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David Kronick's 'Guide' Unearths the Bones of 17th- and 18th-Century Scientific Journals

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In a sense, David A. Kronick is a bibliographic archaeologist. His digs are in the musty caverns of some of the world's greatest libraries—the British Library in London and the *Bibliothèque Nationale* in Paris, to name but two—where, in his latest “find,” he has unearthed the remains of *Scientific and Technical Periodicals of the Seventeenth and Eighteenth Centuries*.¹ This guide, published in 1991, is the result of almost 40 years of research, begun as a dissertation topic at the University of Chicago in 1952.

As Dave writes in the preface, the bibliography, which includes 1,858 titles, serves “as one rung of the ladder toward bringing the periodicals and society proceedings of the seventeenth and eighteenth century under control.” It is an attempt to define the territory by exposing the antiquarian bones, so to speak, of the past.

‘Like Entering a Ghost Town’

A quotation included in the preface captures the essence of Kronick's feeling about his work: “When we bury ourselves in the yellowed pages of old newspapers, it is like entering a ghost town, another Pompeii, in which, as if we were turning back the wheel of time, we suddenly surprise a people long disappeared, in the midst of their daily existence, in their most intimate domestic tasks.”² (p. 7)

The scientific and technical periodicals of the period covered by the guide, described in greater detail by Kronick below, represent a primary source for study of this period—one of the most interesting in our

intellectual history. This history begins with the *Philosophical Transactions* of the venerable Royal Society of London in 1665. The number of periodicals steadily increased to the end of the eighteenth century. And this growth, of course, continues to the present day. There are now considerably more than 20,000 periodicals published in a year: Indeed, the Institute for Scientific Information® (ISI®) monitors more than 7,000 of these journals worldwide.

Army Medical Library Days

If memory serves, I first met Dave in 1953 over coffee at the Army Medical Library (AML), which later became the Armed Forces Medical Library, and then the National Library of Medicine. I was visiting AML as I often did during the two years I was a member of the Welch Medical Library Indexing Project at Johns Hopkins University in Baltimore. Naturally, David knew my boss, Sanford V. Larkey, director of the project.³ Larkey was an authority on Elizabethan medicine.

Dave was one of the many bright people I met through the Welch Project. He knew, of course, medical librarians Samuel Lazerow,⁴ Estelle Brodman,^{5,6} and Frank Bradway Rogers.⁶ ISI sponsors awards and lectures each year in the names of both Lazerow and Rogers.⁶⁻⁸ A series of Lazerow memorial lectures is given at various universities each year. In addition to a distinguished career in library science, Lazerow served as ISI's vice president for administration from 1972 until his death in 1981.

The award named for Rogers, who died in 1987, is given for information advancement from among the Medical Library Association membership.

A student at the time, Dave would later become director of the library at the University of Texas Health Science Center, San Antonio. Our paths would cross regularly at conferences over the years. When his book, *A History of Scientific and Technical Periodicals*,⁹ came out, I discussed in *Current Contents*[®] (CC[®]) how scientific communications had changed over the last 300 years.¹⁰ Although the journal article is the predominant form of scientific communication today, in the seventeenth century, letters were a leading forum for the exchange of ideas. Indeed, Leibniz wrote a complete treatise on philosophy in a series of letters. Generally, seventeenth-century scientists worked alone. The letter was often a convenient form and length to describe a single experiment.

Dave Kronick has been a prolific author. In 1985, ISI Press[®] published his book *The Literature of the Life Sciences: Reading, Writing, Research*.¹¹ This eminently practical guide explored the history and evolution of the literature. It is still a book that graduate students, researchers, and librarians should have on their shelves. The book covers many concepts that originated in CC essays over the years. Chapters are devoted to citation indexing and analysis, searching the literature, and the primary and secondary varieties of information sources, among others.

There is an especially interesting chapter on writing and publishing. Kronick begins with a quotation from sociologist Robert K. Merton, no stranger to these pages: "Only when he has published his ideas and findings has the scientist made his scientific *contribution*, and only when he has thus made it a part of the public domain of science can he truly lay claim to it as his. For his claim resides only in the recognition accorded by peers in the social system of science through reference to his work."¹² (p. 47)

Actually, I introduced Kronick to Merton during a conference in the 1960s. Both scholars have an abiding interest in the history of science, and, to some extent, Merton shares Kronick's interest in the beginnings and functions of the scientific journal and scientific paper. One of Merton's seminal works is entitled *Science, Technology and Society in Seventeenth-Century England*,¹³ and his 1971 paper with Harriet Zuckerman¹⁴ begins with an analysis of the origin of the scientific journal (which, of course, draws on Kronick's classic monograph⁹). The latter paper also is indebted to the work of S.B. Barnes,¹⁵ F.H. Garrison,¹⁶ and D. McKie,¹⁷ all of whom wrote on the periodicals of these two centuries.

An interesting quotation in Kronick's chapter on writing and publishing is from a voluminous British government study on the comprehensibility of scientific and technical reports: "The great heresy of science has been its adoption of impersonal language. For every observation involves a private world, and science is based on observation.... We see then, that to restore the personal pronoun to the language of science is much more than a literary facilitation of readability. It demands the self-understanding of science as an arbitrary enterprise of man. Too long it has masqueraded as the impersonal voice of Nature, another God issuing commandments. And by forcing the restoration we shall force the examination of the values which dominate our choice of axioms. Moreover, this is no mere verbal problem, but a private evaluation of our public human relations. Scientists must restore their own atrophied feelings."¹⁸ (p. 13)

A Distinguished Career

Born in Connellsville, Pennsylvania, Kronick received a BA degree in 1939 from Western Reserve University and a BS degree in library science in 1940 from the same university. During World War II, he served as a supply officer with a hospital unit that moved from England, to France, to Germany.

Kronick received his PhD in 1956 from the University of Chicago, Graduate Library School. His many published papers since then have appeared in such journals as the *Bulletin of the History of Medicine, Library Quarterly, Texas Reports on Biology and Medicine, Bulletin of the Medical Library Association,* and *Journal of Academic Librarianship.*

Kronick has held a number of distinguished posts. From 1955 to 1959, he was librarian, Medical Library, University of Michigan; from 1959 to 1964, director, Cleveland Medical Library; and, from 1964 to 1965, chief, Reference Division, National

Library of Medicine. During 1965, he began his long association with the University of Texas, San Antonio—through 1973 as director of medical communications and library at the Medical School, and then, through 1985, as librarian of the Health Science Center, where he is presently emeritus professor of bibliography.

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The Scientific Journal: Devant le Deluge

by
David A. Kronick

ABSTRACT

Seventeenth- and eighteenth-century science and technology journals are discussed, beginning with *Philosophical Transactions* of the Royal Society in London in 1665. The author describes the range of subjects covered in his recently published bibliography—*Scientific and Technical Periodicals of the Seventeenth and Eighteenth Centuries: A Guide*, which contains 1,858 titles. Access is by subject, editor, and society. Differences between the scientific community of today and those of the period covered by the guide are analyzed.

Dissertation subjects are sometimes the result of a marriage of expedience and desperation engendered by an anxious search for a research subject that is *manageable*, which will satisfy the high standards of a dissertation committee, and which still can be completed before the candidate has grown old and gray. As a graduate student at the University of Chicago in 1952, I had the happy inspiration to choose the subject of the history of the early scientific journal for my research topic. The subject not only earned me a PhD, but also resulted in two editions of a book: *A History of Scientific and Technical Periodicals, the Origins and Development of the Scientific and Technical Press* 2d Ed. Metuchen, N.J. Scarecrow Press, 1976. It seems to have filled a void in the literature. I take pleasure in finding it cited from time to time, probably not because of its merits, but because there has been so little written on this important and interesting subject. I learned a number of facts in the process of compiling a list of relevant titles for the project. One was that the periodicals I wished to examine were widely scattered in libraries all over Europe and the North American continent. Strangely enough, more of the titles I was looking for were to be found in the United States and Canada (43%), although these countries did not then measure up to the academic and scholarly activities in Britain (39%) or France (33%).¹ Many of the titles can no longer be located, although they may still exist somewhere, or are sadly designated by a note on a British Library call

slip as "destroyed in the war." I also learned that titles like "Journal" (a daily record), "magazine" (a storehouse), and similar designations did not always signify that the title in question was a periodical as commonly defined.

Period of Intellectual Awakening

Since science is a cumulative form of knowledge, the need to access scientific records becomes less and less important as they grow older. There are a number of reasons, however, for studying these sometimes quaint and archaic-looking publications. They are important, not only as a resource for learning about the diffusion of scientific and technical information in this early period, but also for studying the characteristics of scientific information disseminating and storage systems as they evolved. We can witness many of the same concerns and activities that exist in contemporary scientific and technical journalism, such as the problems of authority, documentation, priority, and quality control. All these factors can be studied in embryo in this period. During the intervening period between my happy inspiration and my retirement from a long career as a medical librarian, I have spent many pleasant hours in libraries all over this country and abroad looking for these sometimes elusive records. My choice of the subject also gave me a wonderful opportunity to become acquainted with one of the most interesting and influential periods in both our social

and intellectual histories and to meet some luminous and fascinating characters. The seventeenth and eighteenth centuries were a period not only of a revolution in science in which new ways of putting the question to nature were explored, but also a period of intellectual awakening to problems of science and society and to an enhanced awareness that science could be used for improving the quality of human life.

There are a number of lists (most of them old) of these early periodicals that are of interest to the study of the history of science and technology in this period, but none of them are comprehensive, nor do they provide the kind of access that can be useful to scholars. Their almost random scattering in libraries requires consulting several reference works to identify and locate them. Recently, with the help of a grant from the National Endowment for the Humanities, I was able to put together a list that has been published under the title *Scientific and Technical Periodicals of the Seventeenth and Eighteenth Centuries: A Guide*,² which I hope will facilitate the study of this period in the development of scientific and technical journalism. The bibliography not only brings together a large number of titles garnered from many sources, but provides access to them by subject and by editor, and designates when they were associated with learned and scientific societies. The list contains 1,858 titles, which may seem like an inordinate number for this period, unless one is aware of the brief duration of many of them and the fact that journal editors in this period frequently changed titles so that subscribers could be assured of acquiring a complete series. This sense of a need for completeness (which has still not been abandoned) is an indication that the periodical in this early period was not fully separated from books that were then often also sold in parts and by subscription. In fact, the sharply defined dichotomy between books and periodicals did not develop until much later in the history of these two formats. The titles in the guide cover a wide range of disciplines, from "agriculture" to



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"zoology," and include such subjects as "gynecology," "mineralogy," "resuscitation," and "bee culture," although a high degree of this kind of specialization might not be expected in this period. The scope of the subjects covered in a title were not always easy to designate, and subject terms had different meanings in this earlier period than they have now. It was frequently necessary to use such subjects as "economics" to cover the publications of "oeconomical" and other societies devoted to the advancement of agriculture, manufacturing, and industrial arts.

Societies' Mission—Communication

Science and technology were difficult to separate in this period when utilitarian objectives were clearly embodied in the charter of most scientific societies, such as the *Académie des Sciences* in Paris, and the Royal Society of London. Many of the other scientific and learned societies that sprang up all over Europe also engaged in the improvement of agriculture and industry. Above all, they were formed to generate and communicate information, not only for their own members, but also for wider au-

diences. In many instances, the preparation and reading of papers were requirements of membership. The societies kept close control over their publications, through mechanisms that foreshadow the "peer review," which is characteristic of our best scientific periodicals today, but news and accounts of their activities also were disseminated in the scientific and technical periodicals of the day. The specialized journals in chemistry, mining, agriculture, and other subjects dealt primarily with practical problems, although theoretical and scientific papers were included when they were regarded as relevant.

The seventeenth- and eighteenth-century scientific community (if indeed we can say that one existed at this time) differed greatly in many aspects from the scientific community at the end of the twentieth century. The differences are not only those of size, complexity, structure, and social significance. They were bigger in the sense that a larger part of the literate population could read and understand much of the literature being produced, but smaller in the number of disciplines that had established their identity. However, there is ample evidence that many of the behavioral and psychological aspects of publishing in science have not changed very much over the centuries. Editors, particularly those of publications issued by scientific societies, were concerning themselves with the problems of peer review. Authors showed as much interest in establishing priorities and were as jealous of their property rights in ideas as they are today. Editors in their prefaces to new journals then showed as much need to justify starting a new journal. One editor started his preface with the expression "Not another journal?,"³ and then, as editors still do, went on to justify its existence on the basis of its superiority and the fact that it answered special needs that were not being met.

Independent Journals Derivative

Many of the independent journals (i.e., those not associated with the learned soci-

eties of the period) were largely derivative in that they often used material borrowed from other journals or included abstracts or reviews of work published elsewhere. In scanning some of these early periodicals, one is sometimes reminded of the legendary village in which all the inhabitants made their living by taking in each other's laundry. In that sense, these periodicals resembled the newspaper which had been established as a format almost a century before 1665 when the *Philosophical Transactions*, the first scientific journal, appeared. The newspaper also provided the scientific journal with a format and mode of distribution. As in the newspaper, which may carry the same news no matter where it is published, dissemination of news was the object, and redundancy was not considered a factor.

The guide also contains many general periodicals as well as periodicals that served review or bibliographic purposes and covered the scientific and technical literature along with literature of other disciplines. The general periodicals also provide outlets for original contributions, especially for authors who were aware of the delays in the publishing of proceedings of scientific and learned societies. For example, Lavoisier, who was sensitive about his priorities and very conscious of how to use the media, published several of his original contributions in such general journals as the *Journal de Paris* and *L'Avantcoureur*, as Duveen and Klickstein have shown us.^{4,5} Another example of the use of general periodicals for the dissemination of scientific papers is Leibniz, who published 26 articles on the calculus in the *Acta Eruditorum*, a German review journal published in Latin.⁶

There do not seem to be any useful discussions of how the standard format of the scientific paper developed. For these origins, we need to look at the early scientific journals, such as the *Philosophical Transactions*, that owed their formats largely to the form of the "erudite letter"—a primary form of communication for scientists preceding the introduction of the journal. The

origins of the scientific paper are more likely to be found in the memoirs presented at scientific societies and selected for insertion into their proceedings. Another likely source for these formats may be found in the "prize essays" that were composed in competition for awards offered by many of the societies of the eighteenth century for answers to questions which the society posed. They gave issue to essays that were published, sometimes separately, and sometimes in series. These efforts, with some stretch of the imagination, may be regarded as a form of sponsored research. In this case, however, the granting agency chose the topic for investigation rather than the grantee. They thus provided the benefit of having many investigators working on a problem at the same time, without having to fund more than one.

Large Gaps Remain

There are still large gaps to be filled in the history of the scientific journal. In 1960, estimates of the number of scientific and technical journals ranged anywhere from 20,000 to 60,000.⁷ Some of the reasons for the growth are to be found in the nineteenth century, with the transformation of science in Germany between 1825 and 1900 when departments and institutes in new disciplines were created in German universities and there was intense competition for leadership of these new organizations.⁸ The importance of publication as a basis for advancement in academic life also was greatly enhanced. It seemed as if every department chairman or institute director wanted to have his own journal. As the number of disciplines, subdisciplines, and clinical and technical specialties grew, their identities had to be bolstered by new journals. The growth of mission-oriented research in the twentieth century⁹ added another factor, so that all kinds of combinations and permutations of disciplines, clinical, and technical specialties were identified, each with its need for a special journal. As each specialized journal is created with an ever decreasing size of audi-

ence, and a greater scatter of the literature, the distribution system becomes less and less viable. Nevertheless, the scientific journal has not changed basically in formats and management from those which appeared in the eighteenth century, although the conditions in which they appear and the technologies that are available to us have changed considerably.

Conclusions

One of the conclusions I reached in my earlier study of the scientific periodical was that it served two primary and important functions: first as a vehicle, and then as a depository. This conclusion was not received with any great acclaim, because it was, of course, obvious. I felt a little like the Molière character who on hearing the definitions of poetry and prose was surprised to find out he had been speaking prose all his life. The distinction, nevertheless, is an important one. The journal serves first as a vehicle for the dissemination of a collection of individual papers or memoirs that are related in some way or other, although the relationships may not be those that are significant to any individual subscriber. The problem is an old one: classifications are linear while the world is multilinear. As the number of disciplinary and mission-oriented societies grew, the number of periodicals where an individual paper could be published increased, resulting in an ever wider dispersion of the literature. The other purpose that the scientific journal served, I concluded, was as a haven for individual papers that could be retrieved on demand. The periodical title then serves as mnemonic to locate a particular paper. The journal also serves other purposes, of course, such as providing a criterion for validating the paper, which is based on the credit and reputation of the journal in which it had been printed. However, if this function could be performed by some other mechanism, any arbitrary system could serve as a locating device. In some sense, this is the way many investigators

access the literature today with the use of indexes and other aids such as *Current Contents*®, *Chemical Abstracts*, *Science Citation Index*®, and a score of other services. The need for these kinds of aids was recognized very early in the history of the scientific journal. With the growth of experimental science the individual paper became the significant dissemination unit. It is this unit with which the investigator is primarily concerned. This notion is reflected by the complaint of an anonymous author who wrote to *Nature* on March 7, 1870:

I wish it were possible to induce our learned societies to be liberal; it should be their aim to spread knowledge, not to make it a luxury for the wealthy. I happen to wish to read a paper by Professor Tait on "Rotation" published in the Transactions of the Royal Society of Edinburgh. The only libraries I have access to are those of the British Museum and London Institution. At the Museum there is no volume of the "Transactions" later than 1864; at the London Institution no volume later than 1862; so that if I persevere my intention of reading the paper, I must buy the volume containing it, for which I must pay 2£ 2s—that is, I must buy thirteen papers I don't want in order to be able to read one which I do want.... All papers should be published separately; this would lead to a much wider diffu-

sion of them, and the Societies would benefit by their increased sale. London, March 7.¹⁰

Our new technology is making possible the successful introduction of new systems of distribution for research reports and the creation of what can become personally designed journals for investigators. The early journals, like most of our scientific and technical journals of today, were composed of different kinds of ingredients, such as news items, reviews of books, and abstracts of papers, just as most journals are today. There will always be a place for journals that are created for more general audiences, leaving specialized research reports for individual distribution. The issue is not between the use of electronic or paper media for storage or distribution, but of rationalizing and creating economically, socially, and intellectually viable systems that will be able to satisfy all the different options which readers desire. These new systems, when they are created, must, of course, not ignore the reward and recognition aspects of the current system, nor sacrifice its methods of quality control and openness, which, as history reveals, were fostered from the very beginnings of the scientific revolution in the seventeenth century.

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