The Acquisition of Scientific and Technological Material

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It is an accepted fact that the potential value of a library to its users is the result almost entirely of the acquisition policies, past and present, which have determined the nature and extent of its holdings. The development of a library acquisitions program which will insure a collection of materials in the field of science and technology adequate to meet the demands placed upon a library depends basically on the answer to such questions as: Who will use the collection? What materials are necessary to provide good service to these users? How can the materials be made available?

Who will use the collection? No two library communities are so similar that a collection adjusted to the needs of one group will necessarily meet the demands of any other community. Each library bases its acquisitions program for scientific and technological literature on a rather thorough background knowledge about the particular people which it serves.

An analysis of library clientele discloses the fact that users of scientific material may be grouped into at least five types: 1) intelligent laymen, individuals who attempt to keep abreast of current developments which affect society; 2) amateurs, the untrained individuals who have made a hobby of certain phases of the field of science; 3) students, learners at various levels from elementary school to post-doctorate level; 4) applied scientists, the specialists who are interested in using their knowledge of science and technology for a practical purpose; 5) research workers, the individuals interested in scholarly research in pure or applied science. The relative proportion of each of these types of users in the community of a specific library will depend on such factors as type of library, location, size, and adequacy of collection.

What scientific and technological material is necessary to provide

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good service to the users? The answer to this question should be based on a dynamic view of science such as expressed by J. B. Conant when he defines science as "an interconnected series of concepts and conceptual schemes that have developed as a result of experimentation and observation and are fruitful of further experimentation and observations." Implied in this definition are certain factors that have a marked influence on the literature of science and technology. Scientific progress is cumulative; hence it is the report of the latest development in the field that is in demand. The problem of the dissemination of scientific information is enhanced by the fact that science is international in scope, and that modern specialization has resulted in a great interdependence of the various fields of science. To these factors add the influence on the literature of the extraordinary increase in the volume of research and the increased interest on the part of the layman in scientific development, and there is some explanation of why scientific literature poses before the world a problem huge in bulk and intricate in complexity.

There is a steadily increasing demand for understandable books on science by the novice, the intelligent layman, the hobbist and the beginning student. Nearly all young people today have an interest in science and a fairly clear understanding of even the more obscure aspects of the field. This is a scientific age, an age in which the results of science affect everyday living to an extent undreamed of a few years ago, an age in which science plays a controlling role in matters that affect the whole policy of industry, commerce, and government. In our modern culture there is a need, as never before, for an intelligent citizenry with sympathetic understanding of science and the way scientific work is done, an intelligent citizenry who as voters should be interested in congressional action on scientific and technological matters.

Fortunately for the general reading public there is an increasing flow of books in which science is made intelligible to the novice. As Helen Haines indicates,

There are manuals or textbooks for elementary or advanced use; monographs and treatises for the scientific investigator or scholar; simple, popularized introductions and "outlines" for the inexperienced general reader; essays and studies of literary charm; "classics" that have won permanence both as science and as literature (from Lucretius' poem, "On the Nature of Things," to Augustus De Morgan's Budget of Paradoxes); and works of sound scientific authority that with ability and literary skill are "humanized" knowledge. Each form has its own
special requirements and characteristics, but for all there is one prime qualification. Truth and art together establish permanence as literature; but in the field of science truth is the first necessity . . . in contemporary scientific literature the more recent a publication is, the more valuable it is likely to be. So rapid are the modern developments in research, experimentation, discovery, and invention that new material constantly changes and enlarges the body of knowledge. This, of course, is particularly true in applied science; but in all fields of science the latest harvests are the richest.

Numerous investigations of the literature used by the serious students of science have been reported within recent years. These studies are based primarily on either “reference counting” methods or on surveys of the use of a particular collection. Of the former type, Fussier’s analysis of the literature used by chemists and physicists and Hintz’s comparison of the literature used by botanists in four different countries are noteworthy. Elsewhere in this issue Orr goes further into this subject.

Of the latter type, Urquhart’s report on users of the Library of the Science Museum in London, Bernal’s study of scientists in English universities, research foundations, and laboratories, and Herner’s report on the information gathering habits of the scientific personnel of Johns Hopkins University are particularly significant.

Data collected by Herner on the relative use of fifteen different sources of information by the pure and applied scientist indicate that monographs, research journals, handbooks, tables, and unclassified research reports were the most extensively used. Elementary textbooks, review publications, classified research reports, dictionaries, and supply catalogs were close behind the first five categories. The least used were patents, encyclopedias, standards and specifications, theses, and trade publications. According to this study, the extent of formal education and the age of users apparently had small effect on the use of the literature. The factors which appeared to influence the scientists use of materials were their field of specialization, the type of institution in which they were working, and whether they were working in pure or applied science. The difference in literature use between the pure and applied scientist was that the pure scientist made relatively great use of periodicals, monographs, and review publications and little use of classified research reports. The applied scientist, on the other hand, made heavy use of classified research reports, slightly less use of periodicals and monographs than the pure scientist, and very little use of review publications. The scant use of review publications
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by the applied scientist is undoubtedly explained by the fact that the review literature of applied science is not so well developed as in the pure sciences. It is interesting that one of the recommendations of the Royal Science Information Conference dealt with the need for making available more reviews, particularly in the fields of the applied sciences. In addition to providing a critical summary of current and past developments in a field, reviews usually include an extensive bibliography of works on the subject.

Fussler found a heavy, almost overwhelming proportion of serial use in his study of the research literature of the chemist and physicist. The scientific journal has been recognized as the most important media for the dissemination of scientific information since its origin in the mid-seventeenth century. In the intervening three centuries the number of scientific periodicals has increased to such an extent that today the World List of Scientific Periodicals, 1900–1950 lists some 50,000 titles and undoubtedly does not completely cover the field. New Serial Titles indicates that for the past three years there have been more than 500 new periodicals in the basic sciences annually with three to four times that many in the fields of agriculture, medicine and technology. Estimates of the quantity of individual papers run as high as two million articles per year. Scientific journals furnish the major source of original material in science and technology and also provide important bibliographic tools. For example, during 1953 Chemical Abstracts published over 73,000 abstracts (approximately 61,000 of papers and 12,000 of patents), Biological Abstracts covered 33,498 articles, and the Current List of Medical Literature indexed over 105,000 papers.

The acquisition of scientific periodicals presents two kinds of problems: subscription to a new serial is a far more serious decision than the purchase of a book of equal cost for periodicals must be checked in, claimed, bound, and stored for years to come; and the literature on a given topic may be widely distributed through a number of subject periodicals as demonstrated by Bradford's so-called “law of scattering.” Complete sets of all the serials which are of potential value to the users constitute the ideal resources of a library; incomplete files of periodicals are almost valueless for the particular issue needed is usually not available.

In reporting on the comparative ages of the periodicals consulted by scientists, Herner indicates, “the overwhelming majority of the group surveyed stated that they referred mainly to journals less than 5 years old. Thirty-five per cent consulted mainly journals less than
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1 year old. Thirty-seven per cent referred mainly to journals from 1 to 5 years old. The pure scientists made greater use of the older periodical sources than the applied scientist. Thirty-two per cent of the pure scientists used mainly periodicals 5 years old. Twenty-two per cent of the applied scientists referred to periodicals 5 years and older. These data are indicative of the reason research libraries find it necessary to maintain as complete a file as possible of as many serials as the needs of their users indicate. It should be noted, however, that in his section of this issue on serials Orr presents arguments against acquiring complete files when the need is not clear.

Scientific research has experienced great changes in the past decade, not alone in the volume of activity but also in the methods of support. During the war period the federal government initiated a program of research by contract with university and industrial laboratories in order to expand research activities. According to the third annual report of the National Science Foundation there has been a general tendency for federal research expenditures to rise during the period 1940 to 1954. In 1954 these expenditures amounted to $2,225,000,000 as compared with an expenditure of $97,000,000 in 1940. Estimates for 1955 indicate a slight decline to about $2,020,000,000.

Since much of this research program has dealt with security classified information, it has not always been possible to describe the results of research in the regular scientific journals. Consequently, a system of research reports was initiated for the exchange of information between appropriate groups. When the seed of a new development falls on fertile soil the result can be both amazing and disturbing. It is evident that an increasingly significant body of information is appearing in the large number of research reports. Estimates as to the number of such reports prepared annually range as high as 150,000 but the more conservative figure of 50,000-75,000 appears more realistic at present time. Many of the reports are available, for security reasons, only to people associated with the research projects. However, there are many unclassified reports which are prepared in accordance with control requirements and that receive only limited distribution. The National Science Foundation in a small scale study of the eventual publication of information security in unclassified reports found that the most important findings eventually reach scientists through established publications channels but sometimes after a marked delay.

Individual governmental agencies have used four principle methods of distributing research reports: automatic mailing to a standing list on a field of interest basis; distribution upon specific request; loan dis-
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distribution, particularly when only a limited number of copies are available; and photographically reduced copies of reports. The Office of Technical Services, an agency of the Department of Commerce, was established on presidential order for the public dissemination of unclassified and declassified reports.

Librarians are finding of material assistance in their acquisition of research reports summary information supplied by such specialists in the field as Eugene Jackson, Eugene Miller, and Bernard Fry. Listing of research reports in normal acquisition tools is not always complete. The Monthly Catalog of U. S. Government Publications lists only a fraction of the annual output. Specialized indexing and abstracting services such as Current List of Medical Literature and Engineering Index are including selected research reports among the forms of literature covered by their publication. Various secondary source material now available, essentially for retrospective searching, include the U. S. Government Research Reports, formerly the Bibliography of Technical Reports with its special indexes, the key to 250,000 unclassified reports available through the Office of Technical Services, Nuclear Science Abstracts, the outstanding guide to the Atomic Energy Commission's unclassified reports, National Advisory Committee of Aeronautics' Research Abstracts which covers the N.A.C.A. publications, translations and reports of a number of British agencies, and the Title Announcement Bulletin which provides current notification of the research reports issued by the Armed Services Technical Information Agency. Acquisition procedures for the publications listed are indicated in these secondary sources.

The patent literature, considered as a part of the scientific literature, furnishes one of the important sources of original results for it records the progress made in almost all fields of industrial technology. It provides a valuable, and in some cases the sole, bibliographical source for the survey of the development and technical details of an operation. The patent literature of this country consists primarily of the publications of the U. S. Patent Office. Of prime importance are the patents themselves, some 45,000-50,000 issued annually and made available at the Patent Office library and at some thirteen public libraries, three university libraries and four special libraries over the country. Copies of individual patents can also be purchased at the Patent Office at a cost of 25 cents each. Important secondary literature published by the U. S. Patent Office includes the Official Gazette, which summarizes some 1000 patents and trademarks issued during the week, the Annual Index, issued in two volumes, and General In-
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formation Concerning Patents, a pamphlet, designed for laymen, that contains in non-technical language a large amount of general information about patents and about the workings of the Patent Office.

Most libraries find the cost of the physical maintenance and servicing of patents prohibitive in relation to the amount of use made of the collection. The general trend is toward the use of the rapid duplication service provided by many of those libraries which do maintain files of patents, both domestic and foreign.

It has been estimated that a considerable number of the approximately 100 countries which grant patent protection issue official publications from a national patent office similar to our own. With about 200,000 foreign patents issued annually, the patent literature of the world is of such stature that it cannot go unrecognized. Severance's Manual of Foreign Patents,13 supplemented by the bibliographical sources indicated by Fleischer14 in his more recent paper, provide the best concise, but comprehensive, account of the subject.

Theses, original manuscripts for the major part, form a small but important part of the scholarly scientific literature. For the year 1952, 4,506 doctoral theses in science and technology are listed in Doctoral Dissertations Accepted by American Universities and 5,588 master theses in the field are listed in Masters Theses in Science, 1952. Many of these theses are eventually published in whole or in part but during the interim period the results are not available—and frequently the complete data are never published. It is to be hoped that those institutions which grant degrees in science will participate in the plan adopted by the Association of Research Libraries which provides for photographic reproductions of doctoral theses and the publication of an abstract of these dissertations in Dissertation Abstracts.

How can scientific literature be made available? As Lazerow15 indicates in his recent consideration of the acquisition program of the Armed Forces Medical Library, "Building a collection requires money, a large measure of skill and ingenuity, and a certain acquisitive instinct which can survive prolonged immersion in the cold sea of fanfold forms, balance sheets, overlapping bibliographies, and painfully fragmentary source information."

The techniques for the acquisition of scientific materials are not unlike those discussed elsewhere in this issue for library materials in general. Perhaps a significant development in the acquisition of scientific literature by many libraries, research libraries in particular, has been the systematic use of exchanges as a means of acquiring both current and out-of-print material, a matter discussed in this issue by
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Miss Welch. The University of California, for instance, receives annually by exchange some 950 to 1,000 serials in the field of science and technology. An exchange program such as this can also fill in the lacunae of the library’s collection by exchanging duplicates with other libraries.

No one library can hope to provide all of the material published in a single division, to say nothing of the entire field of science and technology. An alert librarian can, through the use of cooperative acquisition programs such as the Farmington Plan, bibliographical aids, Union lists, micro-duplication and the system of interlibrary loans open the doors of the vast resources of libraries the country over, and in time the world over, to those who have need for these resources.

The eminent scientist, Michael Faraday, is frequently quoted as having said that there are three important stages in the development of a research project: to start it, to end it, and to publish it. Had he been a twentieth century librarian instead of a nineteenth century scientist he would probably have included a fourth stage: to acquire the report of it.

References


