telephone in quick succession provided extensive publicity, all of it favourable. If the Victorians suspected the implications of science, they appreciated its applications. The general reader of the 1870s was therefore faced with a dichotomy of opinion concerning the value of science recognisably similar to that facing his counterpart in the 1970s.

The latter half of the nineteenth century saw the evolution of what is essentially modern science in terms both of its structure and of its organisation. Correspondingly, the way in which science was communicated changed. Many of the developments of that period have become the orthodoxy of today. If, as is possible, we are moving towards a new transition period in the communication of science, these orthodoxies may change; but the question of access to the results of scientific research will remain as central in the future as it has in the past.

References

This provides a detailed discussion of the entire development of Science Abstracts.
Provides a good general guide to bibliographical and statistical aspects of the growth of abstract journals.

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ROY M. MACLEOD

Introduction

Despite the considerable role of publishing in the history of scientific ideas, historians of science have paid the subject remarkably little attention. Most would agree that scientific books and journals are more than merely cultural artifacts. Yet few have studied the history of publishing for us as an essential element in the development of the modern scientific enterprise.

When one turns to the history of publishing, however, difficulties immediately arise. For many reasons, the history of scientific publishing in general, and of international scientific publishing in particular, has been neither popular nor easy. For here, one must deal with more than the antiquarian interest in the history of individual books, or authors, or ideas. Rather, one must examine a complicated pattern of economic and institutional, as well as intellectual factors; the promotion of cultural values, as well as the pursuit of ideas. The historian of scientific publishing must concern himself with the image, as well as with the content, with commercial prospects, as well as philosophical positions, with the vagaries of fashion, as well as with the codification of new knowledge.

These difficulties, abundantly clear today, first became apparent in the mid-nineteenth century. Science has traditionally enjoyed an ideology of ‘internationalism’, and scientific publishing, since the sixteenth century, an international market place. Men of science, editors and men of letters have together contributed towards its cultural ascendency. But around the middle of the last century, several ‘vested interests’ came into play. First, there emerged, throughout Europe, a new and growing class of scientists for whom publication was commercially and institutionally, as well as intellectually, important. Academic hegemonies, no longer simply matters of patronage, could be established (or undone) by the control of individual journals and key texts. And publishers, responding to new institutional opportunities, recognized the new readership this implied. Moreover, throughout the Western world, Governments began to encourage expansion in education. Wherever this occurred, especially in secondary education, there arose a demand for books. The natural sciences took their place in this expansion,
especially where, as in Germany and France, scientific education became a token of national economic and cultural prestige.

Within Europe, but more especially within Britain and America, there were other impulses towards expansion in scientific publishing. The 'fashionable' interest in science, so prominent a feature before 1830, now gave way to a 'popular' interest among a larger, literate audience, seeking in science both rational entertainment and useful knowledge. Schools, mechanics' institutes, public libraries and field clubs replaced the Literary and Philosophical Societies as the market place for science books. Increasingly, publishers and journalists, and popularizers of many descriptions, came to recognize the opportunities presented. The message of self-help through self-knowledge, popularized by Samuel Smiles and others, contributed to an atmosphere receptive to the discussion of new ideas. And by the 1860s, in the midst of the Darwinian debate, publishers could build upon the debates surrounding the concept of scientific naturalism. By the 1870s, a growing belief in the existence of underlying principles of uniformity in nature had begun to nourish a new hegemony within European science. Over the next two decades, that hegemony was increasingly mediated and represented by a generalised commitment to the principles of 'evolution' - principles understood to operate at all levels, through the relations of man, nature and society.

In retrospect, scientific publishing - particularly international publishing - was decisive in establishing this hegemony, and in supplying its mediations with the reading public. In more practical, if more prosaic, terms, publishers found in science a respectably marketable commodity which had the added appeal of a fashionable 'modernity'. With the growth of new knowledge, 'specialization' seemed unavoidable, and infinitely sustainable. At the same time, the opposing force, towards 'general' comprehensive textbooks, was equally strong. Neither market need be neglected. For many publishers, the ideal way, commercially speaking, to recapture the 'unity of science', to restore the 'circle of the sciences' and yet to recapture the 'specialist' reader, lay through the publication of books in 'series'. Indeed, formal series of books acquired growing popularity in both Europe and America. Whether 'classbooks', primers or standard texts, they closely embraced the entrepreneurial interests of publishers, scientists and educators alike. As a commercial activity, they escaped risk. Although not intended to eclipse single volumes in Britain (which represented 90% of titles produced by leading houses), they could expect a regular library institutional sale. For men of science, they conveyed both a broad editorial vision, and a representation of science as culturally more than the sum of its increasingly fragmented parts. For educators and teachers, they conveyed an image of order, and a sense of stability at a time when the restless advance of scientific thinking left few beliefs undisturbed.

The economic and intellectual importance of the scientific series, and the relevance of this gene to the history of scientific publishing, is perhaps best illustrated by an extended example, and by a close study of the factors involved in its particular evolution. The case is that of the International Scientific Series - of all Victorian attempts at codifying and popularising scientific knowledge in a systematic fashion to a wide reading public, perhaps the most famous. The ISS, whose 'familiar red covers were a guarantee of sound material within' (Eve and Creasey, 1945, p. 154), appeared in over 120 titles between 1871 and 1910, in four languages, in the U.S.A. and five countries of Europe. Conceived by Americans, nourished by Englishmen, the ISS was sustained by the new 'scientific movement' sweeping Europe and America in the late 1860s and early 1870s. It was blessed by the 'Young Turks' of science (cf. Huxley, 1858, p. 541), and was dedicated to the proposition that science as the 'new learning' had a central role to play in social progress and international prosperity. For a generation, the series endured; ultimately, it died - and in the trajectory between its birth and death one finds revealed the enormous hopes, and equally enormous disappointments involved in the search for order unity within the natural and social sciences.

This history begins with the entrepreneurial vision of Edward Livingstone Youmans (1821-1887).

EDWARD YOUMANS COMES TO EUROPE

Youmans was born in Albany, New York, in 1821 and conquered childhood blindness to become one of the country's most prolific scientific popularizers. Reading Chambers and Lyell in the 1840s, he became a confirmed evolutionist, and, joining the firm of Appleton in New York, he pressed for serial publication of new work in palaeontology and geology. In the 1860s, when Darwinian theory arrived in America, Youmans cast himself in the role of herald archangel - pressing Appleton's to take up the Darwinian cause. Previously, Charles Appleton - amid intense rivalry with Harpers, Rand McNally and the Boston houses - had spared no expense to capture the 'world's outstanding works in science' for quite candid commercial reasons:

When the growing interest in educational matters called for new textbooks, D. Appleton and Co. provided them. When a new encyclopedia was urgently needed, then Appleton's were ready with the best one ever prepared; and when interest in the development of scientific thought created a demand for a new literature, the Appleton house provided it. (Madison, 1966, pp. 72-73).

When it came to capturing scientific authors, Appleton had at his right hand Youmans, who became known among publishers as the most dynamic force in the advancement of scientific thought in America (Overton, 1925, p. 35; cf. Fiske, 1893).

Long before the publication of the Origin of Species, Youmans found a working form of the evolutionary metaphor in the writings of Herbert Spencer. In 1856, Youmans read Spencer's Principles of Psychology, and, in 1859, his Social Statics. In
1860, soon after seeing the prospectus of the philosophical series Spencer proposed to issue by subscription, Youmans offered to become Spencer’s American agent. In 1861, Youmans met Spencer in London, returned to New York, and began proselytising in America for the grand Spencerian concept of evolutionary development. ‘In no part of the English world has Herbert Spencer’s philosophy met with such a general and cordial reception as in the United States’, John Fiske later recalled. It was to Youmans that this reception was largely due (Fiske, 1894).

Youmans’ imagination was particularly fired by the prospect of diffusing Spencerian evolutionism across international frontiers. As literary analyst to Spencer, he equated his task with that of international and progressive social development (Duncan, 1908, p. 178). Youmans himself was a committed Anglophile. During the mid-1860s, he made repeated trips to the scientific circles of London. He became a frequent guest of the famous ‘X-Club’ (cf. MacLeod, 1970), where he met Tyndall, Huxley, Lubbock and several of his future authors (Huxley, 1900, p. 258). In 1867, Youmans arranged for Appleton’s to publish Huxley’s Lessons on Elementary Physiology and, while in England, he edited reprints of a famous series of addresses (Of Modern Culture: Its True Aims and Requirements), which included addresses on the claims of scientific education. Youmans believed he could tap in America a ready commercial market for English intellectual goods. Despite the growing and pervasive German influence on American university life, C.S. Pierce recalled that ‘the type of our thought was decidedly British’ (Whitelaw Reid, in an address at Dartmouth in 1873, summarised the position thus:

Ten or fifteen years ago, the staple subject here for reading and talk, outside study hours, was English poetry and fiction. Now it is English science. Herbert Spencer, John Stuart Mill, Huxley, Darwin, Tyndall have usurped the places of Tennyson and Browning, and Matthew Arnold and Dickens. (Straitener’s Monthly, 1873)

Happily for Youmans, Appleton, like his English contemporaries, particularly John Murray and Alexander Macmillan, was anxious to dominate this market. But there were risks. Economic difficulties had undermined the short-lived Appleton’s Journal (edited by Youmans) in 1869. Margins had to be calculated carefully; investment sustained over initial periods of loss. Moreover, there was the fear of competitive pirating, which made profit margins unpredictable. For authors and publishers alike, lack of copyright protection was one of the most serious omissions in prevailing arrangements. Until the 1880s, the international economic rights of English and other European authors and publishers were safeguarded by only a small body of copyright laws and by a network of informal agreements governing reprinting and translation. By the late nineteenth century, however, the growth of a substantial demand for scientific books in Europe and America placed authors in an unfavourable position. Even when European copyright arrangements were codified by the Berne convention in 1886, publishers in the United States, which was not a signatory, remained a threat.4 It was well known during the 1830s and 1840s for English works of literature and fiction to be regularly ‘pirated’ by American houses. In the 1870s and 1880s, there was every reason to expect that scientific works would share the same fate.5 In capturing the market for British and European scientific books in America, a new policy was necessary. With syllable acumen, Appleton became generally ‘much more inclined to friendly cooperation and mutual concession than to barbarous competition’ (cf. Unwin, 1946). In particular, and to secure exclusive permission to publish their works, Appleton made it ‘a point of honour to treat foreign authors as though they were legally entitled to some equitable rights’ (Huxley, 1920, p. 283).

Youman’s struggle on behalf of Spencer and Huxley, and his own experience with Appleton’s Journal, had taught him the financial importance of attracting consistently the best writers. In 1870, with the cooperation of the X-Club and its leading English men of science, Youmans therefore proposed to Appleton the idea of launching a new ‘International Scientific Library’ designed to contain ‘the best work of every important scientific thinker of the day in all countries’. In an age of ‘specialists’, such a series could bring so much of each separate science as might be thought necessary for the ordinary layman within the compass of a single volume, which, while being accurate, should also be in a ‘tongue understood of the people’. (Kegan Paul, 1898, p. 279)

The plan to secure proper royalties and recognition for his authors was one of eloquent simplicity. By prior arrangement with participating publishers in several different countries, all authors would receive a fixed percentage royalty on their books, and would receive that royalty in every country in which their books were sold. In the absence of legislated international copyright agreements, this would virtually guarantee individual rights on a national basis. Appleton approved, and Youmans sailed to England in June 1871 for a decisive visit of six months. Furnished with introductions through the X-Club and a letter from Spencer (which stressed Appleton’s success in securing fair contracts in America for English men of science), Youmans began his round. His task was not straightforward. Some potential authors were suspicious of ‘popular’ series, while others ‘so eminent as specialists as to be well-nigh indispensable’, were too busy to contribute. And ‘not a few bluntly stated their opinion that the series would not “go”’ (Fiske, 1894, p. 275). Despite the ‘rap incredulity’ of his listeners, Youmans persevered. ‘Its importance grows upon one’ he wrote his sister in July, 1871, ‘and when I think of the quality and delicacy of the enterprise, and of the important consequences that may flow from it ... I am anything but dissatisfied with the aspect of things’ (Fiske, 1894, p. 276).
Support steadily materialised: 'Alexander' Bain is all right and will be helpful'; Youmans soon wrote to his sister from London, and 'I have this morning had a very interesting interview with [Francis] Galton. He thinks well of the scheme, and, strange to say, is now writing upon the very subject that I had assigned to him' (Fiske, 1894, p. 276). By July, Charles Darwin even insisted that the subject be brought up at the forthcoming British Association meeting in Edinburgh, for endorsement by all British men of science there assembled.

As it happened, the Edinburgh meeting of August 1871, was of critical importance to the scheme. Moving with Spencer's help through the 'bewildering crush', Youmans held a special session on the 'fringe' of the Edinburgh meeting, which included J.D. Hooker, T.H. Huxley, W.B. Carpenter, W.K. Clifford, Balfour Stewart and Alexander Bain, together with Dr. William Lindsay, the botanist of Perth. The session decided that Huxley, Tyndall and Spencer should form an advisory committee, representing the biological, physical and 'human' sciences. The meeting then turned to enlisting prospective authors. Edward Smith 'is the authority on diet', and Smith was duly registered. 'Tylor is great on primitive man - greater than Lubbock' although 'he may not be able to leave his present publisher'. His name, too, was inscribed (Fiske, 1894, p. 275).

After the Edinburgh meeting, Youmans returned to London with Spencer to meet Appleton who had just arrived from New York, and to conclude arrangements for an English edition with Henry King - a 'wide-awake wholehearted fellow' of 65 Cornhill Street, King, formerly a well-known bookseller of Brighton, and a partner of George Smith (of Smith, Elder and Co.) between 1833 and 1866, had recently begun his own publishing house, and was looking for a series which would help 'make his name'. King's optimism gave Youmans great hope. 'They will drive it with energy', Youmans declared, 'and are bound to make a success ... The only apparent remaining difficulty is to transfer authors to the new house. Several are sure, some doubtful, and there are four hopeless, but their places can be supplied' (Fiske, 1894, p. 284).

In a 'Private and Confidential' letter circulated in August 1871, Youmans sought the attention of 'English Scientific Writers' for his project of 'monographs or elaborate essays' in a 'form suited for wide circulation'. Youmans drew particularly on his American market, which, he claimed, 'would give efficient support to such an enterprise'. 'That country', he said, 'now contains nearly 40 millions of inhabitants and they are eminently a reading and book-buying people; education is extending and improving, and the interest in science, especially its progressive aspects, is also becoming more earnest and more general' (Huxley Papers, 1871).

By mid-October 1871, Youmans had great expectations. In five years, he predicted, the series would run to seventy-five or one hundred volumes. 'It will be the world's popular cyclopedia of reading science. Spencer is delighted, but half-bewildered; every once in a while he breaks out, "who would have thought such a result would arrive from your first beginnings with me?" ... He says this whole movement is going to revolutionise the position of English authors' (Fiske, 1894, p. 285).

In November, Spencer accompanied Youmans to Paris, and helped him persuade Henri Paul Bailliere to accept the scheme. French scientific publishing presented special problems. It was widely believed that scientific books could sell, but it was known that circulation was slow and distribution was limited, so new ideas from abroad could only by degrees, and with difficulty, make their way. Still there were important questions of prestige at stake. Youmans' proposal reached Paris in the wake of Germany's victory - a victory seen in no small measure as a triumph for German science. The Revue Scientifique, founded in 1871, was convinced that 'c'est la science et l'esprit scientifique qui ont vaincus'. Bailliere saw the new 'Bibliothèque Scientifique Internationale' as a means of stimulating the resurgence in science which Pasteur and the Third Republic rightly sought. In November 1871, 'France is committed', Youmans rejoiced, 'and I have just received a French note from the publisher pledging ten books from the ablest men in France' (Fiske, 1894, p. 286). Again, with Spencer's prompting, Youmans went on to Berlin, but this time alone. Germany was not quite so easy to win. Youmans - alas - spoke no German, and Spencer had few German friends. Moreover, as Youmans explained 'France was dispatched quickly because Paris is France, but it is otherwise here. The men are scattered ... and [while] there is great boasting of "universal education", yet there is no place in the world where there is on the part of the learned such contempt for popular education, or such shallow and worthless trash as they write when they attempt to write for "the people"'. Youmans continued sadly:

Germany is not going to suit me. They are too cocky - 'We don't want your translations; we can make our own books; the talent is here', is the way publishers talk. On the other hand I find that scientific men here have a contempt for 'popularisation' more intense than anywhere else. They ostentatiously despise it and the countries that tolerate it. It looks like a very bad market for my pigs, but I am going to know more about it before I get through. (Fiske, 1894, pp. 286-287)

Above all, there was evidently no great love for what was called 'English philosophy', and astonishingly, 'no one had heard of Spencer'. Youmans moved from Berlin to Leipzig in search of a publisher, with growing impatience. 'I feel I am at the extremist point of my Quixotic career in Leipzig', he wrote:

The Dutch [i.e. the Germans] are prodigiously slow ... They continue as ever to have their doubts, and I feel it awful hard work to wait. Still, it will have to be done but once, like gravitation and evolution, and so I continue to be patient. (Fiske, 1894, p. 286)
By December, however, the Germans had succumbed, and Brockhaus of Leipzig agreed to take the series. Returning to England, Youmans' views of Germany underwent a sea change, not least because he felt 'Germany is more ripe for the movement than even England; its best men can be procured' (Fiske, 1894, p. 290). In fact, in Germany, as in France, an 'inner circle' of English scientific men had done the trick. In the end, what Spencer's reputation had wrought in England and France, Darwin's magic had worked in Germany. 'The whole nation is pervaded with religious skepticism, and they are without philosophic guidance', Youmans wrote. That guidance Darwinism had begun to supply.

By the winter of 1871, the series had 'caught on'. In mid-December, Youmans dined with Spencer, Tyndall and Huxley in London, and found the atmosphere precious different from my first dinner there six months ago. They are fairly in harness and trot quite smoothly. They took hold of work as a matter of course, and are going to make a pretty good committee. It seems to be universally agreed that we have a great thing in prospect and well under way, and which can hardly fail to result in large advantages to many authors and to the public also. (Fiske, 1894, p. 293).

Huxley and Tyndall agreed to advise Youmans on condition that it would not involve 'the slightest correspondence or business, or anything more than the giving of an opinion now and then in regard to the competency of writers' (Duncan, 1908, p. 187). In editorial matters Youmans looked to Spencer alone for guidance.

In February 1872, arrangements with Messrs. Bailliere and Brockhaus were concluded. By the terms of agreement, a committee of 'not less than three' men of science in each country would decide what works should be admitted into the Series, and the publishers of each country would then publish 'according to the custom of their respective houses.'

In France, most work fell upon Emil Aligave, a young lawyer and economist, who had begun the Revue des Cours Scientifiques (later the Revue Scientifique) in 1864. In Germany, the committee of three – all university professors – was, at first, to include Rudolf Virchow of Berlin and Jacob Rosenthal (then of Berlin, but later of Erlangen). Eventually, however, the German committee included Rosenthal, I.R. Tzermai ('Chermac' in Youmans' letters) of Leipzig, and Oscar Schmidt of Strasbourg. All translations were to be issued in crown octavo. A first edition of 1250 copies, and all subsequent editions, would be issued at the discretion of each respective house. Each house would keep independent accounts; works would be exchanged in stereotype, and all illustrations in electro-type clichés. Books not accepted for the series in a given country could be exchanged with another participating publisher on the same financial terms. Volumes in the series would be sold for five shillings in Britain, $1.30 to $1.74 in America, 6RM in Germany, and six francs in France. Author's contracts were to be negotiated individually, but were usually based on a fee of £50 on publication of the first 1250 copies. Royalties for 'foreign authors' were fixed at 2 5/8% of the published

price of works translated. The costs of translation were to be defrayed by each publisher. By far the greatest blessing, however, was the implicit provision for international distribution, which, according to Spencer, 'practically amounted to international copyright' (Duncan, 1908, pp. 138-159). Similar arrangements were made with Dumond Fratelli in Milan and Znanie in St. Petersburg, for reproduction in Italian and Russian.

The series was advertised in England by Henry King in June, 1872. Spencer modestly proposed that 'each of the volumes should ... [deal] with some part of science capable of being cut out from the rest and within the limits of which there had been recent developments of importance' (Spencer, 1904, p. 230). More grandly, King claimed these 'Popular Treatises' would embody the 'latest investigations in the various departments of Science at present most prominently before the world' written by 'many of the most distinguished professors in England, America, Germany and France'.

In fact, King's enthusiasm defied the sceptics. 'It is by no means easy to say how far a scientific subject may be fairly popularised', warned the Athenæum. 'To entice the public to swallow a dose of science a good deal of sugar is no doubt necessary ... But Youmans disagreed. While not specially intended for the 'instruction of beginners', the ISS titles were intended to 'address the non-scientific public'; while they would be as far as possible explanatory in character and free from technicalities, the object of each was to 'bring his subject as near as he can to the general reader'. In New York, Appleton's advertisement proclaimed that the series would give authentic yet popular expression to the latest and growing thought on the leading subjects of progressive inquiry. The various branches of physical, biological, psychological and social science, which have undergone marked revision within a record period, will be so presented as to help a better understanding of the phenomena of human nature and the economy of life. (Madison, 1966, p. 73).

In France, it was determined from the outset that the series would not be limited to the physical and natural sciences; all titles 'empruntent les méthodes d'observation et d'expérience qui ont rendues si fécondes depuis deux siècles'. The Bibliothèque Scientifique Internationale asserted it was not 'une entreprise de bibliothèque ordinaire'. Its object, to popularise science in all its aspects, was no less important than the reflection that

On peut ainsi, sans quitter la France, assister et participer au mouvement des esprits en Angleterre, en Allemagne, en Amérique, en Italie, etc., tout aussi bien que les savants "de chacun de ces pays." 20

In Germany, Brockhaus began the series in 1873, and made the 'Internationale Wissenschaftliche Bibliothek' the most important of its encyclopedic endeavours.
In America, then witnessing ‘large increases’ in popular scientific publication (Newcomb, 1874), and helped by Tyndall’s lectures in 1872–1873, the series took hold.

THE SERIES IN THE SEVENTIES

The 1870s were perhaps the most exciting years of the ISS. In America, Appleton’s titles probably encountered stiff opposition from ‘Van Nostrand’s Science Series’, edited by Prof. George Plympton. 127 titles of which appeared (in green cloth), price 90 and 75 cents, between 1873 and 1902. The titles in Van Nostrand’s list, chiefly concerned with industry and engineering, sold steadily as a series until the 1920s. Other American rivals were Henry Holt’s ‘American Science Series’ which successfully published American authors, including William James’ Principles of Psychology (1890), and Holt’s ‘Nature’ series which began in 1906, and which promised 18 volumes.

In England, the ISS had the advantage of originality and surprise, coupled with the virtue of offering world-famous authors to a middle-brow audience at moderate prices. Given this audience, the series had the force of a new testament to the age, codifying the ‘Religion of Science’ and belief in scientific method which Beatrice Webb described as the ‘most salient element in the mid-Victorian Time Spirit’ (Webb, 1926, p. 183). It was Spencerian in range, as much as an inspiration – as the evolutionary metaphor was amplified from botany to speech, from music to political organisation. Quoting G.H. Lewes, Beatrice Webb (1926, p. 115) later recalled the evolutionary optimism of the 1870s: ‘Onward and ever onward, mightier and forever mightier, rolls this wondrous tide of discovery’. And onward rolled the ISS.

In June 1872, King issued a list of 34 prospective titles, and between 1872 and 1879 produced 27 books, or an average of four per year. The first title was John Tyndall’s Forms of Water in Rain and Rivers, Ice and Glaciers [1], a collection of essays begun as six lectures for children at the Royal Institution in 1871. The second was Bagehot’s Physics and Politics [2], which had already appeared as a series in the Fortnightly. It went into seven languages by 1888 (Barrington, 1914). Dr. Edward Smith’s classic guide to nutrition, Foods [3], and Alexander Bain’s immensely influential Mind and Body [4], both promised at Edinburgh in 1871, appeared ‘without much delay’ in 1873 (Bain, 1904, p. 321). By 1910, Mind and Body had gone through eleven editions.

In 1871, Spencer, who had not at first intended to contribute to the series himself, was persuaded by Youmans to write a volume on the study of sociology. Successive chapters were first to appear both in the Contemporary Review of London, and in an American monthly. Meanwhile, with his usual gift for seizing opportunities, Youmans, in 1872, took the step of creating in New York the Popular Science Monthly [5], an important ‘class periodical’ devoted to ‘broadening concep-


Evolutionism and publishing had their limitations; the PSM was to be in the periodical press what the ISS would be in the world of books. As arranged, Spencer’s first chapter appeared in the opening issue (Duncan, 1908, p. 160). His Study of Sociology [6] was among the most successful volumes in the ISS, going through 22 English editions by 1914. In French translation (as La Science Sociale), it went through 14 editions by 1914, making it the most popular foreign work in the French series. Spencer’s book brought the series international fame. In America, William Graham Sumner used the Study of Sociology as a text at Yale despite the fact that the President, Noah Porter, forbade it as ‘anti-theistic’. Two new titles – Balfour Stewart, The Conservation of Energy [7], and J. Bell Pettigrew, Animal Locomotion [8] – brought the series in 1873 to a total of seven; by 1874, when Charles Kegan Paul, formerly a master at Eton, joined Henry King as literary adviser, the series was well under way. It had, in fact, become the largest undertaking in the firm (Mumby, 1934, pp. 183–184), and gave Kegan Paul, French and Trubner its first major push to prominence.

Despite these early successes, the early 1870s were not untroubled. A few authors never produced, and Huxley first postponed his contribution, then changed his subject completely. In America, where there was a large increase in scientific publishing (Newcomb, 1874), the series demanded constant care. In 1873, amid murmurings about the alleged ‘exclusion’ of American authors (Duncan, 1908, p. 159), Youmans fell seriously ill, badly strained from overwork (Fiske, 1894, p. 321), and business arrangements in England and America were temporarily left to drift. Moreover, in March 1874, what Youmans delicately described as a ‘difference of opinion’ arose between the English editorial committee, Henry King and Appleton (Spencer, 1904, pp. 298–278). The exact nature of these differences is not clear, but by the summer of 1873 we find Spencer asking Youmans to visit London to sharpen the edge of the Englishmen’s amiable, but unbusiness-like, attitude. The series, wrote Spencer ‘evidently wants a spur – some of the authors are lagging, and it is quite time that measures were taken for finding successors to them ...’ (Duncan, 1908, p. 187). But Spencer’s ‘hard line’ was contrary to the attitude of Huxley and Tyndall, who had deliberately refused to press authors unduly. Youmans felt bound to remind Spencer of their gentlemanly terms of agreement; he did, however, share Spencer’s concern. ‘The “Series” seems to be in a very bad way (internationally) and I don’t know but we shall have to let it go; it was a quixotic project, and I doubt if it is worth much further attention’ (Duncan, 1908, p. 187). The French series is particularly needed a push; of the first ten volumes to appear in France, seven were by British authors. Émile Altgave, teaching first in Douai and then in Lille, lived too far from Paris (psychologically and geographically) to command intellectual assent.

Despite all these hazards and shortcomings, the ISS prospered. Several learned weeklies, notably the Saturday Review and the Athenæum, with middlebrow, educated readerships, regularly reviewed its volumes. In time-honoured
fashion, sharp differences of opinion among reviewers did not hurt sales, nor authors’ reputations. Spencer’s *Study of Sociology*, which caused the *Saturday Review* to wonder whether it was ‘worthwhile for a philosopher to spend time in popularising his own ideas’ (*Saturday Review*, 1873), was warmly received in *Nature*:

Nowhere, perhaps, than in sociological phenomena is the truth of the doctrine of evolution, the central doctrine of Mr. Spencer’s philosophy, more strikingly displayed, and nowhere subject to proper limitation is it likely to prove more serviceable. (*Nature*, 1874)

In May 1874, the *Spectator* welcomed Henry Maudsley’s *Responsibility in Mental Disease* [8] which argued that, while heredity disposed certain individuals towards both crime and insanity, the social influences of bad housing and poor education played an important part. The *Spectator* approved of its bearing on the ‘welfare of the community and the instruction and improvement of the rising generation’ (*Spectator*, 1874).

Perhaps the greatest boost to sales and notoriety, however, came the following year, when there appeared the second most successful title of the entire ISS (and the most popular American volume) – John William Draper’s famous *History of the Conflict between Religion and Science* [13]. Following the ‘victorious certainty’ of Tyndall’s Belfast address, Draper’s book led to a terrific fanfare against materialism, agnosticism and iconoclasm in general. Draper went through twelve editions in English and was translated into French and German.39

By the mid-1870s, reforms in national scientific education were attracting great attention (MacLeod, 1916). The ‘endowment of research’ and the encouragement of scientific education involved demands for reform. Several publishers were alive to the implications of these new developments for the educational book market.40 Macmillan began the *Primeer* series, with texts written by T.H. Huxley, Henry Roscoe, Balfour Stewart and Archibald Geikie – whom the *Publishers Weekly* called ‘the very best men for the best work’ (*Publishers Weekly*, 1873). In 1876, the *Academy* could remark that ‘The cause of science is not likely to suffer in our schools for want of suitable textbooks’. Between five and ten series of textbooks were available, each attempting to set out ‘the orderly progression of ideas from general to particular, which seems the watchword of the age’.41 The publication of these textbooks could be very lucrative. Stanley Jevons, who wrote a *Primer of Logic* for Macmillan’s *Science Primer* series in 1876, said 8000 copies of his volume were sold in the first six months of publication. But as A.J. Mundella observed to John Lubbock, mere textbooks were not enough: ‘They are merely crams and burden the memory of children with a jargon of technical phraseology to which they attach no meaning’ (Lubbock Papers, 1880). What was needed were more sophisticated general books for the enlightened, interested student. In this development the ISS, in many respects, led the way. Although not specifically intended as textbooks, some of them (notably Huxley on the *Crustacean* [38], published in 1880) were so used, and were soon to be found in the libraries of the Headmasters’ Conference schools.

On the lives of its authors, the series, and others like it, had a noticeable effect. W.S. Jevons’ *Money and the Mechanism of Exchange* was published in 1875 [17], and galloped through 22 profitable editions. Meanwhile, his *Elementary Lessons in Logic*, for Macmillan’s *Science Class* Books, sold 3350 copies. In November 1874, he wrote to his sister that the *Lessons* were earning him £70 per year; his conclusion: ‘I think I am going to write more school or college books’ (Jevons, 1886).

After Henry King’s death in 1876, the ISS (which had passed to Charles Kegan Paul) was taken into the new firm of Kegan Paul, Trench and Co. Shortly afterwards, failing health forced Youmans to release more and more of the vital work of organisation to others. Although he lived until 1887, by 1880 he had ceased to be the animating, coordinating influence. In England, Alfred Trench, a younger son of the Archbishop of Dublin, attempted to develop the series in an enlightened fashion. As Kegan Paul later recalled, Trench happily took advice both from his father on ‘agnostic books’ and contributions from men of science on ‘advanced’ subjects:

He thought the day was long past in which questions discussed in those books could be shelved; that our attitude should be that when they were treated in a reverent and serious spirit, we should by no means refuse to publish the works of a firethinking or agnostic type. (Mumby, 1934, p. 189)

Kegan Paul’s reputation for liberal eclecticism won him the patronage of ‘some of the leaders of the advanced liberal movement in England’ (Critics, 1883), who often wrote for the *Nineteenth Century* – a review which performed the same function for Kegan Paul that Macmillan’s *Magazine* (from 1886) performed for Macmillan. Profits apart, the ISS helped to consolidate this liberal, moral and internationalist image of science increasingly preferred by the leading secular middle-brow publishers of London.

THE SERIES IN THE 1880s: CONSOLIDATION AND EXPANSION

In 1882, G.J. Romances observed in *Nature* that the ISS ‘both on account of its popularity at home, and of its well organised machinery for securing rapid translations abroad, is the most suitable place for publishing results which are in so eminent a degree of interest to general readers’ (*Nature*, 1882). During the 1880s, the series issued 43 new titles, twice as many as in the period 1872–1879 (see Table 1), together with continuing editions of older ones – Adolph Wurtz, Charles Young, Jean-Louis de Quetrefages, Nicolas Joly, Robert Scott – works often evolutionary in temperament, progressive in tone, comparative in style.
Table 1

<table>
<thead>
<tr>
<th>Country</th>
<th>Total titles</th>
<th>Total authors</th>
<th>Authors of different nationalities as percentage of total</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.K.</td>
<td>15</td>
<td>45</td>
<td>57.9</td>
</tr>
<tr>
<td>U.S.A.</td>
<td>4</td>
<td>10</td>
<td>21.2</td>
</tr>
<tr>
<td>France</td>
<td>1</td>
<td>12</td>
<td>23.1</td>
</tr>
<tr>
<td>Germany</td>
<td></td>
<td>17</td>
<td>29.8</td>
</tr>
<tr>
<td>Italy</td>
<td>2</td>
<td>4</td>
<td>4.7</td>
</tr>
<tr>
<td>Others</td>
<td>3</td>
<td>4</td>
<td>4.7</td>
</tr>
<tr>
<td></td>
<td>27</td>
<td>40</td>
<td>100.0</td>
</tr>
</tbody>
</table>

The series perhaps reached its apogee with the appearance of Sir John Lubbock's immensely popular *Ants, Bees and Wasps* [40] in 1882. The book - consisting of papers read to the Linnean Society and the Royal Institution on insect psychology, labour and community life - enjoyed the added advertisement of Lubbock's Presidency of the British Association in 1881.

During the 1880s, the series increasingly devoted itself to exploring the implications of Darwinian biological theory. Not surprisingly, the series gained added visibility whenever noted Darwinians, including Ray Lankester and George Romanes, reviewed its titles in *Nature*.24 The effect was for a dozen years at least, highly integrative. In 1887, at the Queen's Jubilee, Grant Allen contrasted the "fragments and disjointive" science of fifty years previously with the spectacle of modern science as a simple, unified and comprehensive cosmos, consisting everywhere of the same prime elements, drawn together everywhere by the same great forces, animated everywhere by the same constant and indestructible energies, evolving everywhere along the same lines in accordance with the self-same underlying principles. (Allen, 1887)

The series illuminated this sense of a unified, comprehensive evolutionary dynamic. In the purest form of flattery, the idea of the ISS found one important imitator in Havelock Ellis, who in 1888 felt that, despite its success in leading "advanced thought" for over seventeen years, the "old (sic) International Scientific Series" in which such memorable books appeared, had now reached the state of senility. A new series on more modern lines was needed, with more attention to those sciences and those aspects of science which were now coming to the front. (Ellis, 1897, pp. 170-171)

One could not keep a good idea down.

In 1889, Ellis began the 'Contemporary Science Series' (opening with Patrick Geddes and J. Arthur Thomson's *The Evolution of Sex*) published by Walter Scott, which carried on for 25 years and 48 distinguished volumes (Ellis, 1963, pp. 170-171). Meanwhile, Appleton's themselves began a new 'International Education Series' (edited by William T. Harries) which produced 64 volumes and was sold in 1909 to the American Book Company (Madison, 1966, p. 76). In America, Appleton's leadership was contested by Putnam's *New Progressive Science Series*, edited by J. McKeen Cattell from 1898. Putnam's series (which included Simon Newcomb's *The Stars, C.A. Young's The Earth as a Planet* and T.C. Mendenhall's *The Measurement of the Earth*)20 even received a warm reception in England. Indeed, so successful was the idea that, by 1890, some thought that there was a surplus of scientific series. As Tyndall wrote despairingly to Lubbock:

"In the midst of Napoleon's victories, the French were known to cry out 'Assize Buona- parte', and in the midst of the triumphs of science one is also tempted to cry 'Assize'. Is there to be no end to scientific books and scientific research?" (Lubbock Papers, 1896)

THE SERIES IN THE NINETIES - DECLINE AND FALL.

In fact, as Tyndall surmised, there were factors at work which would hamper its progress. Beginning in the mid-1880s, the series moved into hard times. After its rapid growth in the 1870s, it had declined sharply by the 1890s, and scarcely managed to survive into the twentieth century. Evidence suggests that contemporary series generally did not follow this pattern, but the ISS was vulnerable on several points. In retrospect, its editors and publishers failed to anticipate these difficulties, and to respond to new market opportunities. But this is an easy judgement. To contemporaries, the position was more than complicated.

If the late 1880s were the watershed of the series they also signalled the beginning of what Jerome Buckley has called 'a revolt from reason'.34 Evolutionism had not won man glories of the spirit or the satisfaction of human kindness, and materialism and the 'tyranny of science' had made profound enemies.35 Tennyson summarised his own sensation of disillusionment and despair with science and its mystique in *Locksley Hall, Sixty Years After*. Beatrice Webb described her feelings in 1882 when she explained that she had tried the 'religion of science and [had] found it wanting'. Science could never be, in her terms, the religion of a 'suffering humanity' (Webb, 1926, p. 86). Even William Graham whose volume on *Socialism, New and Old* [75] was published in the ISS in 1890, delivered a heavy blow against the aggressions of 'modern science' in the realm of politics and religion.

Moreover, by the turn of the century, the concept of unified positive knowledge was under attack (cf. Strong, 1966), as A.J. Balfour demonstrated in his Presidential Address to the British Association in 1904. The 'revolt against positivism' incorporated a revolt against the evolutionary naturalism that had served as the conceptual 'character' of the ISS. When Grant Allen died in 1899, his biographer admitted that he 'perhaps...too confidently set up Darwin and Mr. Herbert Spencer in the place of his lost Hebrew prophet (Le Gallienne, 1899).
And both in France and England, Brunetière and Ray Lankester declaimed against
the 'bankruptcy of science'.

It is difficult to assess the extent of the changing beliefs in reading fashions;
any effect upon particular series was, to say the least, indirect. Nevertheless,
the climate had become distinctly unfavourable. In England, the widening
separation between science and religion, literature and philosophy, now mocked
the 'unified spirit' of la science totale and Wissenschaftlichkeit of the 1870s. The
British reading public seems to have moved away from the mid-Victorian fas-
cination with natural history and improving texts. Science became romantic-
ised, as in the novels of William Howells and H.G. Wells; or made the agent
of detection or crime, as in R.L. Stevenson's *Jekyll and Hyde* (1886). 'Popular
science' became operational knowledge, and those several series praising the
'heroes of science' which were successful, looked back to an arcadian vision
of Victorian achievement. C.P. Putnam and Sons began a 'Leaders in Science'
series (edited by S. Chapman) in 1919. But these new publishing ventures
thrive on history; glorifying the past, rather than cultivating a future. The
cumulative effect was to produce a climate which, critical of many former cer-
tainties, did not augur well for the Series, or its contemporaries.

By the 1890s, the ISS met a much less favourable reception in the 'quality'
weeklies of London. The ambitious scope of the series did not agree with everyone.
Indeed, the influence and authority of the 'familiar black and red cover' as one
put it, invested each book with a 'considerable capacity for harm' (*Athenaeum*,
1890). When a book was simply 'bad' (as, in one case, the *Athenaeum* described
Poulton's *Colours of Animals* (1890, 68)), it could make a very much worse
impression than an ordinary bad book. Moreover, as G. Wright's *Man and the Glacial
Period* (1893, 72) demonstrated, a book's mere presence in the series could lend
a misleading air of authority to an otherwise controversial interpretation.28

Sometimes, this impression of authority was belied by the facts. As Kegan Paul,
with a trace of bitterness, recalled, 'some of the most distinguished contributors
gave merely old magazine articles, while others were not so well known to the
world in general as men of scientific importance' (Kegan Paul, 1899, p. 286).
True, T.G. Bonney's *Ice Work, Present and Past* (1896, 78) was welcomed as
one of the best books on glacial geology (*Athenaeum*, 1896), and as a model of
what the series should be. 'An exposition of the results of modern research and
modern thought which shall be an unrestricted and international character, writ-
ten without offence to prejudices or persons...'. (cf. *Nature*, 1896). But while
*What is Electricity?* (1897, 82) was considered 'pleasant reading', F.W. Elderidge-
Green's *Memory and its Cultivation* (1897, 83) was considered out-of-date, alle-
gorical and polemical in the worst sense (*Nature*, 1897). M.G. Cooke's *Introduction
to Freshwater Algae* (1890, 69) took its place as a work of reference next to William
Phillip's *Manual of the British Dicotsydonts* (1887, 61); but Thomas Stebbing's
*History of the Cruciferae* (1893, 74) was rejected as a disappointing failure in scien-
was taken as a most useful guide to the transmutation of species, but George
Henslow's *Origin of Plant Structures* (1895, 77) was criticised by C.A. Barber in

There were also grounds for financial concern. The new titles were not selling
as well as the older ones. In his eagerness to accept the series in 1871, Henry
King had offered what struck Kegan Paul as liberal terms, possibly 'too liberal
indeed to make the series a great financial success' (Kegan Paul, 1899, p. 286) —
unless there were several editions. Many of the works, moreover, including
Huxley's excellent study of *The Greyfriars* (28), had expensive illustrations. Finally,
there were the usual difficulties of translation. Mrs. Kegan Paul did many of the
translations from French (for which she was paid £25 a time), but the office could
not easily cope with other languages. As Kegan Paul woefully recounted, H.
Vogel's *Light and Photography* (1875, 15) had to be translated from German
and only reached him in proof. But the translation was misplaced, and, since
the whole edition of 1250 had to be condensed before publication, a new trans-
lation had to be made. This translation was criticised in *Nature* until a second,
and 'thoroughly revised' edition could be prepared (*Nature*, 1875; 1876). Even
then, the *Academy* slammed it as a 'flagrant case of book-making without sufficient
capital — absolutely useless as a scientific or practical textbook or manual' (*Aca-
demy*, 1876).

Amidst these difficulties, the publishers in London grew increasingly unable
to deal with scientific content. Kegan Paul's reaction to a loss on Lubbock's
*Seedlings* (1895, 79) was to argue for issuing a 'readable edition of the book
from which the purely scientific matter is omitted' (Lubbock Papers, 1893).
After Youmans' death in 1887, the series lacked a strong 'scientific editor'. The
ISS had been weighted strongly in favour of the biological and social sciences
(reflecting, probably, Spencer and Huxley). In omitting volumenes on mathematics
or astronomy, in giving slight treatment to physics, or the 'new chemistry' (only
to of the 98 titles are in these fields), the series by the 1890s gave a misleading
impression of the breadth of modern science.

To compound matters, Kegan Paul misjudged his market. Writing to Lubbock
in 1891, he confessed his fears as to the ability of a new series, 'Modern Science',
to pay its way:

The books, one and all, as far as we have seen them, seem admirable, but not such as the
public are likely to buy in large numbers, and we doubt whether there is a sufficient
number of real students and scholars to purchase the very large quantities necessary to
make 'Modern Science' a paying speculation. (Lubbock Papers, 1891)

In fact, as the experience of Macmillan had shown, science was a gilt-edge in-
vestment. There is no evidence that reducing the price of books in science helped
sell them — a factor American publishers put to their advantage. Kegan Paul
had difficulty with content, in large part because he had difficulties with his authors. If good science books were becoming difficult to sell, good authors were also becoming more difficult to find. The proportion of F.R.S.'s (including foreign members) among authors in the English series had hovered around 39% in each decade between 1872 and 1899, but after 1910 this proportion fell to eight per cent. The proportion of British authors sufficiently distinguished to appear eventually in the DNB also fell sharply (see Table 2).

Within the ranks of scientific writers, the age of the 'great generalists' – Huxley, Tyndall and Spencer – had passed. Their successors were less distinguished, and sold less well. Increasingly, publishers turned to specialisation for professional use, and for the teaching of specific disciplines. This movement towards specialisation, towards institutional development, and towards national efficiency tended, if anything, to distract readers (and publishers) away from general series which emphasised popular scientific culture, and which were directed to an international audience.

This situation worried W.C.D. Whetham, whose Recent Development of Physical Science, which first appeared in August 1904, actively looked to the possibility of treating the wider and deeper generalisations of natural science as fit subject matter for current thought and literature ...

Yet, Whetham believed, there was not a sufficient and ‘proper understanding of the scientific spirit and scientific method even among the more educated portion of the community’. The problem was acute for scientists, too. As a contemporary zoological reviewer for Nature bewailed:

The accumulation of facts in zoology during the last quarter of a century has been so overwhelming that it becomes most difficult even to gauge the capacity of a book ... which deals broadly with the whole field. (Nature, 1903)

Welded to the examination system, science books became increasingly textbooks – in the words of a late-Victorian reformer – mere 'collections of test-cards framed on models of those set by inspectors of schools' (Dyer, 1893, p. 17). The predictable result was evident as early as the late 1880s. A reviewer in Nature observed:

It is by no means an uncommon misfortune to find that textbooks are not written by persons the most competent or with the widest experience; hence the results are very far from satisfactory, and no one expresses such gratification. (Nature, 1888)

The end of the ISS came gradually, but ineluctably. In Germany, the series stopped in 1889. In America, where records have vanished, the series seems to have ended by 1910, and in England, the last new title appeared in 1911. By that time, clearly, the era of international peace which had given the cooperative aim of the series its legitimacy, had collapsed – and with it passed, for a time, heroic appeals to the scientific book as a symbol of ‘free trade in ideas’ (see Table 3).

Faltering, the English edition was suspended between 1899 and 1902, whilst advertisements in Nature offered to re-issue the series ‘at a greatly reduced price’. Only one volume, H.M. Vernon, Variations in Animals and Plants (88) appeared in 1903, and the series lapsed again between 1904 and 1907. The future prospects of the ISS were unpromising; yet, on the whole, it had proved profitable. Of the ninety-eight titles issued by 1911, no less than seventy-four had gone through more than one edition. Although superseded by Andrew White's History of the Warfare of Science with Theology in Christendom, Draper's History of the Conflict between Science and Religion alone sold over 25,000 copies; it enjoyed fifty printings by the early 1930s, and, in 1950, it was still on Appleton's list. Draper's Conflict between Religion and Science was also reprinted by the Vanguard Press in New York, in 1906; Robert Thurston's History of the Growth of the Steam Engine was last reprinted by Cornell University Press in 1939; Abercombie's Weather was last reprinted in 1946, and Spencer's Study of Sociology was last reprinted by Dover Paperback in 1961.

In France, the collective ideal survived the century. This was probably due to a combination of factors, about which one has only the slimmest evidence. On the one hand, the number of French series – scientific, literary and philosophical – in which scientific titles could appear, continued to grow. Declaring the quarter-century ending in 1910, 'la grande période de spécialisation de la médecine et des sciences', Masson et Cie alone published 1370 scientific and medical titles between 1889 and 1900, and began several new series, including a 'Bibliothèque de la Nature' (Masson et Cie, 1954). Even Tyndall's French publishers, Gaudichau-Villars, began their own series of 'Actualités Scientifiques'. In France, the ISS also lived on, strengthened by traditional symmetries between the natural and social sciences, by an evident accommodation between intellectual demand and commercial interests. One may speculate that the ghost of Spencer, mediated by Durkheim, retained some hold on French intellectual life. The new Presses Universitaires de France, succeeding Felix Alcan, began in 1910 La Nouvelle Biblio-

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**Table 2**

<table>
<thead>
<tr>
<th>Distinctions among authors of the ISS (English edition)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1872-79</td>
</tr>
<tr>
<td>Number of titles</td>
</tr>
<tr>
<td>Number written by authors mentioned in DNB</td>
</tr>
<tr>
<td>Number written by FRS's (UK and Canada)</td>
</tr>
<tr>
<td>Number written by FRS's (Foreign members)</td>
</tr>
<tr>
<td>Authors</td>
</tr>
<tr>
<td>---------</td>
</tr>
<tr>
<td>UK</td>
</tr>
<tr>
<td>USA</td>
</tr>
<tr>
<td>Germany</td>
</tr>
<tr>
<td>France</td>
</tr>
<tr>
<td>Italy</td>
</tr>
<tr>
<td>Other</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

* Contributions from Strasbourg are counted as German in the period 1871-1914.

** Brochhaus announced the publication of 68 titles to all, but only 48 can be traced.

** Puème Scientifique Internationale. A half century later, this PUF series continues. In content, there is little to suggest its origins, but in title at least, it keeps alive a semblance of its original ideology.

If the survival of the series in France owes much to the particular supportive characteristics of the French publishing industry, its subsidies, and its selling strategies, in England and America the series was arguably much more sensitive to the changing pressures of the market. As such, the end of the ISS signalled the end of an epoch in English and American scientific publishing, and possibly a turning point in the organisation of science. With the end of the Great War, the concept of the international series was occasionally taken up again, but with very little of the same unifying literary and humanitarian spirit. In 1920, Kegan Paul [now Routledge and Kegan Paul] launched a new series — the ‘International Library of Psychology, Philosophy and Scientific Method’ (edited by C.K. Ogden) — the first volume of which was G.E. Moore’s *Philosophical Studies*. By 1934, there were nearly 120 books in the series, which was described as an ‘heroic attempt to incorporate all current tendencies of international thought’ in the field.** Between the wars, Routledge also published the famous *Future of Science* series. But these ventures now spoke of a vastly altered concep­tion of science, of specialized knowledge and of science and knowledge no longer ‘unified’ by a Spencerian evolutionary, perspective.

The ISS had fostered, commercially and intellectually, a scientific consciousness. With poetic justice, having failed to adapt itself, or to find an ecological niche, it lost its selective advantage in the struggle for survival. Its history reflects the tensions within the mid-Victorian synthesis, and the pressures of commercial competition, intellectual fragmentation and specialisation. Without doubt, by the turn of the century, the vested interests, public demands, and intellectual justifications for scientific publishing were no less pressing — but their force and direction had changed. This, above all, the ISS, and other series to which we can generalise, amply illustrate. An attempt to offer a new ‘common context’ had ultimately failed. In England and America, at least, the circle of the sciences had been broken — and publishers, professors, and researchers, moved in to collect the pieces.

**Acknowledgements**

I am grateful for the kind cooperation of Mrs. Margaret Selby, of Routledge and Kegan Paul Ltd., in making available to me records and ledgers of the English edition; and for the assistance of the Lilly Library of Indiana University, in allowing me to consult the Appleton papers in their possession. I am also indebted to Fraulein Schlecht of F.A. Brockhaus, formerly of Leipzig, and now of Wiesbaden; to M. Hervé Lautrot Prevost of Presses Universitaires de France, Paris; and to Mr. Burton Frye of Appleton-Century-Crofts, New York, for helping in my enquiries. I am also grateful for the assistance of M. Clemens Heller and
Appendix I. The International Scientific Series


(Detailed information on illustrations is not available for all titles.)

[1] Tyndall, John
Forms of Water: in Clouds and Rivers, Ice and Glaciers
(1871) 192 pp.; 25 illus.; (13 editions)

Physics and Politics, or Thoughts on the Application of the Principles of Natural Selection and Inheritance to Political Society
(1872) 228 pp.; (13 editions)

[3] Smith, Edward
Foods
(1873) 483 pp.; 156 illus.; (10 editions)

Mind and Body: The Theory of their Relation
(1873) 196 pp.; 4 illus.; (10 editions)

[5] Spencer, Herbert
The Study of Sociology
(1873) 446 pp.; (22 editions)

[6] Stewart, Balfour
The Conservation of Energy, being an Elementary Treatise on Energy and its Laws
(1873) 180 pp.; 14 illus.; (9 editions)

[7] Pettigrew, J. Bell
Animal Locomotion, or Walking, Swimming and Flying, with a Dissertation on Aeronautics
(1873) 250 pp.; 103 illus.; (2 editions)

[8] Maudsley, Henry
Responsibility in Mental Disease
(1874) 313 pp.; (5 editions)

[9] Cooke, Josiah P.
The New Chemistry
(1874) 333 pp.; 31 illus.; (11 editions)

[10] Amos, Sheldon
The Science of Law
(1874) 417 pp.; (6 editions)

Animal Mechanism
(1874) 283 pp.; 17 illus.; (4 editions)

[12] Schmidt, Eduard Oscar
The Doctrine of Descent and Darwinism
(1875) 334 pp.; 26 illus.; (8 editions)

[13] Draper, John William
The History of the Conflict between Religion and Science
(1875) 373 pp.; (24 editions)

[14] Cooke, Mordecai Cubitt
Fungi: Their Nature, Influence and Uses in their Application to Art, Science and Industry
(1875) 299 pp.; 125 illus.; (6 editions)

The Chemistry of Light and Photography
(1875) 302 pp.; 100 illus.; (1 edition)

[16] Whitney, William Dwight
The Life and Growth of Language
(1875) 526 pp.; (7 editions)

[17] Jevons, Stanley
Money and the Mechanism of Exchange
(1875) 349 pp.; (22 editions)

[18] Lomell, Eugene
The Nature of Light, and a General Account of Physical Optics
(1875) 356 pp.; 188 illus.; (7 editions)

[19] van Beneden, Pierro J.
Animal Parasites and Maladies
(1876) 274 pp.; 83 illus.; (4 editions)

[20] Schützenberger, Paul
Fermentation
(1876) 331 pp.; 26 illus.; (5 editions)

[21] Bernstein, Julius
The Five Senses of Man
(1876) 504 pp.; 91 illus.; (7 editions)

[22] Blakemore, Pietro
The Theory of Sound in its Relation to Music
(1876) 187 pp.; numerous illus.; (7 editions)

[23] Lockyer, J. Norman
Studies in Spectrum Analysis
(1875) 258 pp.; numerous illus.; (6 editions)

[24] Thurston, Robert Henry
A History of the Growth of the Steam Engine
(1878) 500 pp.; numerous illus.; (5 editions)

[25] Bain, Alexander
Education as a Science
(1879) 453 pp.; (10 editions)

[26] de Quatrefages, J.L. Armand
The Human Species
(1879) 468 pp.; (6 editions)

[27] Rooke, Ogden N.
Modern Chromatics
(1879) 330 pp.; 130 illus.; (4 editions)

[28] Huxley, Thomas Henry
The Crayfish: An Introduction to the Study of Zoology
(1880) 371 pp.; 82 illus.; (7 editions)

[29] Bastian, H. Charlton
The Brain as an Organ of Mind
(1880) 708 pp.; 184 illus.; (5 editions)

The Atomic Theory
(1880) 344 pp.; (7 editions)

[31] Semper, Karl
The Natural Conditions of Existence, as they affect Animal Life
(1880) 572 pp.; 168 illus.; (5 editions)

[32] Rosenthal, Jadur
General Physiology of Muscles and Nerves
(1880) 924 pp.; 75 illus.; (4 editions)

[33] Le Conte, Joseph
Light: An Exposition of the Principles of Monocromal and Binocular Vision
(1880) 363 pp.; numerous illus.; (3 editions)

[34] Sully, James
Illusions: A Psychological Study
(1881) 372 pp.; (4 editions)

[35] Juden, John W.
Vocalism
(1881) 383 pp.; 96 illus.; (6 editions)

[36] Morrell, Henry
Suicide: An Essay on Comparative Moral Statistics
(1881) 388 pp.; illus.; (3 editions)

[37] Lys, Jules Bernard
The Brain and its Functions
(1881) 327 pp.; illus.; (4 editions)

[38] Vincoli, Iliod
Myth and Science
(1882) 370 pp.; (4 editions)

[39] Young, Charles Augustus
The Sun
(1882) 321 pp.; numerous illus.; (5 editions)
[84] VINCENT, Ralph Harry
Elements of Hypnotism
(1897) 271 pp.; 17 illus.; (2 editions)

[85] MILNE, John
Seismology
(1896) 338 pp.; 52 figs.; (1 edition)

[86] LUBBOCK, Sir John
Buds and Stipules
(1899) 239 pp.; 340 figs.; (1 edition)

[87] DEMOOR, Jean;
MASSART, Jean;
van der VELDE, Emile
Evolution by Atrophy in Biology and Sociology
(1899) 322 pp.; (1 edition)

[88] VERNON, Horace Middleton
Variation in Animals and Plants
(1903) 415 pp.; (1 edition)

[89] BENET, Alfred
The Mind and the Brain
(1907) 280 pp.; (1 edition)

[90] Poincaré, Lucien
Evolution of Modern Physics
(1907) 344 pp.; (1 edition)

[91] LE BON, Gustave
The Evolution of Forces
(1908) 388 pp.; 42 figs.; (1 edition)

[92] MAKOWER, Walter
The Radio-Active Substances: their Properties and Behaviour
(1908) 301 pp.; (1 edition)

[93] COMPARIEU, Jules
Music: Its Laws and Evolution
(1910) 334 pp.

[94] DEPERET, Charles
The Transformation of the Animal World
(1909) 360 pp.; (1 edition)

[95] MACNAMARA, N. Charles
Human Speech: A Study in the Pragmatic Action of Living Matter
(1908) 284 pp.; 44 illus.; (1 edition)

[96] GARRETT, Albert E.
The Periodic Law
(1909) 294 pp.; (1 edition)

[97] MACNAMARA, N. Charles
The Evolution and Function of Living Pragmatic Matter
(1910) 298 pp.; illus.

[98] TUTTON, Alfred E.H.
Crystals
(1911) 301 pp.; 120 illus.

Note: The edition number in parenthesis refers throughout to the number of editions reached by 1909. This, in most instances, was the final edition.

Appendix II: Dates of First English Editions

1872 Tyndall [11], Bagemihl [2]
1873 Smith [3], Bain [4], Spencer [5], Stewart [6], Pettigrew [7]
1874 Maublrey [8], Cooke [9], Amos [10], Marry [11]
1875 Schmidt [12], Draper [13], Cooke and Berkeley [14], Vogel [15], Whittier [16], Jevons [17], Lommel [18], Lockyer [23]
1876 van Beneden [19], Schützenberger [20], Bernstein [21], Blaserna [22]
1877

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1878 Thurston [24]
1879 Bain [25], Quatrefage [26], Rood [27]
1880 Huxley [28], Bastian [29], Wurtz [30]
1881 Semper [31], Rosenthal [32], Le Conte [33], Sully [34], Judd [35], Morselli [36], Loyd [37]
1882 Vignolli [38], Young [39], Lubbock [40], Romanes [41], Sallo [42], Ribot [43]
1883 Joly [44], Aron [45], Scott [46], Meyer [47], Sidgwick [48]
1884 De Candolle [49]
1885 Romanes [50], Clifford [51], Warner [52], Hartmann [53], Schmidt [54]
1886 Ponsnett [55], Milne [56], Trouessart [57]
1887 Heilpern [58], Abcureseous [59], Binet [60], Phillips [61], Levy [62]
1888 Dawes [63], Henslow [64], Lubbock [65]
1889 Starcke [66], Lagrange [67]
1890 Poulton [68], Cooke and Berkeley [69], Graham [70]
1891 Eldridge-Green [71]
1892 Wright [72], Thompson [73]
1893 Stebbing [74], Kew [75]
1894 Lefèvre [76]
1895 Henslow [77]
1896 Bonney [78], Lubbock [79], Parry [80], Angot [81]
1897 Troubridge [82], Eldridge-Green [83], Vincent [84]
1898 Milne [85]
1899 Lubbock [86], Demoor et al. [87]
1900 –
1901 –
1902 –
1903 Vernon [88]
1904 –
1905 –
1906 –
1907 Binet [89], Poincaré [90]
1908 Le Bon [91], MacKower [92], Macnamara [93]
1909 Deperet [94], Garrett [96]
1910 Combarteu [95], Macnamara [97]
1911 Tutton [98]

Notes

1 Youngmans was described as one of Appletons's greatest contributors to publishing and American culture (Madison, 1966, p. 31).
3 Quoted in C. Wright Mills, Sociology and Pragmatism, the Higher Learning in America, New York, 1959, p. 53.
4 Provision for international copyright for British works was made by the International Copyright Act (1892 and 1893), as elaborated by the Copyright Act, 1911, which took 53 years and 12 Bills through Congress, copyright in the United States could only be obtained by American citizens; cf. E.J. MacGillivray, Twelve upon the Law of Copyright in the United Kingdom, London, 1902. George Putnam appears to have been the first American publisher to pay royalties to British authors, beginning in 1889, but many of the better houses formed a kind of "unofficial copy-
right'. American publishers often argued that American readers were poor and that English authors could live on their English sales. There was also some fear that, if copyright were granted to English authors, pirating might pass to English control; cf. George S. Gordon, Anglo-American Literary Rights, Q.U.P., 1924, pp. 83-86 (cf. also Madison, 1969, pp. 25-90, 53-57).

Youmann, himself, was not entirely innocent of this—his record in publishing material previously published in Nature in the Popular Science Monthly (begun in 1871), proves.

Spencer, he later wrote: 'Spencer to Youmann, J July 1871, also endorsed by Tyrndall and Lubbock.'

These pages are indebted to Fiske (1894, Ch. XIII, pp. 266-294) which offers the best account of the origins of the series through the letters of Youmann to his sister.

Leonard Huxley intriguingly describes H.S. King as politically a 'stout conservative'; what bearing, if any, this may have had on the future of the ISIS is not clear; L. Huxley, The House of Smith, Ender, London, 1925.

H.P. Baillière (1840-1905), son of Jean-Baptiste Baillière (1797-1885), also founded the famous publishing house of Baillière et Cie. By 1871, Baillière has built a wide reputation in scientific and medical texts and bibliography. Through Gustave-Germot Baillère (a cousin of Henri Paul), the Maison had already begun the 'Bibliothèque de Philosophie Contemporaine' (1868), and had acquired (with the editorship of Emile Aligave) La Revue des Cours Scientifiques. This was resumed in 1872 as La Revue Scientifique.

Cf. Evidence to the Royal Commission on Copyright, 1878, [c. 2036-7], Q. 1297.

It happened, however, that the Germans became more interested in Spencer's title than in any other, and Youmann thought that this must lead to a prompt demand for the Synthetic Philosophy.

In fact, scientific publishing was flourishing in Germany. W. Crookes found that from a sample of 31 scientific books published in the first fortnight of September 1872, 15 were German, 8 were French and only two were British. W. Crookes, 'Endowment of Scientific Research', Quarterly Journal of Science, VI (Nat.), (1876), 469. An excellent example of the success of German scientific publishing at this general level can be found in the Geschichte der Wissenschaften in Deutschland, Königliche Akademie der Wissenschaften, Munich, which published 14 volumes between 1861 and 1915; cf. G. Sarton, Histoire: A Guide to the History of Science, New York, 1932, p. 174.

Despite comment to the contrary, the vision of European cooperation seems as much attributable to Spencer as to Youmann himself: A. Appleton, The House of Appleton-Century, New York, 1936, pp. 13-15.


University of Paris, and later an influential writer on the reform of import duties and alcohol regulations; cf. Dictionnaire de Biographie Française, Paris, 1935.

Termed dead in September 1873, and his place was taken by Professor H. Marquard of Erlangen; cf. Heinrich Brockhaus, Der Firma F.A. Brockhaus von der Begründung bis zum 100jährigen Jubiläum, 1805-1905, Leipzig, 1905, pp. 306-307.

Memorandum of Agreement cited in Note 11. It was also specified that no national committee could admit to its series a work of another country which did not come into the list sanctioned by the committee of that country.

H.S. King and Co., First List Advertisement, June 1871.

See: The Publishers and Stationers Weekly Trade Circular (afterwards Publishers Weekly), 1 (25 January 1872), 47; a further advertisement, listing the titles to be published, featured in the same issue (p. 79), with the description: 'These Books will be so much for beginners in science as to acquaint those who have had at least a fair general cultivation in the latest developments of the subjects treated'.

Part of the advertisement for the series which appeared for example, in the French edition of Balfour Stewart, The Conservation of Energy (1868).

For a chronological list of authors in the English edition, see Appendix I, numbers in brackets refer to the order of publication (see Appendix II).

For Bain's contributions to associationism and sensory physiology, see R. Young, Mind, Brain and Adaptation in the Nineteenth Century, Oxford, 1976, Ch. 3. Most of Bain's works were published by Routledge and Kegan Paul, but by John Parker, later Longmans.

The PSM, in periodical form, reflected the same concept; cf. PSM, I (May, 1872), 113. The Popular Science Monthly, with which Appleton intended to bring to America the scientific thought of Europe, began in 1872, widely read and influential periodical of its kind (Madison, 1966, p. 74).

It was sold in 1900, when Appleton's suffered a severe financial crisis, and was edited by J. McKern Castell (then editor of Science), until 1915, when it was divided into the PSM, and the Scientific Monthly, the former thereafter became a popular 'journal in a different sense, while the latter survived in original form until 1936, when it was incorporated into Science.


Huxley's famous study of The Crayfish was eventually published in 1880 [28], and went through seven editions.

This was the common plight of all series. Henry Holt's attempt to develop the rival 'American Science Series' required 'great patience, constant concern and adroit diplomacy. Authors failed to meet deadlines, or backed out suddenly, or wrote on a level unsuitable for the intended reader' (Madison, 1966, p. 98). Recent enquiries of Holt have failed to elicit details of this series, which would undoubtedly provide interesting parallels.

Joseph Cooke's The New Chemistry (1874) was the first American volume in the series.

A search has been made for each of the 48 English volumes in the following journals: Academy, Spectator, Nature, The Saturday Review and the Athenaeum. The Academy rarely reviewed the ISS, the Spectator reviewed only four and The Saturday Review, only seven; Nature, with 35, was better; but this analysis given only a partial impression of the series' reception as a whole. Searches in more specialist journals would undoubtedly reveal more detailed reactions, and although the general impact would probably remain difficult to assess, the methodology of Alvar Ellegård would almost certainly yield interesting conclusions.

Part of Tyrndall's Belfast Address had been based on Draper's earlier book on European culture. In France, Draper was denounced in a series devoted to Actualités Scientifiques as 'une expression passionate de haine, une déclaration violente de guerre, une déclaration pleine de colère, basée sur une interprétation particulière, arbitraire et fausse des faits de figures de l'histoire! L'Arche Maconn, La Foi et la Science: Exposition de la Libre Pensée. Youmann's negotiations with Draper are described in Donald Fleming, John William Draper and the Religion of Science, Philadelphia, 1936, pp. 123-126.

As early as 1874, the Royal Society of Art held an educational exhibition with a three-volume Prospectus which advertised science texts likely to be accepted by the Science and Art Department. Among the contemporary rivals were Longmans' 'Textbooks of Science', edited by T.M. Goodwin and W. Merrifield, FRS, begun in the early 1870s, and, in 1879, 'adapted for the use of artisans and other students in public and other schools'. Longmans also published Advanced Science Manuals, 17 vol., 1870-1900; Elementary Science Manuals, 2 vols., 1870-1900; and H. Helmholts' Popular Lectures in Scientific Subjects, with an introduction by John Tyndall.

The Academy, 20 (24 July 1876) in a review of the PSM's Manuals of Elementary Science (1875- ); cf. the Clarendon Press List of School Books and Manuals (1866), and Macmillans, School Class Books, 7 vols., 1870-1877, and Manuals for Students (1865), Science Printers, 10 vols, 1873-1880; and the Nation, 1872-1880.

For Romanes, see Jacob Gruber, A Concise in Conflict, New York, 1966. This is unfortunately no recent list of Lancaster.

Madison (1966, p. 79), 'That volumes in a series like the "Progressive Science Series" should reach second and third editions is a welcome sign that we are beginning to recognize a good thing when it is offered to us. Certainly the three volumes before us are quite indispensable to students of the subjects dealt with, and they have also the rare advantage of being intelligible to the general readers.' These volumes were by J. Arthur Thomson, Hendry: T.G. Bonyey, Volumes; Soddys, Interpretation of Radio-

For the intellectual and literary dimensions of these reactions are described in Ch. 10, 'The Revolt from Tradition', Jerome Buckley, The Victorian Temper, Cambridge, Mass., 1931.


This series was published by the PSM from 1871.
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Nature (1881): 26, 121.
Oberon, G. (1907): Portrait of a Publisher: The First Hundred Years of the House of Appleton, 1825-1925, New York.
Publisher's Weekly (1871): 3, 375.
Saturday Review (1873): 29 November, 701.
Spectator (1874): 23 May, 684.