

of the volume that adheres in spirit to the author's previous book and to most of the work done in his profession. Here he forcefully and fully delineates how he will extend his previous quantitative estimates on the creation and distribution of knowledge. For those readers who might have hoped that he would make their jobs easier by making the estimates consistent in every way possible with the received knowledge of our national income and product accounts, the news is bad; refusing to follow the lead of Marc Uri Porat, whose *The Information Economy* does exactly that, Machlup decides instead to make his forthcoming estimates consistent with his own previous work. In that way, as he carefully explains, he will capture aspects of the knowledge-creating industries and occupations that are lost if one uses the alternative techniques.

While the actual quantitative work is far down the path yet, Machlup sketches for us the outlines of what will be involved. The subject matter will be an information explosion. In the years between 1958 (the cut-off point for his previous volume) and 1975 (the cut-off point for the current study), the knowledge industries experienced astonishing growth and the knowledge occupations came to play a greater and greater role in our national economy. For the present all Machlup can do is describe these changes in general terms and set forth the categories he will use in his subsequent volumes (each of which is tentatively described). But already you can see how important the subject is and how significant the results of his project will be.

Those of us who are deeply concerned about the declining rate of productivity increase in America in the last decade and a half will await Machlup's estimates with particular interest. We need to know far more than we do about the knowledge industries and occupations, about their roles in the private and public sectors of our society, about their growth rates, and about their economic impact. We need a study that combines, as this one does, quantitative measures with qualitative and historical evaluations. Whether you are an impatient highway traveler or a stroller, you will thus find something to enjoy in this, the entranceway volume to Fritz Machlup's garden.

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## The Publishing Enterprise

**Development of Science Publishing in Europe.**  
A. J. MEADOWS, Ed. Elsevier, New York, 1980. x, 270 pp. \$48.75.

The first Elsevier publishing company, established in 1580, expired in 1712. The second was founded in 1880 by J. G. Robbers, who perceived the advantage of attaching to his firm a name other than his own. The book under review commemorates the first centennial of the newer and the fourth of the older Elsevier. Its disconnected essays cover the development of scientific publishing in Europe about as well as the Elsevier firms fill the centuries.

The ten contributors, most of whom

are British, survey European scientific journal and monograph publishing to 1850 (A. A. Manten, D. M. Knight), journal publication in natural history, 1800–1939 (J. G. Shaw), scientific publishing in the 20th century (A. J. Meadows, J. K. W. van Leeuwen), and newspaper reporting of science since the Second World War (B. Dixon). They give special attention to dissemination of science in Victorian England (Meadows), the International Scientific Series (R. M. MacLeod), commercial science journals in Victorian England (W. H. Brock), monograph publishing in France around 1900 (H. W. Paul), and the *Philosophical Transactions* of the Royal Society of London (M. F. Katzen). The collection is evidently skewed toward British de-



Frontispiece from Thomas Sprat's *History of the Royal Society* (London, 1667). "Just as publishers today not infrequently bring out a cased and a paperbound edition of a book simultaneously, so, in the past, editions of different quality of the same book have often appeared. Some copies were often printed on larger paper, often, too, of better quality than that used for the ordinary edition. Sometimes, the large paper copies might be superior in other ways," as in the inclusion of this frontispiece, "which did not appear in ordinary copies" of Sprat's work. [David Knight, in *Development of Science Publishing in Europe*]

velopments and the years around 1900. Germany, the home of the *Handbuch*, the textbook, and many of the world's leading scientific journals, does not receive a separate essay.

Knight's survey is a useful introduction despite his odd opinions that "octavo" signifies a sheet folded eight times and that Sadi Carnot's book on thermodynamics was directed to the general public. Among much else, he mentions consequences of improving printing technique and rightly emphasizes the introduction of wood engravings (as opposed to woodcuts) around 1800. Katzen also discusses format and technique, taking as example the typography, layout, and size of the *Philosophical Transactions* over 300 years. She presents much useful information, but her efforts to identify important developments in the history of science from the changing physical makeup of the journal do not appear promising.

Probably the most valuable for readers of *Science* are the essays concerned with Victorian practice and those dealing with events after the Second World War. In the first group Meadows discusses efforts to gain access to the rapidly multiplying literature through creation of abstract journals and bibliographies. He mentions the Royal Society's catalogue of 19th-century literature and characteristically omits the no less serviceable *Handwörterbuch* of the immortal Pogendorff. Meadows also attends to the lower end of the dissemination, and gives interesting statistics on borrowing patterns in public libraries and mechanics' institutes.

MacLeod takes this theme further in a workmanlike account of the early successes and ultimate failure of the series of high-level popularizations inaugurated in the 1870's by the American E. L. Youmans, founding editor of *Popular Science Monthly*. Among the causes of decline that MacLeod enumerates was the increasing reluctance of distinguished scientists to write for general audiences. The same problem weakened the *Monthly* and aroused concern in the general press. The reluctance persists, especially in Anglo-Saxon countries; in place of T. H. Huxley, J. Tyndall, and H. N. Moseley we have professional intermediaries, science reporters, and Carl Sagan.

In the last solid essay on a Victorian theme, Brock discusses commercial journals, particularly the *Philosophical Magazine (PM)*, and the several "taxes on learning"—duties on paper, taxes on periodicals, high postage—that obstruct-

ed publishing in Britain until 1860. According to Brock, the press run of *PM* remained at about 750 copies from 1844 until after 1900. The *PM* was one of the two top physics journals in the world in 1900; its circulation is a good gauge of the size of the profession. From other studies it appears that the number of academic physicists in the world in 1900 was less than twice the press run of *PM*.

In the last group of essays, Dixon raises the question of the responsibility of newspaper science writers. He gives data about the increase in newspaper coverage of science and about attempts of scientists to manipulate the press. In a striking reversal of the usual argument, he observes that in many instances alert questioning by reporters has caused scientists to moderate or withdraw hasty claims. Still, few newspapers besides the

*New York Times* and *Le Monde* have the large and specialized staff needed to vet professional pretensions, and pressure for quick publication, acting on scientists and reporters alike, continues to bring forth premature revelations.

The book concludes with descriptions of the rise of international commercial journals in Britain (Meadows) and the Netherlands (Leeuwen) as a counter to American dominance in scientific publishing after the Second World War. The great increase in costs in the 1970's affected European journals more seriously than their rivals. Retrenchment has been necessary, and, we hope, sufficient, to ensure that this first centennial of the new Elsevier will not also be its last.

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### Cattell: The Beginnings of a Career

**An Education in Psychology.** James McKean Cattell's Journal and Letters from Germany and England, 1880-1888. MICHAEL M. SOKAL, Ed. MIT Press, Cambridge, Mass., 1981. xxviii, 372 pp. \$30.

In July 1880—the month the first issue of *Science* appeared—young James M. Cattell sailed for Liverpool from Philadelphia. Leaving his parents for the first time, pursued by depression, without any clear direction, but also "eager to speak to everyone" aboard ("the ladies always excepted"), the 20-year-old set out to seek his fortunes in Europe. Eight years later he returned, having "nearly everything I wish": a German Ph.D., an English bride, a new professorship in

psychology at Pennsylvania, and an invitation to return to Cambridge, where he had hobnobbed with the intellectual elite. (After another six years, he was to acquire a defunct *Science*, revitalize it, and run it for half a century.) The intriguing story of these eight Wanderjahre is told in *An Education in Psychology*, mostly in Cattell's own words as recorded in his journal and letters to his parents (along with some of their replies), with transitional sections by the editor, Michael M. Sokal.

It is not quite the rags-to-riches story of a long-lost child. Cattell returned home four times, once for a year's study at Johns Hopkins; he also traveled with his parents in Europe. Born with at least

#### MR. FRANCIS GALTON'S ANTHROPOMETRIC LABORATORY.

The Laboratory communicates with the Western Gallery containing the Scientific Collections of the South Kensington Museum. Admission to the Gallery is free. It is entered either from Queen's Gate or from Exhibition Road.

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"Cattell's record at Galton's anthropometric laboratory." [From the Cattell papers, Library of Congress; reproduced in *An Education in Psychology*]