleton's 1841 machine, see invoice for 9 February 1839, in WRC 459 (Repairs to machinery etc, 1839).

^{xliv} Chambers balance sheet for 1845, WRC 304 (Balance-sheet book), fol. 33–6.

^{xlvi} The engine was listed against 14 December 1844 in Norton's invoice, June 1845, WRC 477 (Receipts 1844–45).

^{xlvi} Middleton's invoice, March 1845, WRC 478 (Receipts 1845).

^{xlvi} "Address to readers," *CEJ*, 4 January 1845, 1.

^{xlvi} F.S. [Frederick Saunders], "The Publishing Business," *Literary World* 6, 5 January 1850, 12. For Chambers's own estimate, see Cooney, "Publishers for the People," 214.

^l The new arrangement with Orr is most clearly set out in WC to RC, 28 September 1846 in WRC 314 (LL 1844–47). A letter to Orr (from Chambers's manager, R. Inglis) in February 1847 makes clear Chambers's determination not to allow the London edition to be restarted.

^{li} Monthly invoices for spring 1845 and spring–summer 1848 survive in files WRC 478 (Receipts 1845) and 484 (Receipts 1848).

^{lii} David Chambers to Robert Chambers, 11 January 1854, in WRC 109 (Domestic Correspondence).

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^{liii} David Chambers to Robert Chambers, 11 January 1854. David attempted to use the new technology of electric telegraphy to sort the situation out, but on this occasion the necessary brevity of telegraphic messages led to further misunderstanding.

^{liv} "Mechanism of Chambers's Journal," 151.

^{lv} "Editorial," *CEJ*, 31 January 1835, 1. In later years, they could also point out that the *Information* had been completed as planned, unlike the *Penny Cyclopaedia* which outgrew its original plan and took ten years to complete.

^{lvi} "Editorial," *CEJ*, 1 February 1835, 1–2.

^{lvii} Chambers Publication Ledger 1845–67 (WRC 275), fol. 6–7.

^{lviii} Murray remaindered the *Family Library* to Thomas Tegg in c. 1834. Longman kept the *Cabinet Cyclopaedia*, but sold off its volumes at greatly reduced prices in the late 1840s. See Scott Bennett, "John Murray's Family Library and the Cheapening of Books in Early Nineteenth-Century Britain," *Studies in Bibliography* 29 (1976): 139–66.

^{lix} Cooney, "Publishers for the People," chapter 4.

^{lx} John van Wyhe, *Phrenology and the Origins of Victorian Scientific Naturalism* (Aldershot: Ashgate, 2004), appendix C and 217–20.

^{lxi} William Paley, *Natural Theology* (1802, Chambers 1837) was one of the first of these volumes. It sold 10,000 copies in two years, see Publication Ledger 1842–45 [sic] (WRC 274), fol. 351–4.

^{lxii} As far as I know, Chambers did not comment on the religious publishing societies, but there are comments on the SDUK in Chambers, *Memoir*, 213.

^{lxiii} On the US book trade in the 1840s, see Meredith L. McGill, *American Literature and the Culture of Reprinting, 1834–1853* (Philadelphia: University of Pennsylvania Press,

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2002); Scott E. Casper et al. eds, *A History of the Book in America, Volume 3: The Industrial Book, 1840–1880* (Chapel Hill: University of North Carolina Press, 2007); on its connections with Britain, see James L. W. West, "Book Publishing 1835–1900: The Anglo-American Connection," *Papers of the Bibliographical Society of America* 84 (1990): 357–75.

^{lxiv} James J. Barnes, *Authors, Publishers and Politicians: The Quest for an Anglo-American Copyright Agreement, 1815–1854* (London: Routledge, 1974).

^{lxv} Chambers to Gould, 30 September 1847, WRC 314 (LL 1844–47).

^{lxvi} UK trade price was 1s. 1½d. per dozen, with 13 counting as 12. See, for instance, WRC 600 (1858 Trade Catalogue).

^{lxvii} Francis E. Hyde, *Cunard and the North Atlantic, 1840–1973: A History of Shipping and Financial Management* (London: Macmillan, 1975).

^{lxviii} "Taxes on Knowledge in England," *Literary World*, 1 June 1850, 532.

^{lxix} In 1847, 5/8 of the circulation was in monthly parts, see "Booksellers," *CEJ*, 6 February 1847, 88.

^{lxx} Orvis was the publisher of the cheap weekly the *New York Journal*. Chambers's refusal (for the second time) to sell him plates is mentioned in Chambers to Lippincott, 2 May 1854, WRC 321 (LL 1854).

^{lxxi} Chambers to Lippincott, 5 June 1854, WRC 163 (LB 1853–67), fol. 30. There is no record of the actual size of Lippincott's order, but extrapolating from the increased circulation in 1854 (when Lippincott started taking the *Journal*) and its partial reduction in 1855 (when Lippincott cancelled his order partway through the year) it may have been around 16,000 copies.

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^{lxxii} Chambers to Lippincott, 10 March 1854, WRC 163 (LB 1853–67), fol. 45.

^{lxxiii} Chambers to Lippincott, 18 May 1855, WRC 163 (LB 1853–67), fol. 86. Orvis went out of business in mid-1856, but Lippincott did not re-start imports of *Chambers's Journal*.

^{lxxiv} "Chambers's Papers for the People," *Norton's Literary Advertiser*, December 1851, 92 and "Chambers's Papers for the People," *Literary World*, 12 June 1852, 409.

^{lxxv} WRC to Lippincott, 24 October 1856, in WRC 163 (LB 1853–67), fol. 185.

^{lxxvi} "Editorial," *CEJ*, 1 February 1834, 2.

^{lxxvii} Some of their neighbours disagreed, in 1833, and tried to get an injunction to prevent the steam-engine being built. Defenders of traditional hand-press skills might also have objected.

^{lxxviii} 'F.S.', "The Publishing Business," 12. Saunders was the son of a London publisher, but had lived in New York since 1836.



